



Estonian eVikings

# **Analysis of Estonian Participation in the European Union Fifth RTD Framework Programme (FP5)**

**USER FRIENDLY INFORMATION SOCIETY**

**Working draft**

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## Introduction

Association of Estonia with the EU Fifth Framework Programme in the midst of 1999 was an instrumental step forward in bridging indigenous R&D community with European knowledge and innovation networks. A new window of opportunities opened for Estonia – gaining the status of associated country placed Estonian organisations on equal footing with their colleagues from the Member States, promising them much higher visibility and stronger presence in European innovation and R&D circles.

The ultimate benefits for Estonia from the participation in EU RTD programmes, however, would not so much realise from scattered individual projects, but from compounded effects from successful transfer of innovative technologies to the local economy<sup>1</sup> and accumulation of scientific excellence through international cooperation. In fact, this is also what Estonian R&D Strategy “Knowledge Based Estonia 2002-2006”<sup>2</sup> envisages as key objective in the field of international cooperation. Framework Programme as such represents this opportunity, but how effectively this opportunity is used remains to be the question. Emanating from this question, but also from the aims of the Strategy, the current analysis focuses on assessing the effects of international R&D cooperation on Estonia’s transformation to ‘knowledge based economy’.

In doing this, understanding technical change and innovation is crucial for understanding the dynamics of ‘knowledge based economies’ (OECD, 1996) and ‘learning economies’ (Lundvall and Borrás, 1997). Differences in innovation performance and the related institutional setting of a country, partly explain variations in economic performance. In modern innovation theory the strategic behaviour and alliances of firms, as well as the interaction and knowledge exchange between firms, research institutes, universities and other institutions, are at the heart of ... innovation processes. Innovation and the upgrading of productive capacity is seen as a dynamic social process that evolves most successfully in a network in which intensive interaction exists between those ‘producing’ and those ‘purchasing and using’ knowledge<sup>3</sup>.

European Union Fifth Framework Programme represents in this context a high level innovation policy instrument, by which top down and bottom up innovation incentives are merged and deployed for the interests of increasing EU’s industrial competitiveness<sup>4</sup>. Through well defined ‘soft’ intervention mechanisms networking process between different companies, higher education and research institutions, etc is supported, which is believed to foster the emergence of knowledge clusters with inherent competitive ability. Thus, the EU Framework programme as such is designed to reduce market inefficiencies

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<sup>1</sup> About the role of technology transfer, see for instance **Willam, T.** The Role of Technology Transfer in Developing Countries, *International Journal of Human Resource Management*, Dec 96; or **Siniani, E., Meyer, K.** Identifying Spillovers of Technology Transfer from FDI: The Case of Estonia, Copenhagen Business School, 2001.

<sup>2</sup> see <http://www.tan.ee/tan/en/doc/Documents/1018442944.46/Estonian%20R%26D%20strategy.pdf>

<sup>3</sup> Th.J.A. Roelandt, V.A. Gilsing, J. van Sinderen. New Policies for the New Economy. Cluster-based Innovation Policy: International Experiences. Dutch Ministry of Economic Affairs/OCFEB. Dec 2000.

<sup>4</sup> [http://europa.eu.int/comm/research/fp5/fp5-intro\\_en.html](http://europa.eu.int/comm/research/fp5/fp5-intro_en.html)

in long-term and high-risk R&D, and contribute to better innovation environment in Europe in general. For Estonia, integration into such an environment should undeniably be one of the main priorities.

Hence, Framework programmes represent an important dimension in European policy implementation procedures and are most powerful levers for directing research and development efforts on political level. In order to assess the efficiency of such policy intervention mechanisms, and recommend modifications to the implementation procedures, if necessary, innovation system studies and grass root reviews like the present one are needed.

The present assessment cannot be classified as innovation system study, as it is too narrow to depict adequately the functional features of the whole system. And this is not the objective. **The objective of the present study is to extract feedback from the experience that Estonian R&D community has gained during the last years from the integration process with international knowledge networks, to assess their ability to compete for R&D funds and to accumulate the world class scientific excellence.** More specifically, the present report focuses on the performance of Estonian organisations in the field of Information Society Technologies of FP5, which has become an instrumental engine for economic growth in a number of societies<sup>5</sup>.

Amongst other things the present report aspires to discover the reasons for failures and obstacles for the participation in FP5, as well as indicate some recommendations to National Contact Points, who are responsible for the dissemination of information on EU Framework Programme. It also aims to provide recommendations for policy makers in order to facilitate the participation of Estonian organisations in EU innovation networks also by relevant support from underlying local R&D environment.

## **Methodology**

The data reflected in the present report is an outcome from 24 interviews with successful participants in the IST programme, and analysis based on projects' Evaluation Summary Reports<sup>6</sup>. Interviews at hand represent more than 80% of successful projects with Estonian partner or coordinator.

The interviews were made after the closure of last IST call of FP5 in late August and early September 2002. Questionnaire consisted from 5 parts and 142 questions. Particular interest was paid to participant's attitudes and satisfaction with the Programme and National Contact Point work. The interviews were made by the author of the present study.

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<sup>5</sup> ,The phenomenon has led to an emergence of the concept of 'new techno-economic paradigm' in theoretical literature, see f.i. Freeman, C., Soete, L. 1997. The Economics of Industrial Innovation. Cambridge, Massachusetts: the MIT Press

<sup>6</sup> ESR are formal consolidated assessments by the projects evaluators

## **Overview of Estonian ICT R&D community**

The landscape of R&D activity in IT is relatively constrained for the number of qualified participants. Value added R&D activity is only a domain of few institutional players, while majority of R&D results deriving from universities and RTD labs are mostly basic research oriented without significant market relevance. Upon the mapping of such R&D structures in Estonia one could observe Tartu University and Tallinn Technical University with its Institutes (such as Institute of Cybernetics at TTU) as representatives of higher education system and research, and few private research based enterprises, as the key market players. The former ones are focused to a large extent on basic research with less substantial dedication also onto applied research, the latter ones specialise for the natural reasons on the market tailored solutions, mainly pursuing experimental development activities<sup>7</sup>.

From industrial point of view, the evolvement of Estonian ICT sector throughout the last decade has been gradual, from low value added computer assembling activity to higher value added software production and telecom services. The ICT market is shared between few large corporations, which consolidate a substantial economic power and account for a dominant part of the entire Estonian ICT sector, and many small IT enterprises with lower market relevance, who specialise either on subcontracting, sell hardware and software or develop niche products. It is estimated that Estonian ICT sector comprises of 350-400 enterprises, whilst majority of these are active in wide area of parallel activities, meaning that specialisation is not common practice amongst Estonian ICT related SMEs<sup>8</sup>. R&D spending from enterprise sector is on average in Estonia 0,15% from GDP, in ICT sector the spending is slightly higher due to higher knowledge intensity, though on general R&D takes more the form of development, whereas research is done to a very limited extent.

## **Participation in FP5 IST programme**

### ***Programme Structure***

User friendly information society was one of the four vertical thematic programmes of the FP5. To remind, FP5 is European Community funded multiannual programme, setting the directions for the European Union's research, technological development and demonstration for the period 1998-2002. The Programme built on four vertical, including the IST programme, and three horizontal pillars.

The objective of the Information Society Technologies (IST) Programme was 'realising the benefits of the information society both by accelerating its emergence and by ensuring that the genuine needs of individuals and enterprises are met during the process'.

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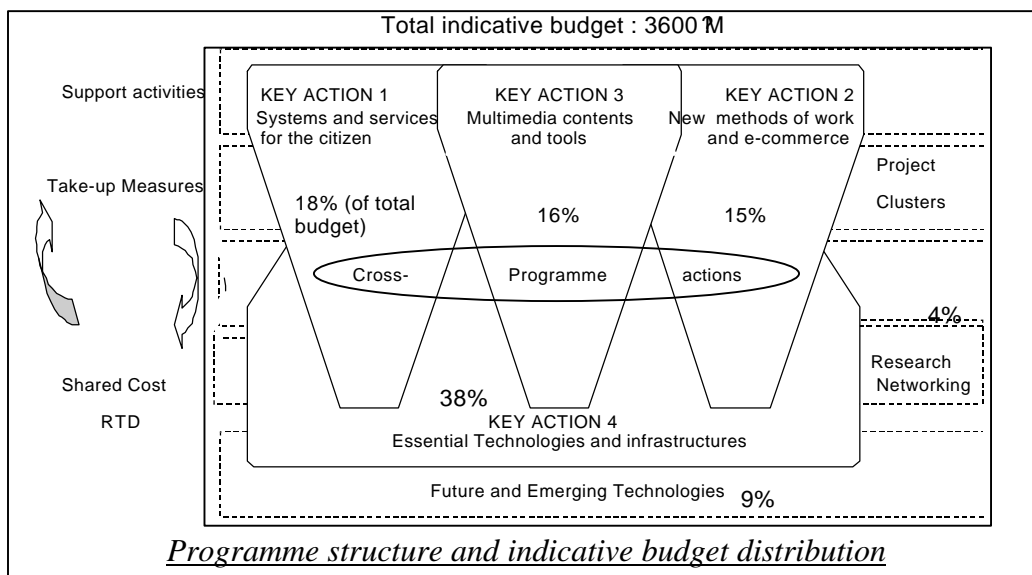
<sup>7</sup> Tiits, M., Pihl. T. IST R&D and innovation in Estonia, Tartu 2002

<sup>8</sup> here and further the data is based on questionnaire results, if not indicated otherwise

The vision, on which the Programme directions are based, can be summarized as follows: "Our surrounding is the interface" to a universe of integrated services. This enables citizens to access IST services wherever they are, whenever they want, and in the form that is most "natural" for them. While directly targeting the improvement of quality of life and work, the vision is expected also to catalyse an expanse of business opportunities.

In order to structure the Programme into workable implementation tool, it was founded on four key actions, or different IT fields, with horizontal links in-between. The short description of each Key Action will follow<sup>9</sup>.

**Systems and services for the citizen (KA I)** were designed to meet the needs and expectations of European citizens for high quality and affordable services. Research and development was carried out in the fields of health, persons with special needs, including the elderly and disabled. The priority for KA I was to enable European citizens, businesses, and public authorities to take full advantage of the recent advances in ubiquitous computing, communication and intelligent interfaces in the areas of general interest, services, administration, environment and transport.



**Figure 1.** Structure of IST Programme under FP5

**New methods of work and electronic commerce (KA II)** was designed to enable both individuals and organisations to innovate and be more efficient in their work and businesses. Work in Key Action II built on the Programme's vision of a networked economy where consumers, workers and enterprises can seamlessly and dynamically come together and interact through a ubiquitous infrastructure that promotes both trust and confidence.

**Multimedia content and tools (KA III)** addressed issues such as interactive electronic publishing, digital heritage and cultural content, education and training, human language

<sup>9</sup> extracted from [www.cordis.lu/ist](http://www.cordis.lu/ist)

technologies and information access, filtering and handling. In particular, the key action concentrated on promoting creativity in the content industries through new forms of highly visual and interactive media content.

**Essential technologies and infrastructures (KA IV)** had orientation onto developing basic technologies, covering areas such as the convergence of information technology and communications; mobile and personal communications; microelectronics; technologies and engineering for software, systems and services; simulation and visualisation technologies; novel multisensory interfaces; and the development of peripherals, subsystems and microsystems. In particular, the priority was on realising a ubiquitous computing and communications landscape with embedded, networked information systems and on developing open technology frameworks for personalised services irrespective of time, location and context.

The programme structure also included "**cross-programme themes**" (CPA) that aimed to support the integration of work which was performed across the four key actions. In order to ensure that the programme remains open to new research ideas for tomorrow, the four key actions are balanced with a **future and emerging technologies** (FET) action, with a visionary and exploratory perspective. This involved research of a longer-term or particularly high risk nature, but which promised major advance and potential for significant industrial and societal impact.

### *Interest for IST programme and success rates*

This paragraph aims to demonstrate the activity of Estonian IST community in diffusing into international R&D networks. It is a part of the process called knowledge clustering. Knowledge haring within these clusters, in turn, helps cultivating an entrepreneurial culture in the research environment, unleash business opportunities from new ideas, and enhance productivity of researchers and private businesses<sup>10</sup>. Harnessing these opportunities should definitely prevail in national priorities for research and technological development.

For Estonian organisations FP5 was the first real contact with Community RTD funding programmes. Before that, there were sporadic attempts to participate in FP4 INCO<sup>11</sup> field, however, the participation was governed by the third country status which Estonia had at that time, and thus did not result in sufficiently high participation activity.

Association with FP5 placed Estonians as newcomers to the Framework programme on the starting point of the learning curve. However, despite of the lack of experience the programme was picked up relatively quickly and considerable number of projects was submitted to the first round. Table 1 outlines the number of proposals submitted during each call to the IST programme, as well as presenting the number of successful projects with Estonian participation.

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<sup>10</sup> P. Formica. Industry and Knowledge Clusters. Principles, Practices and Policies. Univestity of Tartu Press, 2003

<sup>11</sup> International Cooperation

## Participation activity as distributed between calls

**Table 1**

	call 1	Call 2	call 3	call 4	call 5	call 6	call 7	call 7bis	call 8	Total
Nr of Proposals	13	12	14	13	3	12	21	3	33	124
Coordinated by EE	0	0	2	1	1	0	3	0	4	11
Successful	0	3	3	1	0	5	7	0	9	28
Success rate	0	0,25	0,21	0,08	0	0,42	0,33	0	0,27	0,23

Based on the Table 1 statistics, it is evident that with time the experience of constituency rose as towards the end of the programme the results were getting slightly better. On the other hand, majority of the participants were not coordinators, but partners, without possessing significant impact on the quality of the proposal *per se*. In the case of the projects, where Estonian organisation was coordinating, the activity rose also towards the end of the programme, though success rate fell. Out of the 4<sup>12</sup> projects submitted by Estonian coordinator during the first six calls as much as 3 were successful. Later, starting from call 7, out of the rest 7 projects only 3 succeeded.

The reason for falling success rate derived perhaps from the fact that the first projects were prepared with higher care and at the involvement of experts such as NCP, also perhaps towards the beginning of the programme the involvement of candidate countries was even higher priority than towards the end of the programme. As interest towards IST Programme rose within constituency, more projects were prepared and less involvement of experts in the preparation phase of the projects was observed. Still, one must admit that overall success rate was amazingly high amongst those Estonian organisations who decided to coordinate a project. Total success rate was around 23%, as compared to the astounding 54% success rate captured by Estonian organisation led projects.

With respect to the popularity of the programme one can clearly notice that it increased steadily during the last calls, which was obviously a result of more effective awareness campaigns as well as general 'perception of missing opportunity'. This was especially evident during the end of the programme, where unprecedented 33 proposals were submitted to the last call.

Generally, interest for Community Programmes was higher amongst research institutions than private enterprises. The result clearly demonstrates Estonia's current reality, where industrial R&D spending accounts for 0,17% of GDP, whereas only 2% of industrial enterprises have invested more than 4% from their turnover into R&D<sup>13</sup>. Low R&D spending certainly inhibits taking a lead role in Community funded R&D projects, though niches for outsourcing etc still exist. Estonian ICT companies have enough room in shifting their activity towards higher knowledge intensity, and searching for a spot in international knowledge clusters.

<sup>12</sup> Including one CRAFT project

<sup>13</sup> Innovation in Estonian enterprises

<http://www.estag.ee/orb.aw/class=file/action=preview/id=6152/Community+Innovation+Survey.pdf>

### *Project Preparation Process*

With a view to the degree of the participation of Estonian partner organisations in the preparation process of international R&D projects, as much as 53% of all the respondents confirmed that their role was limited to signing the A forms<sup>14</sup> only, or in few cases, the participation was very modest. **In one fifth of the cases the project was prepared by Estonian organisation**, another 27% considered their participation in the preparation process to be medium. **It is therefore obvious, that in the case of half of the projects the participation was really secondary issue**, with financial argument being the primary reason for participation. Thus, it is reasonable to suspect that the impact from these projects is not so straightforward, except for gains in experience and international contacts, which might serve as valuable material for future R&D cooperation.

Often, enterprises turned out to be more active than universities and research institutes in project preparation process.

Project consortia were formed mainly on the basis of previously existing contacts. This applied to 60% of the projects. Surprisingly modest was the role of 5FP National Contact Point, the focal point for supporting the formation of the projects, which partner search facilities were used for finding suitable partners and projects just in 8% of the cases. **This refers either to low awareness of the interested parties about the existing range of services, including partner search services offered by the National Contact Point or tendency not to enter the projects without previously existing personal contacts, which might be especially true in the case of RTD projects.** As RTD projects often involve IPR issues, the prerequisite for successful project is mutual trust and coherence between project partners, posing inherently the necessity to know your partner.

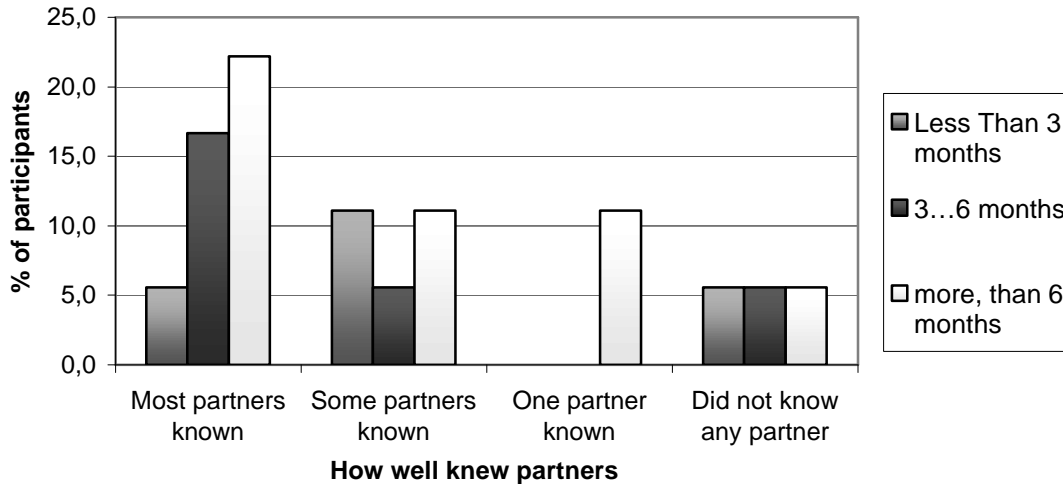
Usually, search for partners starts as long as 12 months before the closure of the call for proposals, with highest tendency to search for partners already half a year prior the deadline (the case for ca 50% of the projects). Figure 4 indicates also the reason for this - most of the IST participants had pre-existing personal contacts with foreign partners and thus information about the project reached them well in advance. In those cases, where the partners were not known the contact was also more incidental.

However, early partner search is not so straightforward in the case of EE coordinators searching for foreign partners, in this case the formation of consortium starts ca 3 month before the deadline. It indicates that Estonian coordinators act within the cycle of awareness dissemination events, which usually anticipate the deadline of calls for proposals with 2-3 months where the complete information about the call becomes available. For NCP organisation this information might serve as guiding principle for organising the awareness events sufficiently early, if one is interested in addressing those who are most potential project initiators. Of course, it may affect the completeness of shared information, but if more project proposals are launched as a result, the disadvantages are highly outnumbered by advantages. **Information days, which are**

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<sup>14</sup> Typically, FP5 projects consisted of three different parts, A part consisted of administrative forms, B and C parts were project descriptions

organised in conjunction with the launch of calls for proposals (i.e. ca 3 month before the deadline), are mostly addressing the audience suitable for becoming a partner to a project, not project managers themselves, as it takes usually more than 3 month to prepare a good proposal. In terms of the latter ones, these information days serve more as a support instrument for receiving complementary information, which perhaps is not known to them. One should consider an information day at least 6 months before the closure of the call, to facilitate the activity of indigenous RTD performance in the programme.



**Figure 4.** Division of project partners by the knowledge about each other vs partnering timescale

Lack of previous experience (70%), knowledge about FP5 (47%) and shortage of time (45%) seemed to trouble organizations most during the project preparation process. There was a distinct correlation between shortage of time and time dedicated on finding project partners, referring to the fact that shifting partner search, as well as project preparation well before the deadline alleviates the time shortage encountered afterwards. It is another argument for organisation of anticipating information days. On the other hand, the availability of information regarding FP5, availability for support and communication with partners was not considered to be a problem.

**Despite of the fact that the problematic areas could be overcome at the assistance of experts such as NCP, majority of proposers (60%) did not regard the necessity for additional help.** Around half of them did not need the additional information or consultation due to their good contacts with other project members, which obviously was better intercommunication channel for them. Around 30% of all project participants still turned to the NCP for consultation or information, leaving the rest 10% who actually needed either consultation or help and were aware of Archimedes Foundation with opportunities to ask for help from other sources. On the positive side, all interviewed successful project participants were aware about Archimedes Foundation, thus the visibility of the Foundation amongst its constituency was very good.

Most of the respondents claimed that they expect support organisations still to assist in dissemination of the information regarding FP, help with administrative work such as filling of forms etc, but to the lesser extent also consulting in specialised fields, assist in finding partners and help with project writing. **It seems that constituency appreciates most the role of NCP as information filter tailoring the relevant information to customers' expectations. Time consuming work like administrative form filling is also the area which customers would like to shift to NCPs.**

### *Reasons for failure*

Overall quality of the projects submitted to the EC IST programme, except for those, which were considered ineligible and disqualified, was evaluated according to the five criteria<sup>15</sup>:

- 1) Scientific/Technological quality and innovation (3/5)<sup>16</sup>;
- 2) Community added value and contribution to EU policies (2/5)<sup>17</sup>;
- 3) Contribution to Community social objectives (0/5);
- 4) Economic development and S&T prospects (3/5);
- 5) Resources, Partnership and Management (2/5)<sup>18</sup>.

Reasons for failure were mostly derived by weak scientific and technological prospective of the project, where the economic relevance was considered too poor. It is essential to keep in mind, that IST programme is industry driven programme with clear market vision. Thus, projects, which are R&D intensive, but not relevant to market are nevertheless having lower priority in funding. The average mark here was as low as 2,41 points out of 5 available, and around 54% of all projects with Estonian partner failed at the threshold.

50% of projects failed due to inadequate scientific and technological quality. This indicates that around half of the projects submitted to the IST programme lacked visionary approach and sufficiently high level of innovation, which led to their further rejection. Average mark for this criteria was 2,7, whereas 3 points was the threshold.

Quality of resources and management was also poor for a number of projects, although majority (ca 80%) of proposals did manage to fulfil the threshold requirement. Average mark for all the proposals with respect to criteria nr 5 was 2,45.

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<sup>15</sup> Evaluation Manual, <http://www.cordis.lu/fp5/src/evalman.htm>

<sup>16</sup> Read: threshold 3 out of maximum 5 points

<sup>17</sup> except for Accompanying Measure type of action, where threshold was 4

<sup>18</sup> except for Best Practice type of action, where threshold was 3

## Average marks by criterion and number of projects above threshold

Table 2

	criterion 1	criterion 2	criterion 3	criterion 4	criterion 5
Average mark, all proposals with EE	2,71	3,06	2,73	2,40	2,45
Per cent of projects above threshold	51,6%	90,5%	100,0%	46,3%	84,2%
average mark, all proposals coordinated by EE	3,00	3,43	2,57	2,71	2,43
Per cent of projects above threshold	71,4%	100,0%	100,0%	57,1%	100,0%

It would be however more interesting to have a look at the projects, which were initiated by Estonian organisation - to have an insight to the problems Estonians faced while putting forward the proposal. As indicated above, there were altogether 11 proposals submitted by Estonian organisations, out of which 6 were successful. The latter number includes also one CRAFT project.

Table 2 above illustrates the results. Generally, the picture is the same – **most problematic issue for Estonian coordinators was to comply with economic and S&T relevance aspects**. More than 40% of proposers failed on this criterion. Another 30% failed on innovation (criterion nr 1). **These two criteria should be addressed more in depth during the training days of constituency and their awareness reinforced by providing relevant documentation and consultation on the issue.**

### *Domains of Comparative strength*

Highest number of successful projects by project field was under generic activities (table 3 last column), which consist mostly of Accompanying Measure type of actions. Accompanying Measure is an instrument designed as a support tool for increasing the participation in IST Programme. Thus, Accompanying Measure type of project does not deliver immediate results as RTD or Demonstration projects do, but it contributes to enhanced dynamism in establishing R&D networks and better communication between different players of IST community. Generic activities accounted for 46% of successful projects, which is the very indication of the imbalance (with a strong bias towards soft projects) between different funding instruments in the case of Estonia.

On one hand, **strong focus on generic domain may indicate that Estonian R&D community is essentially more competitive in the R&D support activities, as the level in R&D itself is insufficient to participate successfully in the Programme**. On the other hand, it was naturally much easier for Estonian organisations to enter ‘soft’ projects, as there was no intellectual property issues involved. It was also higher stimulus for project coordinators to add new partners from the newly associated countries (NAC), as often the entire project budget was increased with the inclusion of one additional partner from NAC.

## Participation of Estonia in the IST Programme

Table 3.

	Nr of proposals	Budget		Partners	Successful projects	
		Total (mln eur)	Average (mln eur)		nr	received from EC <sup>19</sup>
	Total			Avge nr		
KA I	19	56	2,9	9	4	788950
KA II	25	63	2,5	11	3	100 418
KA III	24	66	2,7	8	1	36 613
KA IV	10	8,8	0,8	6	4	461900
CPA & FET	19	57	3,0	9	3	667416
Generic	28	247	8,8	13	13	1 847 503
Total	125	500			28	3902800

Interestingly enough, most problematic domain for Estonian organisations was Key Action III, multimedia content and tools, where only 1 project turned out to be successful out of 25 proposed. There were no projects submitted by Estonian coordinator in this field. **Perhaps it is the most obvious evidence of the widely spread misconception about Estonia's strength in multimedia domain.** Still, this particular field needs considerable support, as content and multimedia domain is gaining importance in EU with a view to enhanced broadband capacities, however underused.

### *Strength and weaknesses of successful projects*

Overall sentiment amongst those IST participants, who were successful, reveals that FP5 projects are considered as relatively strong in most of the aspects: management, innovativeness, partnership, use of resources and workplan. It might be due to the fact that most of the successful projects did pass relatively high competition, and thus only good quality projects managed to overcome the threshold and were retained for funding.

**Participants were giving tribute to high competency of project partners (ca 90%), and practical applicability of the results (ca 90%). The weakest aspect according to partners' opinion was Scientific and Technological Excellence of the projects,** at his point slightly below 50% were ambivalent. Rest of the project features were considered relatively strong.

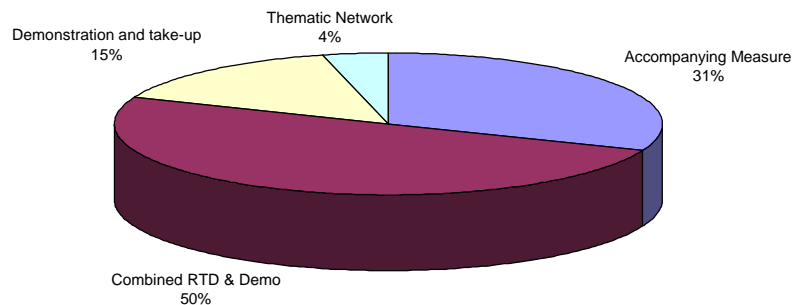
These results are confirming the arguments that the main motivators one can look for in FP projects are related to finding new scientifically competent partners and possibilities to apply the developed products to European market.

### *Extent of funding and distribution between partners*

<sup>19</sup> This is indicative number obtained from ESR, not to be taken as final

Total funding received by Estonian organisations from EC accounted for around 4 million EUR, although one has to be careful in treating the number as the final one. As the numbers are derived from the ESRs, the information is not complete and reduction of the budgets was most plausible. Therefore, indicative amount of funding received could range somewhere between 3 and 4 million EUR.

Figure 1 illustrates division of total funding by project type in case of successful projects with Estonian partner<sup>20</sup>. The figure helps to understand the importance of each instrument in financial terms. The highest share project type wise is reserved by Research and Development projects, which account for 50% of requested budget. 31% of total budget was allocated to Accompanying Measures, whereas 15% and 4% were Demonstration projects and Thematic Networks respectively.

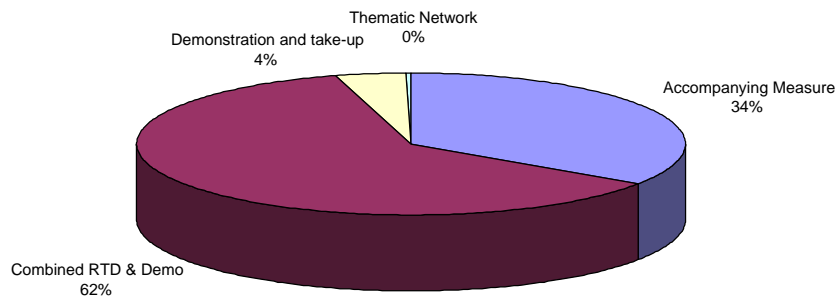


**Figure 1.** Total budget by project type

The share of R&D projects in the budget of Estonian organisations turned out to be 62% (figure 2), indicating that despite of relatively smaller number of R&D projects their budget is somewhat higher compared to “normal” distribution illustrated on figure 1. Also, the share of investments into Accompanying Measures turned out to be higher. Thus one might conclude that relative capability to trade for funding and tendency to co-invest is higher in case of RTD and Accompanying Measure projects, and lower in Take-up, Demonstration and Thematic Networks. **Considering the position of Estonian organisations in international RTD networks, it would have been natural to presume that take-up and demonstration projects are more popular.** However, this kind of assumption turned out to be biased as seen from figure 2.

<sup>20</sup> Excluding GEANT project, which budget was alone 217 million EUR, not to distort the results

Certainly, one must keep in mind that the result is pretty much shaped by the fact that out of 6 successful Estonian IST projects 4 were RTD and 2 Accompanying Measures, suggesting that in the case of these projects the power of Estonian partner to trade for higher share in funding was most obvious. Still, the popularity of take-up and demonstration measures is below expected even in this case. It provides a good ground to introduce the constituency more in detail with the possibilities, which arise from technology take-up and demonstration, and underline the fact that this kind of activity is also supported by the EC, even in transformed FP6 IST domain.

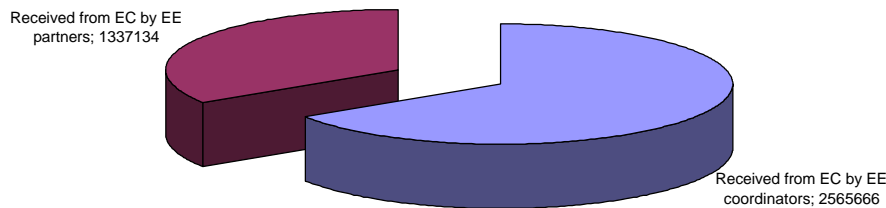


**Figure2.** Financial share of EE partner by project type

In financial terms, projects initiated by Estonian organisations had significant impetus as those 6 successful projects accounted for as much as 66% of total funding received from the EC. Figure 3 shows that the approximate amount of funding with respect to the projects coordinated by Estonian organisation reached 2,56 mln EUR, whereas the rest 22 projects managed to attract funding up to 1,3 mln EURs. **Thus, one might conclude that the level of participation and benefits from networking were substantially more distinct in the cases where Estonian organisation run the project.** Of course, there is nothing new in this conclusion; however the magnitude of difference is astounding. If we consider a researcher with 2660 EUR monthly salary with taxes included, we find that RTD projects coordinated by Estonian organisations could hire as much as 7-16 full time researchers<sup>21</sup> to work on the project. This amount of researchers is enough critical to deliver considerable results. On the other hand, RTD projects led by foreign partners funded Estonian organisation to an extent, where EE partner was able to hire 0,5-3 full

<sup>21</sup> Assuming that entire budget could be spent on salaries

time researchers, which is substantially worse result. **Thus, it is in national interests to support potential coordinators as much as it is socially optimal, and perhaps financial and advisory support should be allocated to the persons, who are interested in preparing the project.** The financial support should however not exceed normal market tariffs in preparing a project, to avoid full scale subcontracting.



**Figure 3.** Distribution of funding between EE coordinators and EE partners.

### *Motivation for participation*

In order to assess adequately the potential benefits of international RTD cooperation in view of local IT innovation system, it is of utmost importance to understand the main reasons behind the collaboration. As previously pointed out, IST programme is industry driven programme, which gives us a good reason to believe the projects themselves are designed to cohere with future windows of opportunities on the marketplace. However, the success of novel technology on the marketplace is dependent on many factors, including ample business strategy in the case of an enterprise or ability to spin-off or link up with other enterprises in the case of research and development institution. In both cases solid technology strategy should exist. For enterprises, amongst other things intellectual property issues, product development, quality of products etc<sup>22</sup> are relevant for developing their technology strategy, to develop unique position in the competitive environment and create sufficient barriers of entry for their competitors.

On the other hand, for successful deployment of research results universities, in developing their technology strategy, should strive for inputs from basic and applied research, intellectual property information, R&D developments and future trends in

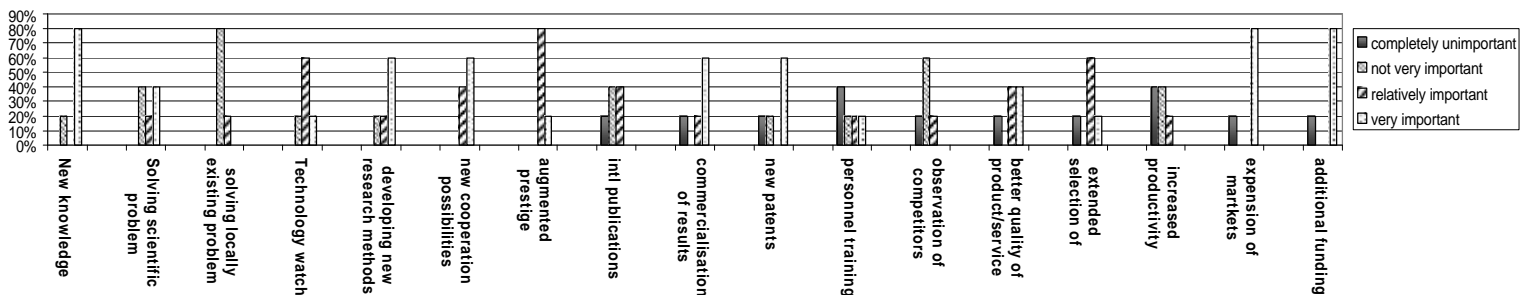
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<sup>22</sup> H. Sjöholm „Technology Strategy for Enterprises“

industrial research. In this respect, the aspects that research and industrial organisations confront are not very much different. Yet, the operating environment is different, and therefore long term objectives of these two different groups are diverging. For industry, market success is crucial, for universities and research labs scientific excellence is dominant. To support both, the success of technology abundant companies as well as scientific excellence, applied research and links between industry and academia are essential.

While assessing these objectives against the empirical facts, the results are somewhat confusing. For enterprises, obtaining new knowledge was by far most important issue, alongside with expansion of their markets, obtaining additional funding for R&D from Community RTD programmes, commercialisation of results, new patents and higher prestige (figure 5). However, increasing productivity was not so obvious motivation. Probably it indicates that companies were more interested in developing a product to final users, not for their own business operating purposes to increase their own productivity by the deployment of innovative technologies. **Interestingly enough, enterprises were also interested in solving persisting scientific problems, and to a larger extent than universities and research institutes did.** The same awkward result was in the case of international publications, where the aspect was considered as important or relatively important by 4/5 of the enterprises<sup>23</sup>.

For academia the main motivation for participating in international RTD networks were new cooperation possibilities, new knowledge obtained through cooperation, discovery of new research directions and technology watch. **The latter aspect indicates that universities are keeping track on market directions, but their extremely low interest towards new patents and commercialisation of research results is still confirming the fact that the gap between industry and academia is relatively large even amongst those participants, who are taking part in Community industry led innovation programme.** Low tendency for patenting amongst researchers does not convey scientific excellence to enterprise sector and thus hinders positive spill-over from existing and new inventions encapsulated in patent descriptions.



**Figure 5.** Expectation of industry sector from participation in international R&D projects

We also assessed cross-tabulation between motivation aspects and coherence of the research performed by academic sector with their main research topics. As a result, **more**

<sup>23</sup> The results should be treated still as an indication, as one enterprise (Cybernetica AS) was dominating the selection

than 80% of academic institutions considered funding as very important motivation aspect, however indicating also that in 40% of all the cases (half of those who regarded funding as important) the project was not coherent with their research activities. This leads us to a belief that academic sector is either oriented too much on EC funding due to relatively low domestic support, or the research directions sustained in Estonia are not coherent with the ones prioritised by European Community.

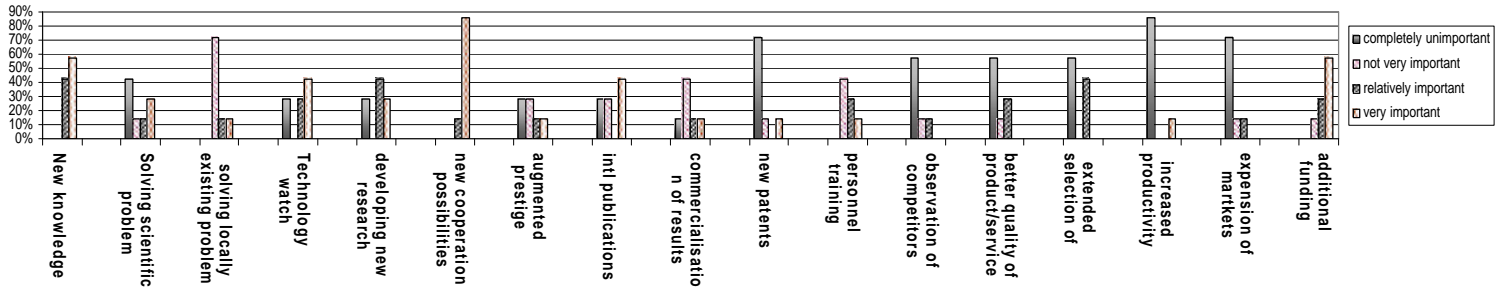


Figure 6. Expectation of academia from participation in international R&D projects

The reality seems to confirm both reasons. In their report “IST R&D and Innovation in Estonia”, M. Tiits *et al* have compared public sector sponsored IT RTD projects in Estonia to those funded by EU IST programme within first three calls. The preliminary findings of the report indicated that only up to one third of the projects contributed to one of the ten Key Emerging Technologies of European Community, while the rest tend to be very theoretical with no clear market prospective foreseen (Figure 7). The graph is constructed based on the number of IT related projects funded from Estonian public sources and the result is matched against EU projects using the same methodology.

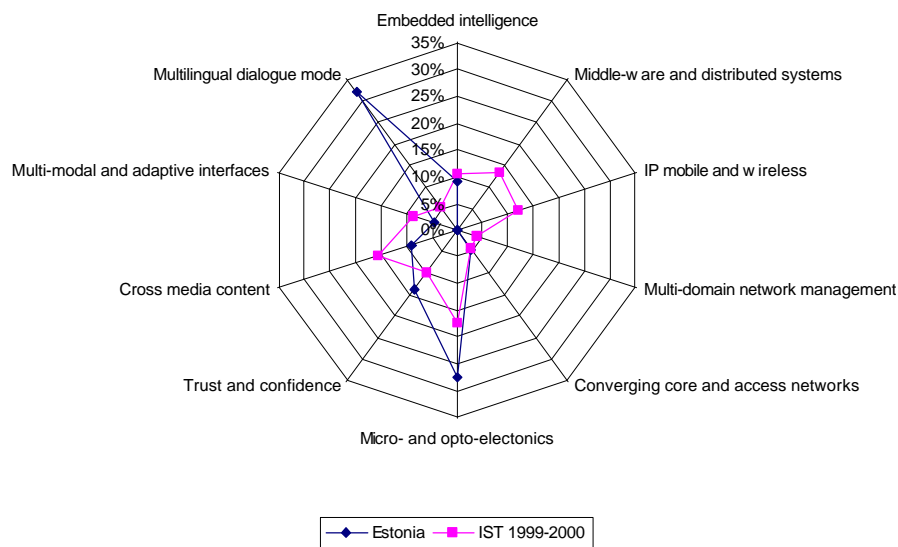


Figure 7. Estonian public IT R&D projects by Key Emerging Technologies

Enterprises were by far more focussed, as out of 80% of enterprises who considered funding important, all regarded the project to be in scope of their business objectives and main activity. **This is a positive result, indicating that in previous, FP5 IST programme, enterprises were not distracted from their main operating activities, which could be the case with public funding.** In case funding is available, there is a lucrative option to join projects purely for funding reasons, shifting thus actually company's focus from strategic activities to those offered by a relatively short term publicly funded project.

In contrast, more than 40% of RTD project participants did not regard commercial value of the product as important. Even, if it was the case derived from academic preferences, one should have interest in the further applicability of results. It underlines even more the fact that academia should work together with industry and vice versa, to increase the possibilities of transferring the research results of RTD projects to the marketplace. **This was also the case with intellectual property rights, where 60% of the interviewed project leaders did not value proprietary ownership potentially embedded in the project.** However, in most of the projects (85%) IPR was an issue discussed. It shows clearly that Estonian organisations are endangered by losing possible opportunities, as realisation from the benefits an IPR provides is too hazy.

Training of personnel was not an issue for RTD projects, evidently the participants stepped into the projects where they possessed reasonable competence for completing the tasks. Still, it is unlikely that participation did not result in higher competency of the participants, which might be just a hidden result for project participants.

Interesting fact is that in more than 60% of the cases existing projects would not have been implemented without EC help. Only 12% of the projects were initiated with a solid aim to carry on with R&D work even if the project proposal would have failed, and 20% sought for extending the scope of the project by shared funding with the EC. As Framework Programme has declared that it is primarily meant for the projects, which otherwise would not have been implemented, the task is fulfilled well. Still, it raises the question whether some of these projects were started purely because of Community funding, which should not be the aim by itself. Then it is likely to distort the outcomes of innovation policy, as funding is not directed optimally.

### ***Transfer of Technologies***

Introduction to the present study highlighted the importance of technology transfer and ability to use the technology for production of competitive output. In the situation, where counties own R&D intensity is low, technology transfer is one of the possibilities to deploy technologies for producing commercially viable, yet novel products. Indeed, another important aspect is associated with learning capabilities, since new technology entails adaptability on the user side.

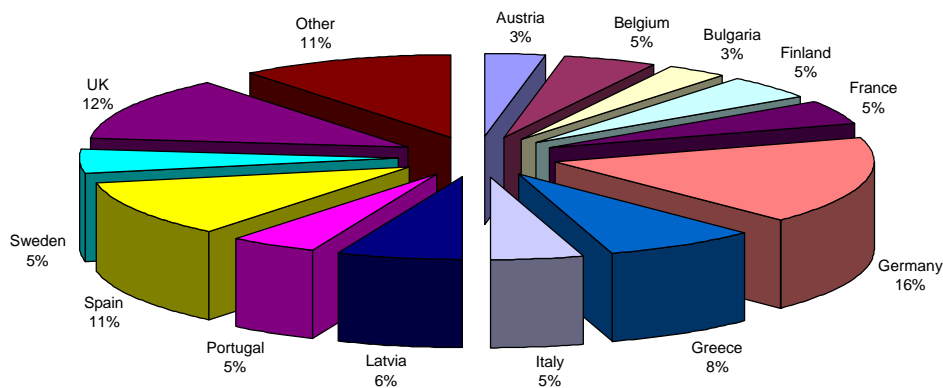
It is somewhat awkward to talk about the economic relevance of the technologies elaborated within the FP5 IST programme in context of Estonia, as the number of RTD,

take-up or demonstration projects was relatively low to expect path-breaking commercial results. It is however true that one still should not rule out this possibility completely, since a couple of projects out of 10 observed are likely to have a pan-European impact, if market conditions and the ability of partners prove to be adequate for the projects.

As previously found in the study, the share of take-up and demonstration projects was relatively low. Take up concerned most the adoption of content solutions based on public sector information. Mostly Estonian partners were engaged as users and content providers, where synergy was created from belonging to pan-European service or surveillance networks.

Share of software development was high amongst RTD projects, some of the projects involved both software development as well as elaboration of hardware. Usually, in these projects Estonian partner had a significant role, and RTD results could go beyond purely project itself. It was however interesting to see that universities were more often involved into the consortia where research organisations prevailed, whereas enterprises searched for partners in enterprise sector. Still, as a rule, all projects involved partners from both academia as well as enterprise sector.

Technologies, which were developed in the projects ranged from telemedicine to RF and microwave signal processing, DWDM technology, digital signatures, Geographic Information Systems and 3D software programming, XML and MPEG technologies.



**Figure 8.** Partners for technology development

Technology development partners were to a high degree from Germany, UK and Spain, where Germany and UK were distinctively dominating due to good contacts of Estonian scientists with German and UK colleagues.

### ***Satisfaction with the participation***

When comparing the aspirations of the Estonian IST programme participants with the real results achieved during the implementation phase of the projects<sup>24</sup>, in around half of the cases the aims were achieved according to the prior expectations. In terms of one third of the cases, people felt that their objectives were not fulfilled and around 20% were crowned by better results than actually expected.

The success and satisfaction is well reflected also in the overall sentiment, by which 86% of interviewed organisations were sure about follow-up participation in the Framework Programme. This fact is a good opponent to the claims of a number of people, who regard Framework Programme as bureaucratic, non-efficient and inconvenient funding mechanism. The empirical data shows clearly, that in most cases expectations from the project participation are fulfilled and those having participation experience are convinced in their future participation as well.

Negative experiences can mostly be derived from the fact that a number of projects fail to receive funding, however, this is a part of the game, and inherent risk born by the proposer.

### ***Strategic planning in organisations***

Typically, a normal R&D cycle lasts for three to four years before one can launch a product to a market. It will perhaps take at least another year to establish oneself on the market. Thus, it is implicitly programmed into the R&D activity that one has a strategic vision for at least four years in advance.

Feedback from the organisations who participated in successful IST projects, however, revealed that in most cases scientific institutions plan their work up to 2 years ahead (66%). These strategic plans are obviously limited to R&D cycle itself, and not marketing the R&D results, which is essentially not the business researchers are dealing with. Industry representatives had in 68% of the cases plans for 5 years ahead, whereas almost all enterprises were active in the field where they pursued the project.

## **Conclusions and recommendations<sup>25</sup>**

1. Slightly more than half of participants were involved into the IST projects to a very limited extent. However, projects initiated by EE organisations were highly successful and accounted for 2/3 of total Commission funding. This leads to high prioritisation of the project originating from EE, and therefore all encompassing support schemes should be developed for such proposers. Support should start with the assessment of the idea, adoption of the idea into EC policy framework

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<sup>24</sup> most of the projects being still unfinished, yet in some cases respondents were able to estimate

<sup>25</sup> recommendations are based on the IST programme participation results, not the whole FP domain. The recommendations will be modified accordingly after similar study will be applied to the whole FP5 in late 2003.

- and position amongst future emerging technologies, assistance with project preparation, evaluation of project to the criteria posed by EC in its guide for proposers, networking and matchmaking with possible partners, grant for preparing a EC project. Most of these support activities are offered by relevant support structures, but not in a coherent way. It is advisable to form a working network of different structures, covering the whole chain of support activities necessary for a creation of successful project. During the process proposer should also be able to find potential investors after the funding of the Commission is validated. Thus, an organisational cluster should be formed, where FP contact points, government agencies, private investors, professional project writers and managers would work on a distinct basis having a distinct role. Chain of support activities should be transparent for a potential proposer and communication with different parties effective and prompt.
2. It is advisable to consider organisation of information days as early as 6 month before the closure of the call. Most of the project coordinators start searching for partners and preparing the proposal on average 6 month before the deadline, in some cases even earlier, and therefore the information campaigns organised during the call are mostly addressing the potential project partners, not coordinators. It is however true that most of Estonian coordinators started preparing the project 3-4 months before the deadline. Even in this case early information delivery is advisable, to provide enough time for those, who do not succeed in 3-4 months.
  3. NCPs serve dominantly the interest of Estonian project coordinators – Estonian partners rely mostly on the foreign coordinator and tend not to search for assistance from the NCP organisation. Thus, the best way NCPs can serve Estonian partners is to assist their inclusion into prominent international R&D networks by delivering relevant contacts to them and by promoting Estonia as a partner on the occasions when meeting with these prominent actors. Thus, greater national support for mobility should be granted to NCPs to enable their most effective performance and larger range of contacts.
  4. As the majority of the projects fail due to the lack of relevance to EU economic development aims and Science and Technology prospects, the awareness in the field of EU development and economic policy and technology foresight should be increased amongst potential proposers. These topics should be included into the awareness campaigns. S&T quality and innovation was similarly an object of criticisms as indicated by many project evaluation summaries, which underlines the necessity to explain the notion of innovation and its concurrence to EU technological developments and available roadmaps.
  5. Weakest domain for Estonian participants was the multimedia field, where Estonia actually has some good prospects and experience. There are a number of alternative EC programmes which are active in the field of multimedia and content, thus synergies should be pursued between these different programmes to raise the success of Estonian multimedia companies and content providers on international scales. Perhaps consolidation and combination of best excellence is needed to compete against large number of alternative projects. Otherwise there is a great chance that the obvious possibilities are not used to a full extent.

6. There is relatively low activity in the field of technology transfer, take-up of technology and demonstration. The level of technological excellence of transition countries is often lagging the one present in EU innovation networks, therefore higher emphasis should be put on technology transfer, which is a means for increasing the competitiveness of companies on international scales and could lead to the creation of indigenous innovative products. National financial help should be considered for stimulating the technology transfer process. EU funds technology transfer only to a maximum extent of 30% and it is often difficult to succeed with an EU project, therefore alternative mechanisms should be also encouraged besides providing financial incentives, such as IRC network.
7. Enterprises are more focussed in their projects and their interests are strongly related to their field of activity. In case of universities the results are more mixed. Around half of those university representatives who regarded funding as important, did not consider the project to be coherent with their research activities. It indicates that financial motives are very strong in participating in EU FP, but also that research performed by academic sector in Estonia is frequently not concurrent with the research prioritised by the EC. It also explains the reason why academia has not been very successful as a coordinator of projects. Restructuring of research domains could be helpful, however more concrete recommendations are well beyond the scope of the present report, belonging to the fundamental questions dealt by national research policy.
8. Intellectual property rights are frequently not considered enough important, which is arguably the most worrisome finding of the present report. It shows clearly that Estonian organisations are endangered by losing possible opportunities, as realisation from the benefits an IPR provides is too hazy. The solution could be the revision the current IPR policy applied by universities, to increase the motivation of research staff to patent innovative results of their research. Also, patent funding support should be provided by national agencies to cover tremendously high patent application costs, keeping in mind the frequent international scope of the patent.
9. The success and satisfaction with the FP5 is well reflected in the overall sentiment of participants, by which 86% of interviewed organisations were sure about follow-up participation in the Framework Programme. This fact is a good opponent to the claims of a number of people, who regard Framework Programme as bureaucratic, non-efficient and inconvenient funding mechanism. The empirical data shows clearly, that in most cases expectations from the project participation are fulfilled and those having participation experience are convinced in their future participation as well.
10. It is highly advisable to look for synergies from EU programmes such as IST thematic area when creating national IT programme. It is true that national IT programme should capitalize on the strength that indigenous IT research community is possessing and is able to convert into commercial products, however it is highly unlikely that the research trends will diverge from those present and prioritised in EU. When determining the foundations of the programme, one should consider the trends encapsulated by the technology foresights of EC and determine niches for Estonian enterprises and research

organisations. Sporadic projects without any deeper focus are not very competitive on national scales and far from being competitive on international scales, on which the IST programme is operating.