

CONSULTATION ON THE HORIZON 2020 FRAMEWORK FOR EU RESEARCH AND INNOVATION

WORKSHOP ON FUTURE AND EMERGING TECHNOLOGIES

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Executive Summary

The European Commission is scheduled to adopt a proposal for Horizon 2020, the Common Strategic Framework for EU Research and Innovation, by November 2011. This is likely to be constructed of actions located within three broad pillars or columns: one focusing on Societal Challenges; one focusing on Competitiveness and Innovation; and one focusing on strengthening the Science Base. Currently, an activity aimed at supporting work on high-risk, breakthrough research with the potential for high technological or societal impact is being contemplated for inclusion within the Science Base column. In essence, one model for an such an activity is the **Future and Emerging Technologies (FET) programme**, currently implemented in FP7 by DG INFSO. Since its inception 20 years ago, this has acted as an **incubator and pathfinder for new ideas and themes for long-term research in the area of information and communication technologies (ICT)**. A complementary model spanning a broader range of scientific and technological areas was the **NEST (New and Emerging Science and Technology)** activity, implemented during FP6 by DG RTD. This supported visionary research that sought to open up new fields of science and technology.

A workshop held in Brussels on June 29, 2011, discussed **the specific role of research on Future and Emerging Technologies (FET) within the future Horizon 2020 Framework for EU Research and Innovation**.

In particular, the workshop elicited detailed opinions on three specific aspects of FET within the context of the Horizon 2020 Framework for Research and Innovation:

- **Role and scope:** What should be the role and scope of FET research in the future Horizon 2020 Framework for Research and Innovation?
- **Positioning:** What should be the positioning of FET within Horizon 2020?
- **Modalities:** How should research on FET be implemented within the Horizon 2020?

The main messages relevant to the design of Horizon 2020 were as follows:

Role and scope

The workshop elicited strong support and persuasive arguments for the continued existence, expansion and broadening of a coherent, integrated FET programme supporting high-risk, multi-disciplinary, pathfinder research in a broad range of novel emerging scientific and technological areas, not just those related to Information and Communication Technologies.

Positioning

Within the overall structure of Horizon 2020, FET's natural home lies within the set of activities designed to strengthen the Science Base, where it complements many of the other proposed activities. It will be important, however, for new mechanisms to be found to link and relate FET activities to the shorter-term research and innovation-

related activities in the Societal Challenges and Competitiveness and Innovation components of the Horizon 2020 Framework.

Modalities

In terms of implementation modalities, the integrated combination of open, proactive and larger-scale flagship components is well suited to the identification, nurturing and accelerated growth of new research communities in emerging areas. Care will be needed, however, when designing and implementing the large-scale Flagship initiatives in order to ensure that they both build on other FET endeavours and offer a transition path to hotbeds of future innovation.

The continuous call and two-stage selection procedures of FET-Open have much to recommend their use in other parts of Horizon 2020.

Introduction

The European Commission plans to adopt a proposal for its Horizon 2020 Framework for EU Research and Innovation by November 2011. This will build upon the results of an on-line, public consultation exercise conducted during the first part of 2011 (see <http://ec.europa.eu/research/csfr>) and a series of workshops designed to complement this exercise by inviting stakeholders to participate in targeted discussions on specific domains of the Horizon 2020 Framework.

This report presents the results of a workshop, held in Brussels on June 29, 2011, that discussed **the specific role of research on Future and Emerging Technologies within the future Horizon 2020 Framework for EU Research and Innovation.**

The FET and NEST Programmes in Historical Context

Within the overall context of the EU's Framework Programmes for Research, the EU's Directorate General for Information Society and Media (DG INFSO) has implemented a programme of research on Future and Emerging Technologies (FET) for 20 years. Since its inception, the mission of FET has been to act as an **incubator and pathfinder for new ideas and themes for long-term research in the area of information and communication technologies (ICT)**. It promotes high risk, breakthrough research with the potential for high technological or societal impact. It promotes the exploration of radically new ideas and trends for future research and innovation and provides sustained support to emerging areas that require long-term fundamental research. It goes beyond the conventional boundaries of ICT and ventures into uncharted areas, often inspired by, and in close collaboration with, other scientific disciplines, since radical breakthroughs in ICT increasingly rely on fresh synergies, cross-pollination and convergence with different scientific disciplines (e.g. biology, chemistry, nanoscience, neuro- and cognitive science, ethology, social science, economics) and with the arts and humanities.

In the Seventh Framework Programme (FP7), FET supports three action lines:

- FET-Open is a bottom-up approach for exploring promising visionary ideas that can contribute to challenges of long-term importance to Europe. It is open in terms of themes within ICT; has a continuous call with no submission deadlines; and a light, two-step submission procedure for proposals;
- FET-Proactive is a top-down approach that responds to emerging scientific challenges by fostering novel, non-conventional approaches and foundational research in selected themes that take societal and industrial needs into account. It is implemented through focused initiatives with highly challenging objectives that aim to spearhead transformative research;
- The new FET-Flagship initiatives are large-scale, goal-oriented, science-driven research initiatives designed to form a strong base for future technological innovation and exploitation in a variety of areas. Six flagship initiatives are in preparation, with two of them due to be launched by 2013.

During the Sixth Framework Programme (FP6: 2002-2006), a scheme complementary to FET was implemented by DG Research (now DG Research and Innovation). The

NEST (New and Emerging Science and Technology) programme supported visionary research that sought to open up new fields of science and technology. Operating in a similar way to the FET-Open and FET-Pro-active schemes, the initiative supported high gain/high risk research in emerging and cross-disciplinary fields in all domains of research apart from ICTs.

NEST supported three action lines:

- **Adventure:** investigator-driven research projects opening up new scientific opportunities, with an emphasis on cross-disciplinary research in areas identified by researchers;
- **Insight:** projects investigating new discoveries or phenomena that could pose risks or problems for society;
- **Pathfinder:** clusters of projects in specific highly promising new and emerging fields of science and technology.

Within FP7, the NEST scheme was partially incorporated into the thematic priorities of the Co-operation programme rather than operating as a separate cross-thematic activity.

Support for FET in the Context of Horizon 2020

The Green Paper that formed the basis for the public consultation exercise specifically included sets of questions related to four issues identified as critically important in the EU's Innovation Union Communication of October 2010, namely:

- The need for different programmes supporting research and innovation at an EU level to work closely together to deliver the EU 2020 objectives;
- The need to have a strong focus on tackling societal challenges;
- The need to strengthen competitiveness;
- The need to strengthen Europe's Science Base and the European Research Area.

The Green Paper did not focus specifically on a potential role for FET in Horizon 2020. One question relating to the need to improve competitiveness specifically asked if light, open implementation schemes that built on experiences such as FET could promote the flexible exploration and commercialisation of novel ideas and facilitate, in particular, the involvement of SMEs. In another section concerned with improving the Science Base, the role of the FET-Flagship initiative in promoting excellence was noted, but otherwise there were no direct questions attempting to elicit support for a scheme focused on Future Emerging Technologies. In the responses to the consultation,¹ however, there were numerous references to FET. In particular, 133 of the 788 submitted position papers contained specific recommendations related to FET. The main messages to emerge were as follows:

¹ Overall, there were 1300 responses to the on-line questionnaire and 788 submitted position papers.

- There was a widespread view that Horizon 2020 will need both curiosity-driven and agenda-driven activities, working in tandem. Many responses pointed out that more funds should go to curiosity-driven research in order to reach an appropriate balance between both activities;
- There was considerable support for scaling-up FET and extending its scope to address all technologies and disciplines, not just those related to ICT;
- Simplification was considered to be a key priority for Horizon 2020 and there was a recurring call for funding opportunities to be less prescriptive and more open. In that context, the FET-Open two-stage evaluation process was often quoted as a route to simplification;
- There was overwhelming support for the Horizon 2020 aim of bringing research and innovation closer together. Multidisciplinary, collaborative research, as conducted in the bottom-up (open) and thematic (pro-active) FET initiatives, was acknowledged as an essential way of seeding science-driven innovation;
- The FET-Open scheme was praised as a way of supporting ground-breaking research and stimulating new, cross-disciplinary collaboration between researchers, with many advocating that it should be strengthened and replicated in Horizon 2020. Its suitability for young researchers and smaller industrial players (e.g. research SMEs) new to European research was mentioned in particular, and there was also support for the notion that similar bottom-up open schemes could be used to fund shorter-term, market-oriented research and novel forms of innovation;
- Many also considered that mechanisms were needed to harness the results from FET research and accelerate technology take-up and market breakthroughs, thus helping industry, particularly high-tech SMEs, to exploit emerging opportunities.

Examples of some of the passages contained in the consultation responses are shown in **Annex 1**.

The Objective and Structure of the Workshop

The aim of the workshop was to elicit detailed opinions on three specific aspects of FET within the context of the Horizon 2020 Framework for Research and Innovation and to capture the main messages relevant to the design of Horizon 2020. The three main foci concerned:

- **Role and scope:** What should be the role and scope of FET research in the future Horizon 2020 Framework for Research and Innovation?
- **Positioning:** What should be the positioning of FET within Horizon 2020?
- **Modalities:** How should research on FET be implemented within the Horizon 2020?

The agenda for the meeting is attached as **Annex 2** and the list of participants as **Annex 3**. The invited participants included representatives from the European scientific research community, representatives from European and National funding agencies, and some other representatives from Member States. After a short introduction by the co-chairs covering both FET and the context in which Horizon

2020 is being planned, a small number of invited speakers gave short introductory statements on the future of FET research. Subsequent discussions were then organised around the three aspects noted above, namely **role and scope**; **positioning**; and **modalities**.

Each of these aspects is discussed below. An introductory section describes the main questions that guided the discussion. A subsequent section describes the main messages to emerge from the discussion.

The Role and Scope of FET in Horizon 2020

Guiding Questions

- What is the ‘raison d’être’ of FET? What are the key features of FET research? Are they still valid?
- What should be the scientific and technological areas addressed by this type of multi-disciplinary research? Should its scope be extended beyond ICT? To what extent?
- What is the potential contribution of FET to innovation?
- What is the potential contribution of FET to objectives such as reinforcing excellence in science; tackling societal challenges; and strengthening the European technology base and overall competitiveness?
- What should be the role of the new goal-oriented FET-flagships?
- Are any changes necessary to the thematic-oriented proactive research initiative and the bottom-up, open research initiative managed in the current FET?
- What should be the involvement of young researchers? How should the pilot scheme to encourage young researchers to lead and conduct small FET projects evolve in the future?
- What should be the involvement of industry and SMEs in FET research? How should the pilot scheme encouraging high-tech, research-intensive SMEs to lead FET projects evolve in the future?
- Should FET research establish more extensive research collaboration with non-EU partners? Why and How?

Main Messages Concerning Role and Scope

Opportunities for expanding, broadening and raising the profile of FET

There was general recognition of the fact that the funding levels likely to be associated with Horizon 2020 (announced the day after the workshop to be in the region of 80 billion €) provided a window of opportunity to foster excellence and seed innovation in Europe by raising the profile of FET and expanding and broadening FET activities.

In particular, there was broad acceptance of the benefits to be gained both by raising the profile of FET for ICT-related research and by expanding the scope of FET to cover other technological areas. It was noted that the expansion of the FET model to other areas might imply some adaptation in terms of implementation approaches.

There was strong support in some quarters for a step-wise progression involving broadening the scope of FET activities; increasing the emphasis within Horizon 2020 on high-risk research; and complementary support from Structural Funds for building capacity and exploiting innovation potential in new emerging areas.

There was broad support for the notion that the complementary FET support instruments in FP7 could act as mechanisms to seed science-based innovation in Europe. The attention paid to young researchers as a source of fresh ideas was highlighted in particular, along with the importance attached to research-oriented SMEs as drivers of innovation.

The nature of FET and arguments for its inclusion in Horizon 2020

It was generally acknowledged that FET's 'unique spirit' sets it apart from research funded via other EU action lines, and that this constituted a strong argument for its inclusion in Horizon 2020.

In terms of its overall mission, there was broad support for FET to act as an incubator and pathfinder for new ideas and themes for long-term research, while extending its scope to encompass other areas beyond information and communication technologies (ICT).

There was broad recognition and acceptance of the key elements that characterise and differentiate FET research (e.g. its emphasis on radical breakthroughs; the importance of its pathfinder role; its focus on high-risk and high-impact research; its focus on exploratory and long-term research; its emphasis on projects with high innovation potential; the attention paid to multi- and inter-disciplinary research; the emphases on emerging areas, purpose-driven research, collaborative research etc.).

A particular distinction was made between purely curiosity-driven research driven, for the most part, by individuals and more purpose-driven research that often requires the formation of collaborative partnerships, with FET activities characterised as nearer the purpose-driven end of the spectrum while keeping their emphasis on breakthrough, pathfinder research.

Attempts to define the 'unique spirit' of FET research emphasised:

- Pathfinding, particularly efforts to foster the emergence of new research areas that often necessitate research collaborations spanning multiple disciplines;
- Adaptability, especially the agility and flexibility needed to adapt to a constantly evolving research landscape;
- Networking, particularly between different disciplines and research actors, but also between different funding agencies at EU and national levels;
- Bridging, especially the emphasis on bridging the gap between fundamental and applied research and innovation.

Other arguments advanced in favour of the inclusion of FET in Horizon 2020 included the following:

- There was recognition of the fact that FET had nurtured excellence and the growth of a vibrant European research community in key emerging areas

related to ICT. These include quantum computing, bio-ICT, neuro-IT and complex systems;

- The point was made that FET attracted some of the most prominent scientists in Europe, with some of the best work in many labs being conducted within FET projects;
- FET offers EU added value because individual countries often lack the capacity and critical mass of researchers to undertake work of this nature, which frequently requires research collaborations involving several countries;
- There was a general recognition that increased support for schemes like FET would help satisfy long-standing calls for the Framework Programmes to place a great emphasis on high-risk research (expressed, for example, in past Five-Year Assessment reports).

The Positioning of FET within Horizon 2020

Guiding Questions

- How should FET be differentiated from the other science-based and technology-based activities in Horizon 2020?
 - vis-à-vis the frontier research supported by the ERC?
 - vis-à-vis research on Enabling Technologies (ETs)?
 - vis-à-vis research guided by Societal Challenges?
 - vis-à-vis the Marie-Curie and Research Infrastructure action lines?
- What mechanisms could be envisaged to ensure the efficient interaction of FET with other relevant parts of Horizon 2020?

Main Messages Concerning Positioning

The positioning of FET within the three main columns of Horizon 2020

Horizon 2020 looks set to be constructed of actions located within three broad pillars or columns: one focusing on Societal Challenges; one focusing on Competitiveness and Innovation; and one focusing on strengthening the Science Base. Currently, FET is being proposed as an activity within the Science Base column, along with the ERC, the EIT, Marie Curie and Research Infrastructures.

There was complete acceptance of the positioning of FET within the Science Base column of Horizon 2020, primarily due to its science-driven nature and to its focus on emerging areas with long-term horizons.

To be considered as an action line in its own right, however, FET has to differentiate itself not only from the other proposed activities in the Science Base column, but also from related activities in the other columns. There has to be a strong case for keeping FET activities together under the Science column in order to avoid, for example, a scenario in which FET-Open work is assigned to the Science Base; FET-Proactive is assigned to the shorter-term enabling technologies action line in the Competitiveness and Innovation column; and FET-Flagship is assigned to a more ‘mission-oriented’ action line in the Societal Challenges column.

The point was made that pressure to reallocate responsibility for FET activities to other columns or action lines with the Science Base column was likely to be small as long as the budgets being considered for FET remained small, but this was likely to change if there was a greater emphasis on high-risk research in Horizon 2020 and budgets for FET activities increased.

The strongest argument for keeping the various parts of FET together within the Science Base column relates to the unique focus on truly exploratory research in areas likely to need up to twenty years of careful nurturing before developing their full innovative potential, complemented by a unique coherence between the different activities comprising FET, with FET-Open planting seeds and FET-Proactive and FET-Flagship linking symbiotically to nurture and accelerate the development of the most promising avenues, some of which will eventually merit support from other action lines once the scientific and technological areas concerned had matured more fully. In this sense, Flagship projects could offer a promising bridge to work supported in the other columns, but creating an institutional separation between Flagship projects and other FET activities too early in the process, e.g. by locating Flagship projects in another column, could help destroy rather than build potential bridges.

Serious thought needs to be given to the mechanisms that will be needed to ensure that all of the FET activities in the Science Base column not only fulfil their own objectives but also feed and catalyse developments in the other two columns. In particular, a big question for FET-Flagship is how it can relate to the Societal Challenges and the Competitiveness and Innovation columns in Horizon 2020, especially in terms of linking research and innovation activities.

Concerning such linkages, the linkages between FET and ICT enabling technologies that build, for instance, on the involvement of industry and high-tech SMEs need to be preserved and expanded to other technologies. It was strongly suggested, however, that there was also scope for fresh thinking and new, improved linkage mechanisms.

One suggestion was for progress reviews in FET-Flagship areas to feed into discussions of potential Technology Platforms.

As regards mechanisms specifically designed to stimulate innovation, it was agreed that further attention needed to be given to the question of how best to exploit the results from FET research in order to foster innovation, especially concerning the role of the new FET-flagship initiatives.

The positioning of FET within the Science Base column of Horizon 2020

It was generally recognised that FET is complementary to the ERC. Participants at the workshop argued that one of the primary roles of the ERC (in conjunction with Marie Curie) is to reinforce excellence in science in Europe by offering attractive opportunities to the best individual researchers to develop their research activities in Europe, while FET offers the opportunity for these researchers to network and engage in ambitious research collaborations aimed at exploring new pathways and developing new, cross-disciplinary research fields.

There was cursory discussion of the need for ERC activities to link in some way with those of FET, but few detailed suggestions emerged.

The demand that launching large European scientific endeavours in new research areas and themes places on computing and research infrastructures should be taken into account when formulating and implementing future research infrastructure agendas.

Some participants argued strongly that the roles of different action lines and the links between them needed to be very carefully defined in order to minimise potential overlaps and avoid gaps. Care should also be taken to avoid excessively compartmentalised ‘silo actions’ that would hamper the rapid exploitation of early research findings with high potential impact.

One participant, however, argued for a sense of realism when discussing links and bridges between different action lines, noting that all action lines should also be considered as ‘innovation founts’ in their own right, with their different dynamics demanding flexible interactions rather than rigid, stylised ‘linkage’ or ‘handover’ mechanisms.

The positioning of FET in terms of international collaboration

There was ambivalence concerning the issue of greater collaboration in FET-related areas between EU research actors and those from other parts of the world. The need for strong collaboration was felt in research areas relevant to global societal challenges, but there was greater reserve concerning the appropriateness of increased collaboration in areas likely to be related in future to enhanced competitiveness and innovation, where IPR protection is essential.

The Implementation Modalities of FET within Horizon 2020

Guiding Questions

- What is the right governance model for FET research?
- What governance structures should cover relationships between the three central pillars of Horizon 2020?
- What mechanism should be used to identify thematic priorities and flagship projects? How can FET best provide the means to develop and support the coordination of European-wide initiatives on emerging technologies? What should be the mechanism for stimulating radically new ideas and research domains? What should be the mechanisms for identifying and maturing emerging technologies?
- What should be the balance between large-scale flagships (FET-Flagship), thematic-oriented research (FET-Proactive) and bottom-up research (FET-Open)? How should SME-led and young researcher-led research projects be supported? How can such schemes be optimised to make them light and fast? What other schemes are needed (e.g. to maximise the innovation potential of FET research)?
- What should be the balance between different types of research project (e.g. large versus small projects; collaborative versus individual projects; coordination versus direct support projects etc.)?

Main Messages Concerning Modalities

Governance

Given the differentiated nature of the work supported by FET and the ERC, plus the need for greater attention to be paid to ways and means of realising the innovation potential unleashed by FET research, there was a large consensus for maintaining separate governance structures for FET and the ERC.

It was also noted that the governance model used by FET over the last 20 years has been very successful.

The governance of the new FET-Flagship initiatives being prepared was a particular issue of concern during the workshop. For some participants, the significant involvement of Member States in their design, development and implementation was considered advantageous, while others felt that the involvement of numerous agencies complicated governance structures and lines of responsibility.

In particular, some participants feared that the involvement of Member States would allow political objectives to take precedence over science-driven objectives unless adequate governance mechanisms were in place.

Some participants asked the Commission to take careful note of the lessons learned from experiences with earlier partnerships such as JTIs. In particular, the need to ensure that contributors to the funding of selected FET-Flagship initiatives had a commensurate voice within the governance structure of the initiatives was stressed. It was also concluded that the selection process for FET-Flagship initiatives should be carefully scrutinised, and that selection criteria should take scientific excellence as well as the political dimension of these large initiatives into account.

There was a clear consensus that the new FET-Flagship initiatives will need their own governance models, and that these should reflect the confederative nature of these large scale initiatives, all of which necessitate joint funding with Member States.

Balance

There was acceptance and keen support for a balance between initiatives such as FET-Open and FET-Proactive, but more muted support for FET-Flagship. Some participants stressed the complementary nature of Flagship projects, but others voiced their concern about large-scale investment in areas still characterised by relatively high risk and unknown innovation potential.

In financial terms, participants generally approved of the historical budgetary balance between the FET-Open and FET-Proactive action lines (approximately 40:60). Support for the FET-Flagship action line, however, was expected to be additional rather than substitutive.

There was empathy with the notion that special attention should be paid to young researchers as a source of fresh ideas, and to research-oriented SMEs as important vehicles for science-driven innovation, and there was general support for the introduction of targeted efforts to support them. There was also support for the design of additional mechanisms to help realise innovation potential in emerging technological areas.

Funding mechanisms

There was widespread support amongst FET participants for retaining the main funding mechanisms used by FET-Open (CSAs and STREPs) and FET-Proactive (CSAs, STREPs, IPs and ERANETs). This broad satisfaction is in marked contrast to the concerns generally voiced by FP7 participants in other areas.

Selection procedures

The continuous call and two-stage aspects of the FET-Open selection mechanism were praised in particular.

When evaluating project proposals, the problem of assessing the merits of multi-disciplinary projects has to be recognised, alongside the fact that sole dependence on 'excellence' criteria can lead to conservative project portfolios that undervalue the benefits of both 'multidisciplinarity' and 'high risk'.

For initiatives such as FET, which should ideally promote high-risk research, the probability of project failure is high and this needs to be recognised when both evaluating proposals and assessing programme achievements. High project success rates in the long run could be an indication that risk levels were set too low at the selection stage.

In terms of the inclusion of SMEs in FET-type activities, the general feeling was that they should be welcomed, but that their participation, as well as the participation of industry more generally, should not be a requirement.

Improvements and additional mechanisms

Concerning the FET-Flagship initiative, some lessons about the construction of future Flagship initiatives became apparent during the workshop:

- The transition from FP7 to Horizon 2020 needs to be as smooth as possible, with the adoption of any new instruments causing as little disruption as possible. In particular, this needs to be taken into account when implementing FET-Flagship.
- A goal-driven approach should be maintained;
- The development of research roadmaps for the implementation of Flagship initiatives is important;
- Maintaining openness in terms of project partners is an imperative, but only critical partners should be involved in the steering of such initiatives;
- Member States will need to be kept in the loop concerning all aspects of design and implementation;
- To be attractive to the best researchers, FET-flagship structures need to be simple, with clear lines of responsibility;
- Review schemes should be of a high quality.

Concerning the need for additional mechanisms more broadly:

- A mechanism is needed to make projects more portable when researchers move from one location to another. This is particularly important for research activities led by young researchers;

- To reflect the nature of high-risk projects, more flexible procedures are needed to enable project partners to adapt work plans, initiate complementary research activities, take on additional partners and staff etc.;
- Despite the clear recognition that collaboration was a core feature of FET, there was some support for single partner projects in specific instances (e.g. the provision of targeted support to an SME or a single project partner to further the exploitation of research results);
- All FET action lines should remain open to industrial researchers in order to enhance eventual innovation prospects;
- Impact assessment studies of the results of FET projects and the career paths of participants would help identify emerging research areas and be of interest to both the research community and to programme administrators and policymakers.

Visibility

In terms of public visibility, there may be a need to re-label FET-Flagship initiatives in order to avoid confusion with the more prominent Europe 2020 Flagship initiatives such as the Innovation Union Flagship initiative.

Concluding Remarks

The workshop elicited strong support and persuasive arguments for the continued existence, expansion and broadening of a coherent, integrated FET programme supporting high-risk, multi-disciplinary, pathfinder research in a broad range of novel emerging scientific and technological areas, not just those related to Information and Communication Technologies.

Within the overall structure of Horizon 2020, FET's natural home lies within the set of activities designed to strengthen the Science Base, where it complements many of the other proposed activities. It will be important, however, for new mechanisms to be found to link and relate FET activities to the shorter-term research and innovation-related activities in the Societal Challenges and Competitiveness and Innovation components of the Horizon 2020 Framework.

In terms of implementation modalities, the continuous call and two-stage selection procedures of FET-Open have much to recommend their use in other parts of Horizon 2020, while the extension of the FET-Proactive scheme beyond ICT would contribute to the nurturing of novel themes and to the structuring of frontier research in other disciplines. The integrated combination of open, proactive and larger-scale flagship components is well suited to the identification, nurturing and accelerated growth of new research communities in emerging areas. Care will be needed, however, when designing and implementing the large-scale Flagship projects in order to ensure that they both build on other FET endeavours and offer a transition path to hotbeds of future innovation.

Annex 1 – Examples of Quotes from the Public Consultation on Horizon 2020, the Common Strategic Framework for Research and Innovation

“To stimulate entrepreneurship and creativity through innovation, a European High Risk Innovation Council should be created by the consolidation of most competitive elements of FP programmes that target individuals, small groups and high-risk innovative SMEs into one flagship programme. This would create a counterpart to the ERC, but in pre-normative and applied research targeted at products and technologies that could revolutionise future European industry.” (Academia Europaea – EU)

“The European Union should also create a space for exploratory collaborative research and emerging themes that will provide answers to tomorrow's challenges. This is the reason why the CNRS proposes the introduction of a ‘white’ programme, beside the thematic priorities, with calls that are entirely ‘bottom up’ and ‘blue-sky’ - like the current programme FET (Future and Emerging Technologies) or FP6’s NEST (New and Emerging Science and Technologies).” (Centre National de la Recherche Scientifique – France)

“Activities such as FET actions should be strengthened, FET actions follow both bottom-up and top-down approaches through two different schemes that have proved to work. FET-Open and FET-Proactive have acted as the pathfinder of the ICT programme, likewise a frontier research action. FET-type of projects especially dedicated to young scientists should be included. This initiative may be extrapolated to other thematic fields or, ultimately, become translational including those themes closely related to ICT.” (Consejo Superior de Investigaciones Científicas – Spain)

“Both roadmap as well as open-ended approaches within FET have their merits and must be maintained, with additional focus being given to harness the results achieved and prepare the ground for their early take-up within the societal or industrial challenges based schemes.” (European Alliance for Innovation – EU)

“Belgium pleads for an extension of the FET scheme for all the themes of the Cooperation Programme. The move towards more bottom-up funding ought to continue, and Belgium supports the Commission proposal for further open, challenge-driven calls for proposals in the final years of FP7.” (Belgian national position)

“The importance of ‘blue skies’ research must not be ignored. Funding streams such as FET are absolutely essential to consistently redress the balance. FET and other more speculative research calls also generate wider public interest in science and technology. Even though practical applications of this kind of research may be harder to discern, the science is justified in the public's mind.” (United Kingdom Research Councils – UK)

“Current philosophy behind the FET Open scheme is seen as a valuable way to allow for theme-based ground-breaking research ideas: a simple procedure, a bottom-up

approach, a relative small scale, and a healthy balance between research institutes and industry. Such a type of exploratory mechanism could be of value in scanning the multidisciplinary potential within most themes and challenges.” (The Netherlands Organisation for Scientific Research (NWO) – The Netherlands)

“RTOs have welcomed the Future and Emerging Technologies (FET) initiative in the ICT field and would like to see it continued and generalised to other fields, in both its bottom-up FET-Open and top-down FET-Proactive forms, in the coming programme period. FET has demonstrated responsiveness to needs and opportunities, combined with significantly less bureaucracy in comparison with mainstream FP contracting.” (EARTO – EU)

“The bottom-up approach of ‘FET Open’ for breakthroughs and new directions in applied research in the ICT theme of FP7 deserves extension to other thematic areas.” (Confederation of the Food and Drink Industries of the EU – EU, and many other industrial respondents)

“Around 1/3 of the CSFRI budget should be reserved for bottom-up/blue-sky activities of different kinds (ERC, FET, collaborative research networks etc.); also all these budget lines should at least be doubled.”... “ALLEA is convinced that a substantial part of the future CSFRI should remain available for exploratory fundamental research.”... “Where areas of strategic importance for research have already been identified by political decision-makers, both the bottom-up FET-Open and top-down FET-Proactive funding mechanisms, successfully tested for the field of ICT, could usefully be expanded to other fields. Support for the next steps after discovery (from the thinking about moving from idea to market, to actual support for demonstration projects) - as currently partly accessible to ERC grant holders - should be on offer also for other awardees in areas.”... “Bottom-up FET-Open activities for multidisciplinary teams in strategic areas should also be expanded beyond the testing ground in the ICT domain.”... “FET is seen as a good addition of the portfolio of funding instruments: it has simple procedures, allows for a bottom-up approach, and is with its relatively small scale a good entry level for close PP-cooperation, which could serve as an exploratory mechanism throughout all thematic areas (not only in ICT).” (ALLEA – federation of national academies of sciences and of humanities)

“R&D intensive SMEs should be supported at EU level for pre-competitive research that should be funded through collaborative projects (grant-based) involving academic and/or industrial partners and/or SMEs on a bottom-up approach on broadly defined areas. FET-like projects should be a priority to give rise to technology and market breakthroughs and allow those companies to compete globally.” (INSERM – France)

Annex 2 – The Workshop Agenda

WORKSHOP ON FUTURE AND EMERGING TECHNOLOGIES

29th June 2011, Martin's Central Park Hotel, Brussels

Co-chaired by

**Mario Campolargo (DG Information Society and Media) and William Cannell
(DG Research and Innovation)**

Rapporteur

Ken Guy (Wise Guys Ltd.)

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|----------------------|--|
| 9h00 – 9h30 | Welcome and Introduction to Horizon 2020 and FET by the co-chairs |
| 9h30 – 10h00 | Introductory remarks by invited speakers |
| <i>10h00 – 10h15</i> | <i>Coffee Break</i> |
| 10h15 – 12h15 | What should be the role and the scope of research on Future and Emerging Technologies in the future Horizon 2020 Framework for Research and Innovation? |
| <i>12h15 – 12h30</i> | <i>Coffee Break</i> |
| 12h30– 13h30 | What should be the positioning of research on Future and Emerging Technologies vis-à-vis the other elements of Horizon 2020? |
| <i>13h30 – 14h30</i> | <i>lunch</i> |
| 14h30 – 16h00 | How should research on Future and Emerging Technologies be implemented in Horizon 2020? |
| 16h00 – 16h30 | Conclusion and next steps by the co-chairs |

Annex 3 – The Workshop Participants

Surname	Forename	Country	Organisation
Accordino	Franco	EU	EC, DG INFSO
Başak Aköz	Ebru	TR	TUBITAK
Bauin (speaker)	Serge	FR	Directeur de la Direction Information Scientifique et Technique, CNRS
Boch	Wolfgang	EU	EC, DG INFSO
Bressler	Patrick	BE	Director, Fraunhofer Brussels
Burgelman	Jean-Claude	EU	EC, DG RTD
Calarco	Tommaso	DE	Ulm University
Campolargo (co-chair)	Mario	EU	EC, DG INFSO
Cannell (co-chair)	William	EU	EC, DG RTD
Centi	Gabriele	IT	President of the European Federation of Catalysis Societies
Dario	Paolo	IT	Director, Scuola Santa Anna - Pisa
De Touzalin	Aymard	EU	EC, DG INFSO
Dietl	Monika	EU	Director of the COST Office
Eder	Johann	AU	University of Klagenfurt, Institute for Informatics Systems
Fellner	Dieter	DE	Member of ISTAG and Head of Graphics Institute, Darmstadt
Ferreira	Alfonso	EU	EC, DG INFSO
Fiala	Ales	EU	EC, DG INFSO
Fragopoulou	Paraskevi	GR	Institute of Computer Science
Grillner	Sten	SW	Karolinska Institute
Guedj	David	EU	EC, DG INFSO

Guy (rapporteur)	Ken	UK	Wise Guys Ltd.
Hearn	Paul	EU	EC, DG INFSO
Hesse	Rüdiger	DE	Max Planck Institute
Hogenhout	Wide	EU	EC, DG INFSO
Ibanez Gallardo	Francisco	EU	EC, DG INFSO
Kern	Martin	CH	State Secretariat for Education & Research
Lagarto	Vasco	PT	University of Aveiro
Langer (speaker)	Jerzy	UK	Academia Europaea
Laurent	Frédéric	FR	Ministry of Research
Lery	Thibaut	FR	European Science Foundation
Meier (speaker)	Karl-Heinz	DE	Kirchhoff Physics Institute
Melhuish	Chris	UK	University of Bristol
Pontiggia	Laura	EU	ERC
Rasetti (speaker)	Mario	IT	President of I.S.I
Samson	Yves	FR	CEA
Stoica	Adrian	US	NASA Jet Propulsion Laboratory
Tostmann	Wolfgang	NL	Innovation Advisor, Ministry of Economic Affairs, Agriculture and Innovation
Verdoodt	Pierre	BE	Department of Economy, Science & Innovation
Vodjdani (speaker)	Nakita	FR	Agence Nationale de la Recherche
Wallberg	Jonas	SE	VINNOVA
Walters	Peter	UK	NCP, ICTC participant
Wendin	Goran	SE	Chalmers University