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Strengthening the role of European Technology Platforms in addressing Europe's Grand Societal Challenges

Report of the ETP Expert Group

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Report of the ETP Expert Group, October 2009

Directorate-General for Research

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Summary

Europe faces numerous challenges that affect all aspects of society; at present engineering a sustainable economic recovery is at the top of political agendas. Many believe that releasing Europe's potential for innovation — building on our acknowledged strength in many research sectors – is one of the key requirements for sustainable economic growth in the decade ahead. Bringing multidisciplinary research skills to bear on the societal 'Grand Challenges' that Europe faces could result in innovative products and services being part of a solution. European Technology Platforms (ETPs) that have evolved beyond their original role could play an important part in helping Europe achieve these ambitious twin goals of sustainable recovery and addressing the societal challenges faced across Europe.

This report summarises the work of an Expert Group on ETPs, convened by DG Research in early 2009, to examine how the activities and achievements of the current 36 ETPs should evolve in the near future. The Expert Group recognised that ETPs have already achieved considerable success and that recently many

ETPs have formed joint activities to address themes beyond the scope of a single platform. **The Expert Group proposes that in future all ETPs should be encouraged to work in flexible clusters focused on addressing the key societal challenges facing Europe**. The clusters should involve all relevant stakeholders, work across all aspects of the knowledge triangle, and be responsible for implementing potential solutions. ETPs will be able to contribute more to focus research programmes towards the challenges faced by European society and also to bring the results of that research to the global marketplace.

Contents

1. Introduction

European Technology Platforms (ETPs) were established over the past five years as an instrument to strengthen the competitiveness of European industry. Their purpose was to develop a common vision and strategic research agenda for all stakeholders responsible for technological innovation within a specific sector. ETPs have been providing major input to European research programmes such as FP7, and some have recently initiated Joint Technology Initiatives (JTI) – a new form of public-private partnership.

The performance of the ETPs was evaluated in 2008 and most of them were found to have been successful in bringing the relevant stakeholders together to discuss and agree on research strategy and themes. However, as times change, some have suggested that the ETPs have achieved their mission and that something new is needed to revitalize the ETP instrument and reach a new level of enthusiasm and engagement. The end of the first decade of the Lisbon strategy and the arrival of the EU 2020 strategy, along with the Ljubljana process for research policy, presents a good opportunity for further developing the ETPs and their research agendas.

With these changes in mind, an expert group of 11 members was established to review and report on how the ETPs could contribute more effectively to EU, national and regional policy initiatives. For a

list of Expert Group members, see Appendix 1. The Expert Group has developed 18 specific suggestions directed towards the whole ETP community, the European Commission and Member States, which are listed in section 4 and detailed in Appendix 2.

2. A challenging future

Tackling the challenges that European society faces in the 21st century will require a multi-disciplinary approach and coordinated efforts. The key societal challenges -such as climate change and the need for clean energy, sustainable transport, sustainable consumption and production, and improved public health or food, water and energy security - are widely accepted by the public and embedded in policies. Such complex issues cannot be solved by single institutions, technology sectors or Member States acting alone, and this has been recognised in many debates and conferences, e.g. the Lund Declaration (see Appendix 3).

Research and innovation are essential because technology will play a major role in addressing these societal challenges. But while research can help us grasp the nature and size of the problem, identify possible remedies, and develop the technologies and processes needed to put those remedies to work, it will only benefit society if its results are transformed into products and services that reach the market. Some refer to this final stage in the chain as ‘social innovation’.

There are currently 36 ETPs (see Appendix 4). These platforms are considered to represent a source of untapped potential, thus their contribution towards efforts to address Europe's societal challenges could be strengthened. There are several incentives for doing so. The most obvious is the possible benefit to society. Also important are the new business opportunities and growth markets that societal challenges present. Just as no institution, technology sector or Member State can solve the problems alone, nor will they be able to implement possible solutions alone. Politicians and the scientific community will need the involvement of business in order to ensure that innovative products and services are successfully introduced.

Another reason to focus research on societal challenges is to attract the brightest and the best of the next generation of researchers. The scientists and technological experts of tomorrow are highly motivated by working for the good of society.

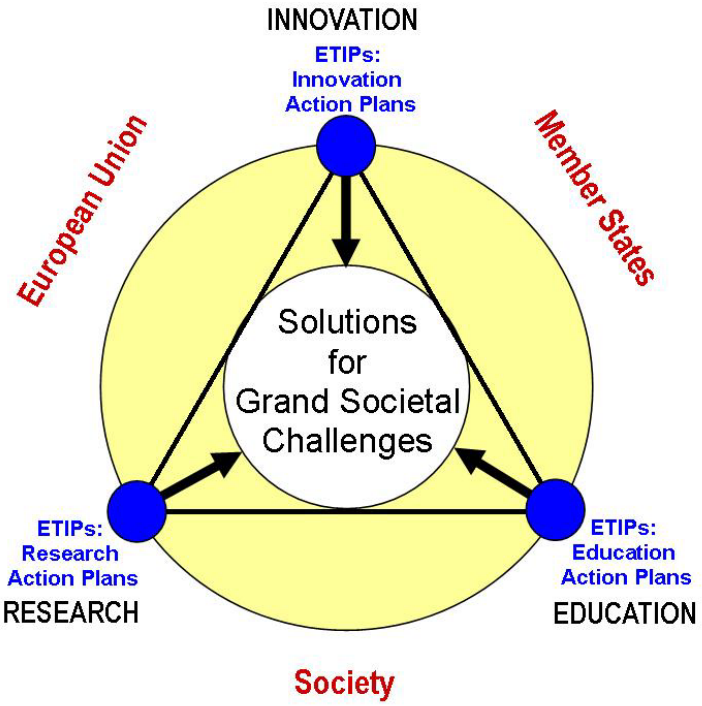
Some have commented that competitiveness is not always an acceptable justification for spending millions or even billions of European taxpayers' money. It is much easier to mobilize the resources needed and to convince financiers – in public and as well in private committees - if the overall goal is an issue well understood by everybody outside the research community, from a citizen who votes in elections to a board member who decides where investments are directed.

Many politicians and representatives of the business and academic community expect a significant shift in the focus of research activities towards societal demand, described for example in the Expert Group report *Challenging Europe's Research, Rationales for the European Research Area* (Chair Luke Georghiou, Nov 2008) and the recent report of the EU's European Research Area Board (Chair John Wood, Sept 2009).

3. Expanding the contribution of ETPs

The ETP Expert Group identified the steps that the ETP community, the Commission and Member States should take to address Europe's societal challenges:

- focus efforts more directly on societal challenges and on developing products and services for a sustainable future;
- help to unite all relevant forces across Europe in working towards solutions for societal challenges; and
- take all three elements of the knowledge triangle into account - education, research and innovation - and specifically tackle the complete innovation chain.



3.1 Create clusters to focus ETP activities on specific societal challenges

The ETPs should continue to exist, but should join forces in temporary activity clusters to work towards solutions to a particular societal challenge. The clusters should adopt variable geometry as necessary. The vision, strategic agenda, implementation plan and deployment strategy on research, education and innovation

developed within such a cluster will represent EU-wide agreement on priorities between academia, business and national authorities, and should be used as a basis to align priorities between the EU and the Member States.

The ETPs are in an ideal position to take the lead on addressing the societal challenges because of their inherent flexibility - they are voluntary communities not bound to any regulations or obliged to wait for formal approval cycles as often seen in politics. Therefore, if agreement among ETP stakeholders is reached, they may start implementing what they feel is needed straightaway. This seems to be important, especially in view of the urgency of the societal challenges.

Many ETPs are already well on the way towards acting as suggested above. For instance, a group of ETPs has formed the FP-funded Bio-Economy Technology Platforms (BECOTEPS) group, which is focused on food, water and energy security and aims to support a stronger Knowledge-Based Bio-Economy (KBBE) in Europe.
Another example is a cluster of three ETPs - ERTRAC, EPOSS and Smart Systems - all keeping their own agendas, but joining forces in a specific activity cluster focused on sustainable mobility (electromobility). Their joint activities have been started in a number of ways – by the efforts of single personalities, based on existing networks or initiated by specific political requests, such as the 2009 European Commission recovery package to fight the

financial crisis.

So, why is there a need for change, why do ETPs need to do more? The examples above are viewed as good progress in the right direction, but their activities do not seem to be motivating other ETPs to follow. These positive, collaborative developments need to become an accepted standard for all ETPs, motivating them to enter a new level of engagement in addressing societal challenges and so bringing research closer to society.

Some may feel that addressing societal challenges may distract ETPs from their focus on industrial competitiveness. In reality, societal challenges provide the largest growth markets for businesses. However, we rarely find that one size fits all, and some ETPs may wish to maintain the competitiveness of their industrial sector or a specific technology field as their major focus rather than follow our suggested path for clustering around the societal challenges.

For the necessary flexibility, and in order to avoid the presence of two different classes of ETPs, **the ETP Expert Group suggests a new label to differentiate the new activity clusters from those ETPs that choose to follow the original model – European Technology and Innovation Platforms (ETIPs).** The word ’innovation’ is introduced explicitly to underline its importance. The new ETIP clusters will have common obligations, rights and branding in order to help distinguish them from the existing, rather

heterogeneous, ETP community, and gain the necessary acceptance and awareness.

In order to avoid being hampered by the different responsibilities of national Ministries and Directorates-General within the Commission and national regulatory authorities, it is suggested that the ETIPs should have the highest level of support, e.g. near EC president and with funding for secretariat support. This corresponds to the high priority given to the societal challenges by all sectors of society. Since the societal challenges are often considered to be ‘leaders’ challenges’, the ETP expert group suggests that ETIP actions should be coordinated by a high level office close to that of the EU President. Seed money should be provided by the Commission to fund a series of initial interactions and preparation for deeper cooperation, including the mobilisation of other funds.

There is a need for specific incentives to encourage existing ETPs to combine forces; as well as the rationale behind the action; they need to see clear benefits for their own interests and for achieving their goals. The ETP Expert Group suggests selecting a small number of societal challenges as pilot projects and asking or inviting all ETPs to respond to these challenges and join forces voluntarily. Such an approach will automatically reveal how much the ETP community agrees with the idea of focusing into clusters addressing societal challenges.

Realising that a greater complexity in research policy and additional instruments in the Commission tool box are not what is needed, the Expert Group envisioned the ETIP clusters as a natural evolution of the existing ETP instrument. Thus an ETIP cluster would not be a legal entity, but would be similar to ETPs today – a flexible and voluntary gathering free to organise as they see fit and not bound by any restrictions, unlike many other instruments of Commission policy such as Joint Technology Initiatives (JTI) or the European Institute for Innovation and Technology (EIT).

3.2 Involve the key stakeholders for each particular challenge

The stakeholders in societal challenges are many. The new ETIP clusters will have to broaden participation to include not only researchers but also funding institutions, policy makers at both EU and Member State levels, business communities, and organisations representing the interests of the citizen.

The ETIP clusters will follow well-specified compliance criteria that will include, for example, a requirement to have civil society actors as full members with rights and obligations. In order to function like all other stakeholders, representatives from civil society groups may need special consideration regarding their access to finance and expertise. The range of different stakeholders implies that integration will be the key word – achieving agreement will be a challenge and an opportunity at the same time. A foresight exercise

started by the Commission and potential ETIP clusters might be the way to achieve the broad stakeholder base necessary.

An important issue will be the development of consistent policies for specific challenges. The EU 20-20-20 goal for tackling energy and climate challenges combined with the Commission's SET plan is a positive example of how to synchronize a research policy and its funding with energy policy.

Other areas are still lacking a common approach, e.g. research policy around biofuels as a source of renewable energy, which contrasts with agricultural policy and trade tariffs for bioethanol. Other policies in Europe also often prevent successful implementation of promising solutions for food, water and energy security.

In building one single European Research Area (ERA), many EU-wide forums, such as the High Level Group for Joint Programming or other groups, the relevant boards within the European Institute of Innovation and Technology (EIT) or the Joint Technology Initiatives (JTIs), are each discussing research priorities. While those discussions and agreements take considerable time, they may be speeded up by leveraging the already existing common understanding within the ETPs – and even more so by the future ETIP clusters. Their key asset is to consist of a heterogeneous stakeholder group with a very broad representation of different types of actors.

The ETIP clusters will help to identify the specific problems for each particular societal challenge. Solving them will require increased coordination between different governance levels, across Member States or the Commission. In contrast to involving the Member States in a specific mirror group, as seen in many ETPs, it is suggested that they should be fully integrated into the ETIP cluster, as the Member States are often the most important stakeholders for successfully implementing solutions.

It is commonly accepted that most societal grand challenges cannot be solved by one nation alone; therefore joining forces and bundling resources will be particularly important for addressing such challenges. But in some cases, such as climate change, even Europe will not be able to tackle the problems alone – broad international cooperation will be needed. The ETIP clusters will help in two ways.

Firstly, since all stakeholders across Europe will be involved in an ETIP cluster, Europe may use ETIP activities to better articulate Europe's interest in the global debate. If Europe is to play a larger role internationally, the often requested 'single voice' for European research around the societal challenges may be leveraged from ETIP cluster activities and efforts to establish a European view.

Secondly, greater international cooperation will help Europe to complement its own resources and capabilities in order to achieve

its goals. This is not only about critical mass but may also relate to specific competence or experience that is lacking in Europe but is available in other regions of the world.

3.3 Unleash the potential of the knowledge triangle – education, research and innovation

The ETIP clusters should take a wider role and extend their scope to include education and the complete innovation chain. It is suggested that all ETIP clusters should have, in addition to a research plan, a related plan for education and innovation actions that is agreed upon and published.

The original ETPs started with a clear vision and a strategic research agenda in specific fields. Research priorities jointly identified by stakeholders in an ETP are more and more taken into account in public research programmes ranging from the European to the regional levels. It will significantly benefit the impact of these programmes in future to draw even more input from the strategic priorities of ETPs and in future ETIPs.
Since addressing the grand challenges needs action in more areas than just research, all three elements of the knowledge triangle, including education and innovation, have to be taken into account. As an example, in the renewable energy sector it is expected that the ambitious goals for increasing the share of wind energy will be impossible to reach due to a lack of trained experts and engineers in this field. All the ETP implementation plans should therefore

include appropriate education actions to ensure that the human resources needed for implementing possible solutions are available.

Just as some ETPs are already focusing on societal challenges, some ETPs are already actively incorporating education into their plans, but it is suggested that all ETIP clusters should engage in this exercise. While the responsibility for higher education lies with national and even regional governments, it may be of great help to leverage the Europe-wide agreements in ETIP clusters to improve education opportunities and environments.

The third element of the knowledge triangle – innovation - is even harder to take into account, since it is only vaguely defined and is understood in different ways by different communities, such as researchers, politicians or citizens.

Tackling societal challenges effectively will require more than research and education. The public sector will also need to work to remove non-technological barriers and create the right framework conditions for bringing the solutions to market. This will involve a broad spectrum of national and EU policy areas. The impact of non-technological barriers on innovation, such as regulations and their implementation, standards or even financing or procurement, is often underestimated. As a community, the multi-stakeholder ETIP clusters may play a key role in ensuring that research results are implemented in the market.

Part of the compliance criteria for ETIP clusters will be to develop innovation plans and strengthen the relation with the EU's innovation policy initiatives, such as the Competitiveness and Innovation Programme (CIP) and the Lead Market Initiative, and the upcoming European Innovation Plan expected in 2010. First discussions with responsible actors (DG Enterprise &Industry and its business panel for innovation policy) revealed a shared vision on how to stimulate innovation in Europe.

Often the urgency of societal challenges makes it imperative to start implementing existing technologies right away, instead of waiting for ideal solutions that are still years down the road. The ETIP clusters will be in a favourable position to recommend actions that go beyond research because they will include members that are not solely focused on research programmes and will be considering societal issues, education and the whole innovation chain.

Another important implementation issue is demonstrations or pilots, where a fast solution is often prevented due to a lack of finance or agreements on the regionally responsible authorities. Without clear expectations of return, private business hesitates to invest in large demonstration projects, and examples can be seen in smart homes for energy reduction or electromobility initiatives. In these cases, the ETIP clusters will serve as an ideal platform for the efficient use of scarce resources.

As the recent EC Communication “**Challenges for EU support to**

innovation in services – Fostering new markets and jobs through innovation" revealed (Brussels, 9.9.2009 SEC(2009)1195), the knowledge intensive services (KIS) in Europe in particular lack the depth of research activities commonly found in many manufacturing sectors. Therefore it is suggested that ETIP clusters take account of the need to stimulate research for services. Such research may be around innovative use of technologies or separate businesses tackling societal challenges, since innovation in knowledge-based services tends to be more 'user driven' than 'technology driven'. Examples from information technology include Skype telephone services via the internet, or even the many new service models related to traditional technology products, from power stations to aircraft engines – in which business success depends on the whole package rather than on the new product features alone.

The traditional distinction between public and private research is changing as researchers move towards 'open innovation' via cooperative networks. This is another example of how many stakeholders join forces, as in the proposed ETIP clusters. A benefit of open innovation is that risks are shared. Since addressing societal challenges may involve high-risk projects, it will be especially important to start high-risk projects in a culture that acknowledges those risks and accepts the possibility of failure. High-risk projects which have important societal benefits should be undertaken as a work-share between public and private sectors and the ETIPs should encourage such programmes. This would work in

a similar way to ‘orphan’ research which does not represent attractive returns to business: high-risk research should be stimulated by ETIP clusters in all relevant areas of societal interest.

In order to tackle societal challenges the first phase, research, is often easier than subsequent phases implementing potential solutions. Besides generating missing standards or removing regulatory barriers, there is good reason to aim at public acceptance or better appreciation from the very beginning of research activities. With this in mind, it is expected that all ETIP clusters will arrange public consultations and debates to foster the environment needed to encourage implementation. These debates should be arranged with the support of the civil society organisations that will be members of the ETIP clusters. For example in agriculture policy and food and water security, civil society organisations are seen to play a key role in the ETIP clusters to ensure that open and beneficial discussions form a basis for public appreciation of solutions.

When many stakeholders, from both public and private sector organizations, join forces, the discussions and negotiations of grants are not always based on trust. But research that will use large budgets to tackle societal challenges will need greater cooperation, and more trust-based and risk-tolerant regulations will be needed than in normal business negotiations where profit is the main goal. Recent resolutions and communications from the research community, e.g. Business Europe (Innovation – Building a

successful future for Europe, Oct 2009), note that European Commission finance regulations should take into account the specific nature of the R&D sector, besides accountability. All the ETIP clusters will also benefit from such a revised Financial Regulation (EC Council regulation No. 1605/2002).

4. Recommendations for strengthening the impact of European Technology Platforms

This list complements the key proposal to launch an enhanced instrument, the European Technology and Innovation Platform (ETIP) presented in Chapter 3, with a set of suggestions relating to the broad scope of current and future ETP activities.
The recommendations based on the considerations above address principally the ETP community – all existing European Technology Platforms – the Member States and the European Commission and these recommendations have been divided into three sections:

- Society Focus
- Knowledge Triangle – education, research, innovation
- European Research Area (ERA)

4.1 Society

RECOMMENDATION 1

All existing ETPs should be invited to join forces in activity clusters in order to focus their activities on specific societal challenges.

RECOMMENDATION 2

To respond more adequately to the societal grand challenges, the new ETIP activity clusters should ensure efficient and appropriate engagement of societal actors.

RECOMMENDATION 3

The new ETIP clusters should engage into open discussions in order to better reflect the concerns of society.

RECOMMENDATION 4

The new ETIP clusters should be provided with the highest level of support to ensure a more coherent and consistent set of policies.

4.2 Knowledge triangle

RECOMMENDATION 5

National and European research programmes should aim for greater leverage of multi-stakeholder, Europe-wide agreements, which will be enhanced by the new ETIP clusters.

RECOMMENDATION 6

Each ETIP activity cluster should identify where there are shortfalls in the skills required to undertake the planned research programmes and innovation activities effectively, and develop an appropriate Education Action Plan.

RECOMMENDATION 7

All ETPs that wish to be accepted into an ETIP cluster and get European Commission support and attention should develop Innovation Action Plans.

RECOMMENDATION 8

Public authorities and all relevant stakeholders within the ETIP cluster, beyond the research community, should be engaged in the shaping and implementation of Innovation Action Plans.

RECOMMENDATION 9

The new ETIP clusters should be engaged in specific Innovation Implementation Programmes aimed at potential solutions, including demonstration projects, in close coordination with European Commission innovation programmes.

RECOMMENDATION 10

The demand side for implementing a potential solution should be tackled by concrete proposed actions for all ETIP activity clusters.

RECOMMENDATION 11

Collaborative foresight studies should be conducted jointly by ETIP clusters and the EC to provide strategic guidance to streamlining efforts for timely delivery.

RECOMMENDATION 12

All ETIP clusters should take special account of the growing service sector in a knowledge-based economy.

4.3 Supporting the European Research Area (ERA)

RECOMMENDATION 13

The ideal structure of an ETIP cluster (and a set of minimum criteria for an ETIP to be accepted and supported by the European Commission) should be defined.

RECOMMENDATION 14

Financial support should be provided for ETIP coordination and planning activities (including engagement with other DGs), and especially for the engagement of societal actors.

RECOMMENDATION 15

The Europe-wide agreement achieved between academia, business and authorities involved in ETP/ETIP committees (which will include Member states and the European Commission), should be

leveraged in discussions on European research priorities, e.g. for the Joint Programming process in CREST.

RECOMMENDATION 16
Cooperation between National Technology Platforms and ETP/ETIP clusters should be strengthened by specific coordinating structures.

RECOMMENDATION 17
Each ETP and ETIP should establish an overview of projects that includes high risk/high return research themes and specific projects.

RECOMMENDATION 18
ETIPs and ETPs should be used to provide a common and consistent Europe-wide view for discussions on and, where there is a clear link to and benefit for the ETIP/ETP, engagement in international scientific and technological cooperation.

5. Criteria for ETIP status

Although they are not intended as formally constituted, legal entities, ETIP clusters will need to adhere to certain agreed criteria in order to take advantage of the funding and support that would be available to them. The key compliance criteria for being recognised as an ETIP cluster include:

- The research focus is a specific societal challenge accepted by the public and politicians without any explanations or discussions.
- All relevant stakeholders are involved, especially civil society organisations (CSOs), Member States and relevant authorities, and all recognised as full members.
- Public consultation, with the help of CSO stakeholders, has been sought
  in order to generate public appreciation of potential solutions.
- The ETIP cluster has developed action plans for research, education and detailed innovation activities.
- The innovation plan includes special consideration for regulations, standards, procurement, demonstration projects and knowledge based services.
- Foresight studies are developed together with EC-DG-JRC.
- International collaborations are prepared where needed.
- High risk actions are pursued in cooperation with public research institutions.

ETIP clusters will not be formed for purely technological programmes. While ETP clusters may continue to focus on a competitiveness agenda, on their own or in clusters, they will not be able to access the incentives provided for ETIP clusters, if they take this route.

A set of monitoring and assessment measures and procedures for all ETIP clusters and ETPs will be developed to help confirm or

adapt the criteria for ETIP cluster status and progress towards achieving solutions to the societal grand challenges

6. A broader dialogue – next steps

The detailed recommendations in Appendix 2 of this report give the Expert Group's views on what ETPs need to do in order to make the ETIP vision a reality. But there are still a number of questions that need to be asked as we move towards an ETIP cluster model that brings the 21st century challenges to the forefront of the research and innovation process.

- What role are ETPs able and willing to play in addressing 21st century challenges?
- To what extent are societal challenges such as climate change, sustainable transport, sustainable consumption and production and public health of a suitable scale, scope and focus for mobilising ETPs?
- What should be expected from the different stakeholders, i.e. the European Commission, the ETPs, Member States, academia, research institutes and societal actors?
- What more would be needed to achieve coordinated action of ETPs in tackling these challenges?

Appendix 1: Members of the ETP Expert Group

The group met six times between January and September 2009. It was chaired by Horst Soboll of ERTRAC (European Road Transport Research Advisory Council) and had ten members, who participated in their personal capacity:

Maria Luisa Castaño (Spanish Ministry of Science and Innovation)
Andreas Dorda (Austrian Ministry of Transport, Innovation and Technology)
Peter Hiscocks (University of Cambridge) - rapporteur
Frank Gider (Public Agency for Technology of the Republic of Slovenia)
Monique Goyens (BEUC - European Consumers' Organisation)
John Hontelez (European Environmental Bureau)
Gernot Klotz (European Technology Platform for Sustainable Chemistry/CEFIC – European Chemical Industry Council)
Henning Kruse (European Wind Energy Technology Platform/Siemens Wind Power)
Karin Metzlaff (Plants for the Future European Technology Platform/European Plant Science Organisation)
Fiona Williams (eMobility European Technology Platform/Ericsson Research).

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Appendix 2: Detailed recommendations

A2.1 Society

RECOMMENDATION 1

All existing ETPs should be invited to join forces in activity clusters in order to focus their activities on specific societal challenges.

These new arrangements of ETPs will be called European Technology and Innovation Platforms (ETIPs) – with innovation in the name in order to distinguish them from traditional ETPs. Each ETIP will be linked to one Societal Grand Challenge.

All ETIP clusters will have to comply with specific criteria in order to get support, and only those that comply will get the high level support and attention needed to achieve their ambitious goal of integrating all forces in Europe to tackle one challenge, starting from research and including the knowledge triangle and beyond.

After a set of clear compliance rules and criteria has been defined by the European Commission, the Commission should select one or a small number of societal challenges as soon as possible to act as a pilot and provide incentives to accept the new branding/label, support of a high level office in the Commission or Council, and the appropriate financial support for coordination activities. Depending on a positive reaction from the ETPs, the expert group proposes

that in the future, EU research funding should go to the new ETIP clusters and the research and innovation topics they propose.

Action: *ETP community, European Commission*

RECOMMENDATION 2

To respond more adequately to the societal grand challenges, the new ETIP activity clusters should ensure efficient and appropriate engagement of societal actors.

In view of the urgent societal grand challenges facing the EU, research and innovation should no longer be a goal as such for technology platforms such as the new ETIP activity clusters. They must match the aspirations and needs of society. In order to ensure this match, structured and appropriate links must be set up between ETIPs and relevant societal actors. The latter would provide the ETIPs with their expertise and knowledge not only of the needs and expectations of civil society, but also of the attitudes and behaviour of citizens (and economic actors) that have to be taken into consideration when designing research and innovation strategies. Early engagement of societal actors would channel the reflections of the ETIPs into those areas that are most relevant to society. The intervention of societal actors at strategic moments and during the last phases of the programmes would allow the potential of the research and innovation strategy to deliver towards society and the societal grand challenges to be assessed.

For this recommendation to be fully effective, several elements have to be taken into consideration:

- The need for each ETIP to select representatives of civil society carefully in order to take account of the variety of stakeholders concerned, and to be sufficiently inclusive so as to gain an accurate view of the potential input from and output to civil society. In this context, the right balance should be struck between inclusiveness and efficiency of working methods
- In order for societal actors to be able to deliver to the ETIPs, it is essential to acknowledge the specificity of their structures, working methods and resources, as well as their limited involvement in the more detailed aspects of research and innovation strategies. This requires the following from ETIPs:
    - Clear division of tasks between societal actors and the members of ETIPs: societal actors should be respected in their outsiders' and sometimes critical but constructive approach towards research/innovation initiatives.
    - Respect for the need for societal actors to reflect on initiatives and to share them with their associative structures before expressing their views: this requires timelines that take account of this need for consultation, also for actors to be able to claim more representativeness.
    - The need to assist the societal actors by making resources available to help them work with the ETIP.

Societal actors as organisations have smaller benefits compared to other stakeholders, in the short-term or long-term, to draw from the ETIPs. They are also characterized by their limited financial resources. In order for them to devote their expertise to making the ETIPs more responsive to society, it is essential that financial means are put at their disposal.

- The strategies prepared by ETIPs should clearly state the results of their interactions with societal actors and should clearly explain the link between their proposals and the benefits that should derive against the societal grand challenges. Where programmes are designed in a way that goes against the recommendations of societal actors, this should be stated and explained.
- Societal actors should commit to their role in advising ETIPs when initiating and finalising research plans and should deliver constructively on the tasks they have been entrusted with.
- In order for ETPs and ETIPs to develop and implement a consistent approach towards engaging societal actors in their works, there is a need for the Commission to develop the appropriate guidelines, in cooperation with lead EU-CSOs. Specific attention should be given to:
    - Criteria for selecting societal actors to participate in the work of specific ETIPs/ETPs, taking into consideration the need to define rules of representation of civil society that strike the right balance between engagement and feasibility.

- Rules and availability of funding to help societal actors participate in the work of the ETIPs/ETPs.

Action: *ETIP community*

RECOMMENDATION 3

The new ETIP clusters should engage into open discussions in order to better reflect the concerns of society.

ETIPs should not be closed shops and should share their reflections with society at large in several phases of their work. This is an essential element to ensure that all ETIPs are responding to the societal grand challenges. Involving societal actors more closely in the work of ETIPs, as mentioned in Recommendation 2, constitutes one element of this enhanced accountability, but the work cannot be open to all societal dimensions at all stages if it is to be effective. However, at certain crucial stages of the planning, there is a need to extend the openness of ETIPs and their strategies to society at large, to ensure that the concerns of society are addressed in the planning and implementation of the Strategic Research Agenda (SRA). This will lead not only to enhanced matching between SRAs, specific research and innovation programmes and societal needs, but also to increased social acceptance and appreciation of research agendas.

In order to guarantee open discussions, the following tools should be put in place:

- Timelines prepared by the ETIP that take account of the need to engage in open discussion at the beginning of their work, in mid-term and before finalizing.
- Invitations extended to the largest feasible number of representatives of different societal actors, on top of those that would be more closely linked to the work of the ETIP, in order to engage with all facets of society.
- Engagement of these actors facilitated by granting them the time and financial resources to contribute.
- Clearly defined rules that guarantee effective consideration is given to the contribution of societal actors and that the latter contribute constructively to the work within the limits of their expertise, knowledge and specific tasks under the ETIP.

Action: *ETIP community, European Commission*

RECOMMENDATION 4

The new ETIP clusters should be provided with the highest level of support to ensure a more coherent and consistent set of policies.

The new ETIP clusters have to engage with all relevant European Commission DGs and National Ministries or authorities in order to achieve (where possible) consistency in policies, synchronised and efficient support, and reduced duplication of activities in research or innovation programmes. A positive example is the Commission's

SET plan for energy and research policies. Subject matter policies must be checked specifically for barriers to the introduction of potential solutions generated by research policy output.

A high level office should be established in the European Commission to encourage, monitor the creation and development of ETIPs, and facilitate synchronization between national authorities or different DGs and their interaction with ETIPs.

To ensure an integrated approach requires input from policy makers on how to tackle a particular societal grand challenge, along with policy support when implementing actions to address that challenge. This includes policy makers at European level (the various DGs of the Commission) and at national level (ministries of the Member States). Due to limited resources, policy makers could not join each of the numerous ETPs, but they could join the few ETIPs. At the European level, a more synchronized approach among the various DGs is crucial to enable the ETIPs to address the societal grand challenges and only feasible if coordinated by a higher level office in the European Commission or Council.

Policy makers from the DGs and the ministries of Member States will be invited to participate in the creation phase of an ETIP and to be involved ideally at the start and end of Strategic Research Area, Innovation Action Plan and Education Action Plan discussions and development. For example, an ETIP could invite policy representatives to their Steering Council and to their working

groups, and/or organise moderated open/public discussions about the Vision/SRA with policy makers in order to discuss a more synchronised policy approach.

The high level office will foster synchronization between the DGs and ETIPs, and help them to address the broader scope of ETIP-led research, innovation and education across all other DGs.

Action: *European Commission, Member States*

A2.2 Knowledge triangle

RECOMMENDATION 5

National and European research programmes should aim for greater leverage of multi-stakeholder, Europe-wide agreements, which will be enhanced by the new ETIP clusters.

Strategic and well balanced input from the ETIPs will be a major source of themes and topics for European, multinational and national research programmes. Most ETPs today, and in the future ETIPs, are important instruments and in reality the only platforms which operate at the EU level with insight into both national and multinational industry and research environments.

To address the societal grand challenges in a timely manner with limited resources, such resources have to be used as efficiently as

possible. Strategies that follow a well-balanced plan, such as the Strategic Research Agendas of the ETIPs, will be effective at addressing the societal grand challenges. Broad stakeholder engagement across the European nations ensures this is a strategic and well-balanced input that will increase the impact of European, multinational and national research programmes. If other input sources are preferred by the Commission or Member States, this might be indicating that the ETIP is not representing all relevant stakeholders effectively. The reasons for not using ETIP efforts would need to be clarified in order to make necessary improvements.

At the European level, ETPs should be invited to recommend themes and topics for cooperation and research infrastructure programmes, and these should be used as a major source of input. ETPs and ETIPs can play a more important role in screening proposed topics, and contribute recommendations and priorities in order to make full use of the work in the ETPs and ETIPs.
At the multinational level, ERA-Nets should work with ETPs to identify themes and topics that should be considered as high priorities for the ERA-Nets.

At the national level, Member States should be encouraged to follow this example and draw input to their research programmes increasingly from the strategic input of the national technology platforms and ETPs.

Action: *Member States, European Commission*

RECOMMENDATION 6

Each ETIP activity cluster should identify where there are shortfalls in the skills required to undertake the planned research programmes and innovation activities effectively, and develop an appropriate Education Action Plan.

ETIP activity clusters will each address a specific societal grand challenge. Along with agreeing and providing a plan on what should be done next in research (Research Implementation Action Plan) and innovation (Innovation Action Plan), the ETIPs will be well positioned to identify any shortcomings in skills and areas of expertise needed to conduct the research and drive the innovation.

ETIPs will ask all stakeholders involved to identify shortfalls in skills, areas of expertise and age groups to educate that are required for the research, innovation, implementation and deployment of new technologies into society, including skills needed for the practical application of new knowledge, such as business development, market research, social sciences and financial planning.
The ETPs and ETIPs should determine the skills/areas of expertise that are in short supply, the numbers and levels of educational requirements that are needed and, where possible, should recommend approaches that would redress these shortfalls of skills. This will be assembled as the Education Action Plan of the ETIP.

In a second step, the ETIPs will need to discuss these shortcomings with the authorities responsible for education – mainly the national or regional ministries for education. This could be facilitated by the Commission, for instance by holding a conference at which several ETIPs present their Education Action Plans and then discuss them with representatives from the ministries of education from the Member States. It will be then up to the Member States to address these shortcomings and possibly discuss them again with the ETIPs and Commission after one to two years.

For example, to address the societal grand challenge of obtaining a very substantial proportion of energy supplies from renewable sources by 2020, the European wind sector has estimated that it needs to employ on average an additional 1,000 research and development staff with PhD or senior level education per annum from now on. The European education system is not geared to this at present, but the need is indisputable in an energy sector with very high growth rates.

To address the societal grand challenge of food security, Europe needs to improve major food crops, fruits and vegetables for growing in Europe, and others for developing countries. Plant breeders will be essential for tackling this challenge, but the number of plant breeders available in the coming decade is decreasing sharply. Several thousand plant breeders need to be trained in the next six years.

Action: *ETIP/ETP community*

RECOMMENDATION 7

All ETPs that wish to be accepted into an ETIP cluster and get European Commission support and attention should develop Special Innovation Action Plans.

Most ETPs to date have focused on research agendas and implementation plans. While recognizing that knowledge creation is the basis for any progress, transferring this knowledge into sustainable solutions that are available to the general public is just as important. Several technical and non-technical barriers have hindered the optimal exploitation of new knowledge. In addition, for several innovations, integrating existing technologies into systems is vital and can be done with only limited further research. One example is the Smart Energy Home (less noise, less energy use, less pollution at comparable pricings), which is demonstrating significant progress by integrating already existing technologies into a innovative house.

Current ETPs should make more efforts to identify and propose solutions for overcoming technical and non-technical innovation barriers. This should be done through formulating dedicated Innovation Action Plans. Such plans should include e.g. support for appropriate skills needs, demonstration projects in public-private partnerships, systems integration (e.g. in IT, factories, construction),

adjustment of standards, facilitating IPR negotiations (e.g. to shorten time for consortia formation) and best practices, analyzing existing and upcoming regulations and their implementation (e.g. in agriculture), and ensuring public acceptance. This could reduce the time frame needed to address the societal grand challenges. The existing EU lead market concept could serve as a starting point.

The European Commission may provide dedicated incentives to ETPs to develop Innovation Action Plans, such as publishing coordination and support action topics in calls.

Action: *ETIP community, European Commission*

RECOMMENDATION 8

Public authorities and all relevant stakeholders within the ETIP cluster, beyond the research community, should be engaged in the shaping and implementation of Innovation Action Plans.

While it is obvious that the relevant players responsible for education in the knowledge triangle should be involved, many stakeholders in the innovation field are often not involved early enough. Turning knowledge from research projects into development and later on into “real” innovation in the very short timeline available to i.e. combat climate change or tackling the challenge of an ageing society requires innovative ways of cooperation. On the one hand, there is the need for a better and

more pragmatic cooperation between EU and national institutions as well as with the private sector in order to use the full potential of Europe and its various strengths in this respect. On the other hand, there is also the need for better alignment between the different industry sectors along the value chain and with societal, public and private partners.

Specific emphasis is therefore needed to ensure that all potential stakeholders responsible for implementation are involved, beyond academia and business, such as standardisation bodies, regulatory agencies, financing institutions for public private partnerships etc. Their contribution is important because the development of ‘innovation action plans’ and their effective implementation requires a range of different expertise beyond research.

In developing Innovation Action Plans, cooperation with other relevant ETPs addressing associated topics will speed up innovation along the value chain (e.g. from the basic materials up to the end products for the consumer).

Dedicated political engagement and support by the relevant public authorities in Member States and the Commission (especially ministries and Commission services responsible for areas outside the specific research focus) will be required to ensure an optimal handover from the research area into the innovation phase. Establishing and using dedicated Innovation Programmes appropriate to the scope and potential of the task will be key tools.

Action: *ETIP community*

RECOMMENDATION 9

The new ETIP clusters should be engaged in specific Innovation Implementation Programmes aimed at potential solutions, including demonstration projects, in close coordination with European Commission innovation programmes.

Due to the urgency of most of the societal grand challenges, the mandatory innovation plans for the new ETIP activity clusters should place greater emphasis on the fast implementation of solutions using existing technologies.

Currently, public support and funds available for research at European and Member States levels seem to be sufficient to ensure quality knowledge creation in the EU. However, the support to transfer this research into development and pre-competitive solutions to the societal grand challenges is insufficient. Several initiatives by the EC, like INNOVA, CIP or the Lead Market Initiative, are promising approaches, but are too limited in scope and budget to be of real support for innovation, particularly in addressing the need for large demonstration projects.

Support is also needed for those innovations that derive directly from the systems integration of already existing technologies. For

example the SusChem Smart Energy Home is a fully developed concept for reducing energy consumption by around 30%, significantly reducing noise, and lowering environmental burden due to waste water by renovating existing homes rather than by building new ones. These technologies already exist, as does the political and societal will. However this project has major problems in finding its place in EU Programmes. It is not regarded as research, and its value is about incorporating all the characteristics of a modern house, so it does not fit into other, segmented EC programmes, such as energy saving, and as such falls between the various EU support actions.

In order to bridge the institutional gap along the innovation chain as the EC establishes a new innovation strategy, ETPs and even more so ETIPs can play a vital part in the handover from research towards innovation.

The Innovation Implementation Programmes will address the actions needed to remove hurdles/shortcomings along the innovation chain that have been identified in the ETPs' Innovation Action Plans. For instance, in DG ENTR a European Innovation Implementation Programme should be started to follow up on results from the European Research Framework Programme and others, and provide feedback to these. Member States are encouraged to follow this example.

Two significant dedicated funding opportunities may need to be set up by the EC.
First, an instrument to ensure the deployment of research into the pre-competitive development phase and, second, a way of enabling the integration of existing technologies into sustainable solutions, such as Smart House, Green car, Process intensification, Biomass etc.

A European Innovation Council (EIC) should be established to assess and improve the long term continuity and efficiency of implementation.

Action: *ETIP clusters, European Commission, Member States*

RECOMMENDATION 10

The demand side for implementing a potential solution should be tackled by concrete proposed actions for all ETIP activity clusters.

As often described – see for instance the European Commission Aho report - innovative solutions are not only driven by the supply side of the value chain, e.g. research and technology, but also by the demand side. In the US, public procurement is significantly higher than in Europe and supports the introduction of new technologies in the market.

Engaging public authorities in the new ETIP clusters will include discussing the demand side and appropriate actions to improve uptake and implementation of new solutions. Large technology programs – with public financial support - may pave the way for new solutions, but these are certainly not sufficient.

An additional issue is how to establish an appropriate risk culture among the responsible actors in public procurement, so that they will tolerate – up to a certain degree – a new, not yet proven solution. If public authorities are always obliged to choose the cheapest and most proven solution, implementation of new ideas, which in many cases are more expensive or lack a sufficient reference period of use, will be hampered.

Spending tax payers' money requires accountability, but there is also a need to balance a culture that avoids risk and failure with the political will to implement new solutions to the societal grand challenges. Here education will play a leading role, along with using the media and press to gain appreciation and encourage critics of a new behaviour to take risks. Both these elements should be tackled by ETIP clusters in order to reduce market entry barriers.

Action: *ETIP community*

RECOMMENDATION 11

Collaborative foresight studies should be conducted jointly by ETIP clusters and the EC to provide strategic guidance to streamlining efforts for timely delivery.

One of the major challenges for ETPs is the lack of complete life-cycle approaches to tackling the societal grand challenges. This often leads to delays in innovation due to the changing political and strategic framework at the critical borderlines between various elements of the life cycle. A most striking example is the dispute over biofuels, where political requirements have lead to significant research and innovation investments, only for these to be wiped out by the dispute between energy supply and food supply. This conflict has been known for some time, but was neglected in the start-up planning.

To ensure a more reliable policy framework and strategic direction in situations of limited human and financial resources, collaborative foresight studies can give direction and contribute to priority setting, focus and thus speed up the implementation of innovative solutions. In addition, these studies help to ensure complementarity between the work of the public and private sectors. Currently there are more than 12 different national innovation plans complemented by more than 10 different EU programmes in research and innovation related areas. These actions are not necessarily complementary, leading to overlap and sub-optimal use of resources.

The Commission should provide active support and incentives (e.g. through calls) to ETPs to undertake foresight studies addressing common societal challenge(s) and link them with existing EC service foresight activities (e.g. JRC- IPTS Seville) under the umbrella of an ETIP. Guidance for further Commission and national research and innovation agendas should be derived from these studies through their impact on the ETIPs' outcomes. They should include economic, environmental and social aspects, and have clear objectives, deliverables and timelines.

One positive step in this direction was the approach taken two years ago when the Commission set up the Strategic Energy Technology (SET) plan and the group of ETPs under the heading "The 3rd Industrial Revolution" (see Rifkin, J, *Leading the Way to the Third Industrial Revolution: A New Energy Agenda for the European Union in the 21st Century.*) By bringing together 12 European Technology Platforms to define the way forward for renewable energy, energy storage and diversified power grids, common Foresight studies by an ETIP cluster and EC plus MS, could guide selection of research priorities and appropriate policy actions.

Action: *ETIP community, Member States, European Commission*

RECOMMENDATION 12

All ETIP clusters should take special account of the growing service sector in a knowledge-based economy.

While services play a leading role in most European economies, research investment is still mainly targeted at the manufacturing sectors. But knowledge based services will grow in Europe to levels similar to those seen in the US today.

Some new technologies, e.g. communication technologies, are already closely related to services and are only introduced into markets by new services, such as
the “voice over Internet Protocol” technology SKYPE from Estonia.
In discussing ways to address societal grand challenges, new business models including knowledge based services, will take a more important role, for instance in ensuring that new technology is adopted by the citizen (customer acceptance).

The more “user driven” types of innovation in services (compared to technology driven in traditional sectors), need to base new solutions on customer behaviour, client feedback and appreciation. For example, in renewable energy strategy, specific business models will be seen as the key for acceptance and success.
Even in traditional sectors for capital goods, like power plants or aircraft engines, the complete business offer must be assessed, as the solution comprises modern technology enhanced by many services, e.g. appropriate financing, maintenance or training.

For all those new areas, the ETIP clusters and their stakeholders will need to ensure that specific expertise for services is involved in finding new solutions.

Action: *ETIP community*

A2.3 Supporting the European Research Area (ERA)

RECOMMENDATION 13

The ideal structure of an ETIP cluster and a set of minimum criteria for an ETIP to be accepted and supported by the European Commission should be defined.

An ETIP is a cluster of ETP activities that jointly contribute to addressing a societal grand challenge or a major part of it. An ETIP cluster needs to agree on a governance model/code of conduct, but does not have to be a legal entity – as with the traditional ETPs, the new ETIP cluster is a voluntary gathering of stakeholders.
For example those ETPs involved in the European Commission's SET Plan could become an ETIP addressing energy security. Other clusters might include the ETPs teaming together in the Economic Recovery Plan addressing Green Car, or those involved in the Bio-economy Technology Platforms (BECOTEPS) project addressing food security.

A set of common minimum criteria are needed for either recognition of a new ETIPs by EC/RTD, or to request an appropriate development or change in an existing cluster of ETPs to ensure that their work is linked more visibly to a societal grand challenge and hence justifies attention and support from politicians. The official label ‘ETIP’ and potential CSA support should only be given to a cluster in a full compliance with those defined criteria.

Examples of criteria include:

- Involvement of relevant actors from industry, academia and society/CSOs, participation of authorities from several DGs and Member State ministries, openness to all relevant stakeholders within the innovation chain e.g. international partners being active in European R&D.
- Creating and updating an SRA, generating a Research Implementation Plan and monitoring it across European nations, developing an Innovation Action Plan and an Education Action Plan.

Action: *European Commission*

RECOMMENDATION 14

Financial support should be provided for ETIP coordination and planning activities (including engagement with other DGs), and especially for the engagement of societal actors.

To ensure that ETIPs are created and active in addressing societal grand challenges, it is crucial to provide financial support for coordination and other selected activities. In addition, financial resources must be provided to ensure the engagement of societal and academic actors when these do not have sufficient financial resources or provision of such funding from industry is not an option due to the need for an independent contribution.

Appropriate support mechanisms, such as tenders or CSA, should be applied across all ETIPs to support coordination and engagement of societal and academic actors. Similar support mechanisms and suitable projects/programmes should be available across all ETIP clusters to support planning activities, such as foresight projects, and the development of Innovation and Education Action Plans.

For example, as a first pilot, the high level office for ETIPs (see Recommendation 4) should publish a call for ETIP support grants for a small number of selected societal grand challenges that ETIP clusters may address. These grants would support coordination, involvement of societal and academic actors, and development of Innovation and Education Action Plans. Potential ETIP clusters can then propose their planned actions and ensure they comply with the published ETIP criteria. More clusters will be able to request support in a second phase.

Action: *European Commission*

RECOMMENDATION 15

The Europe-wide agreement achieved between academia, business and authorities involved in ETP/ETIP committees (which will include Member states and the European Commission), should be leveraged in discussions on European research priorities, e.g. for the Joint Programming process in CREST.

Since Europe faces common societal grand challenges that no Member State is capable of resolving alone, the Council and the Commission aim to synchronise the majority of Europe's research and the various national research programs via the Open Method of Coordination or the recently started process of Joint Programming (JP). Similar processes aiming at research priorities for other European programs, such as ERA-NET or EIT, may benefit from EITP agreements on a single theme. Joint Programming aims to increase and improve the cross-border collaboration, coordination and integration of Member States' publicly funded research programmes in a limited number of strategic areas to help Europe boost the efficiency of its public funding and to better address the societal grand challenges.

This process involves Member States (CREST), identifying areas of common concern where collective action can be more effective in tackling important societal challenges. Such agreements usually

take time, but can be speeded up by leveraging similar discussions already under way or existing agreements among ETIP stakeholders. As the Member States will be involved in ETIP activity clusters, they may use the common themes for other programs as well. If recommendation 16 is implemented, cooperation between ETPs, ETIPs and National Technology Platforms (NTPs) will facilitate cooperation, coordination and commitment among Member States.

Action: *Member States (CREST)*

RECOMMENDATION 16

Cooperation between National Technology Platforms and ETP/ETIP clusters should be strengthened by specific coordinating structures.

As indicated in the report, one of the objectives of ETPs and ETIPs is to promote greater research cooperation within and between Member States, including synchronization, coordination and cooperation between national research programmes. For this purpose, some ETP/ETIPs incorporate Member State representatives in a mirror group, while others have them as members of an ETIP. In parallel, in some Member States NTPs were set up to coordinate stakeholders at a national level and to widen input from industry and academia to the ETPs.

Up until now, ETPs have helped with the development of strategy in their respective research areas (SRAs) and have started to co-ordinate research projects across Europe. However, representation of Member States in mirror groups varies considerably due to the specific situation of each country, and the level and designation of the representatives. As a consequence, not all Member States are represented in all ETPs and not all ETPs are represented at the national level in all Member States. Nor is cooperation between ETPs and NTPs organized in a systematic way, and individual Member States use different approaches to coordinate their NTPs due to different national institutional bodies being responsible for coordinating NTP activities.

Strengthening cooperation between NTPs, ETPs and ETIPs will facilitate the research, development and innovation (RDI) debate at national and regional level, the coordination and synchronization of research priorities between industry and academia and of research priorities at EU and national level, and will harmonize the participation of Member States.

The Commission should create and coordinate a working group of Member States to consider the issue of NTPs, ETPs and ETIPs. This group should define clear rules for the representation of ETPs and ETIPs at the national level, including: minimum requirements for NTPs; communication channels between NTPs and ETPs and ETIPs; rules regarding the representation of NTPs in ETPs and ETIPs (number, level, and designation of delegates,…); and

proposed organizational structure of NTP coordination in each Member State.

Action: Member States, European Commission, ETP / ETIP community

RECOMMENDATION 17

Each ETP and ETIP should establish an overview of projects that includes high risk/high return research themes and specific projects.

The fact that higher risk projects may fail must be accepted, but the absence of high risk /high return projects will result in only incremental innovations being achieved.
The SRAs are defining specific portfolios of projects to address the societal grand challenges along with their research and innovation needs. The projects have different exposures to risks for the society and the stakeholders involved, and are of different importance to society and stakeholders. They are, however, all of high importance. Sharing the workload between industry and academia or privately and publicly funded research should lead to a more high risk portfolio for public research programmes.

In order to determine the right approach, a matrix should be established categorizing the projects based upon importance to industry vs. society and high vs. low risk, providing an overview of

where research and innovation funding will optimize the results of actions.

All SRA projects should be categorised based upon the following measures:

1 Importance to industry vs. society

Projects which have a high importance to industry are more likely to be financed by industry from its own sources.
Projects that have a high importance to industry can also be of high importance to society, but this is not necessarily the case.

2 High risk vs. low risk

A project with a high risk and high importance to industry can probably obtain funding from industry, as can a project with low risk and high importance.
A project with high risk and low importance to industry, but a high importance to society, is not likely to be a priority within industry, but will need additional funding from the EU and/or MS.

Establishing the matrix will give a clear overview of where the impact of EU and MS R&D funding will be optimized.

Action: *ETIP community and European Commission, Member States*

RECOMMENDATION 18

ETIPs and ETPs should be used to provide a common and consistent Europe-wide view for discussions on and, where there is a clear link to and benefit for the ETIP/ETP, engagement with international research organisations and programmes.

None of the societal grand challenges can be tackled within the borders of the EU alone. There are many international organisations working in the areas of the societal grand challenges. The new ETIPs, each focused on an individual societal grand challenge, will provide the EU with an official “think tank” in their respective areas. Since the ETIP stakeholders will represent the key players in EU research and innovation for the selected theme or societal demand, the outcome of ETIP clusters should be used by the European Commission when discussing international scientific and technological cooperation, representing a single voice for Europe.

As well as the international research organizations, there are many different international research programmes sponsored by international organizations such as the UN, World Bank, UNESCO etc. There are opportunities for European researchers to participate in such programmes. ETIPs could provide a framework for systematic and consistent monitoring of such programs, communicating with ETIP clusters, and preparing research consortia. This would increase the participation of European researchers in such programmes.

Level 1: Discussions on the future of international research programmes

The European Commission's high level office, which will be responsible for coordinating activities addressing the grand societal challenges, should promote the use of the research and innovation agendas of ETIPs in discussions on international scientific and technological cooperation related to the fields corresponding to the societal grand challenges. The European Commission could consult the ETIP cluster that focuses on the societal grand challenge being discussed.

An example of such representation is the engagement of the ETP Plants for the Future in global discussions among plant science societies. In 2009, the academic partners of ETP Plants for the Future participated in the first meeting of plant science societies from around the world aimed at starting to identify common research themes to help address food security, health, climate change, energy, sustainability and environmental protection. This shows that, based on their international contacts, ETPs and in future ETIP clusters are well-positioned to provide a common Europe-wide view on international collaboration for research in the respective sectors.

Level 2: Engagement in international research programmes

Each ETIP cluster should set up a structure for coordinated exchange of information between the relevant sponsors of

international research programmes or international research organizations. By doing this, the ETIP cluster would become an official counterpart for communicating with such organizations and programmes. Participation in international organizations or programmes and the results achieved could also be one of the key performance indicators for ETIP clusters. For example, the ETP Global Animal Health worked at the global level from the start due to the fact that animal diseases spread quickly across continents and need to be tackled on a global scale in very short time frames.

Action: *European Commission, Member States*

Appendix 3: The Lund declaration

The Lund Declaration

EUROPE MUST FOCUS ON THE GRAND CHALLENGES OF OUR TIME.

- European research must focus on the Grand Challenges of our time moving beyond current rigid thematic approaches. This calls for a new deal among European institutions and Member States, in which European and national instruments are well aligned and cooperation builds on transparency and trust.
- Identifying and responding to Grand Challenges should involve stakeholders from both public and private sectors in transparent processes taking into account the global dimension.
- The Lund conference has started a new phase in a process on how to respond to the Grand Challenges. It calls upon the Council and the European Parliament to take this process forward in partnership with the Commission.

The 'Lund Declaration' calls on the European Institutions and Member States to focus European research on the major challenges facing our world. This vision, which will contribute to shaping future EU research policy, is the outcome of the conference 'New Worlds – New Solutions' held by the Swedish Presidency of the European Union in July 2009. Three hundred and fifty researchers, research organisations, entrepreneurs and politicians from all over Europe agreed that European research needs more focus, less territorial thinking and greater cross-discipline and cross-border cooperation.
More information can be found on http://www.se2009.eu/.

Appendix 4: Current ETPs

There are currently 36 ETPs, covering the most important technological areas. They connect thousands of European companies, knowledge institutes and policy makers and have facilitated the development of a common vision and research agenda for each of the 36 technology fields they represent.

The ETP research agendas have helped the European Commission to take industry's needs into account when shaping the Framework Programme. The five Joint Technological Initiatives originated directly from ETPs, and ETPs are the European Commission’s main partner in developing the three public-private partnerships launched under the European Economic Recovery Plan: the Factory of the Future, the Energy Efficient Building and the Green Car.

ETPs have also become important interlocutors for the Commission in other policy areas: they contributed to the design of the Lead Market Initiative, participate actively in the Strategic Energy Technology Plan and are closely involved in the preparation of the new Innovation Plan for Europe.

Advanced Engineering Materials and Technologies (EuMaT)
Advisory Council for Aeronautics Research in Europe (ACARE)
Embedded Computing Systems (ARTEMIS)
European Biofuels Technology Platform (Biofuels)
European Construction Technology Platform (ECTP)
European Nanoelectronics Initiative Advisory Council (ENIAC)
European Rail Research Advisory Council (ERRAC)
European Road Transport Research Advisory Council (ERTRAC)
European Space Technology Platform (ESTP)

European Steel Technology Platform (ESTEP)

European Technology Platform for the Electricity Networks of the Future (SmartGrids)

European Technology Platform for Wind Energy (TPWind)

European Technology Platform on Smart Systems Integration (EPoSS)

European Technology Platform on Sustainable Mineral Resources (ETP SMR)

Farm Animal Breeding and Reproduction Technology Platform (FABRE)

Food for Life (Food)

Forest based sector Technology Platform (Forestry)

Future Manufacturing Technologies (MANUFACTURE)

Future Textiles and Clothing (FTC)

Global Animal Health (GAH)

Industrial Safety ETP (IndustrialSafety)

Integral Satcom Initiative (ISI)

Mobile and Wireless Communications (eMobility)

Nanotechnologies for Medical Applications (NanoMedicine)

Networked and Electronic Media (NEM)

Networked European Software and Services Initiative (NESSI)

Photonics21 (Photonics)

Photovoltaics (Photovoltaics)

Plants for the Future (Plants)

Renewable Heating and Cooling (RHC)

Robotics (EUROP)

Sustainable Nuclear Technology Platform (SNETP)

Sustainable Chemistry (SusChem)

Water Supply and Sanitation Technology Platform (WSSTP)

Waterborne ETP (Waterborne)

Zero Emission Fossil Fuel Power Plants (ZEP)

(Source: http://cordis.europa.eu/technology-platforms/individual_en.html)

Appendix 5: Commentary from Andreas Dorda (Austrian Ministry of Transport, Innovation and Technology)

Collaboration on International basis - outside Europe

Facing global challenges like the economic crisis or climate change European as well as national policy makers, the industry and citizens appreciate the importance of international cooperation. The European Union has taken this necessity of joint and coordinated action on a global scale into account by including R&D-collaboration with countries outside Europe in the seventh framework programme. The Cooperation Programme of FP7 covers ten themes corresponding to major fields in the progress of knowledge and technology ranging from health and transport up to security. All ten themes have an important international dimension and most of the FP7 funding for international cooperation will be available under this Programme.

Nevertheless the potential of international cooperation is not fully exploited as these activities are not directly linked to the EU technology platforms and their specific research agendas.

A stronger and well structured international collaboration within ETPs would for sure be strongly desirable.

A concrete example of positive experience in global R&D-cooperation is the International Energy Agency (IEA), which runs Implementing Agreements (IAs) on various energy related topics. Involving experts with direct power to decide on the orientation of national research programmes and projects the Executive Committees of these IAs appeal with efficient and fast decision making processes.

Fully recognising the importance of international cooperation beyond Europe for successfully meeting the global challenges our society are

facing Europe should nevertheless carefully analyse in which technology areas a cooperation beyond its borders is beneficial from a industrial competition point of view. Sharing IPRs is a most sensitive issue and should only be realised in the case of a clear added value due to necessary complementary expertise as well as mutual trust between all partners. A particular sensitive area is R&D on security issues.

a.) The role of international cooperation in ETPs research agenda?

In principle, all the screened SRAs are strongly focused on European networking but international cooperation outside Europe is a task in almost all of them. As clearly pointed out in the Biofuels TP for instance, cooperation on a global basis will bring a range of benefits to any given programme – for example:

- Organisations within the EU can learn from and share insight with other regions.
- Ensure that the EU does not “re-invent the wheel”.
- Collaboration can rely in an efficient way on global based organisations focussed on biofuel technologies.

Nevertheless a clearer identification of attractive partners outside Europe and the interfaces to other Technology Platforms would be beneficial. Also the document: “Evaluation of the European Technology Platforms (ETPs); IDEA Consult” gives clear recommendations to the technology platforms on that topic:

- *Further internationalize the activities beyond the EU*
    - *Several ETPs believe that international cooperation should go further than the EU and associated countries. A more international discussion is essential (with preferential*

partners) in order to be able to compete with other world powers.

- *Peer-to-peer relations with Asian and American research programmes should be established in order to exchange ideas and interests and look for synergies.*

b.) Potential role for ETPs in the planned EC/RTD communication strategy?

In a new EC/RTD communication strategy, the wide range of stakeholders already involved in the ETPs will be important partners. One of their targets is to define a strategy on a number of important issues with high political and societal relevance to achieve Europe's future growth, competitiveness and sustainable objectives. This can be helpful for effective communication and uses well established platforms. One should keep in mind that European success in the future is strongly dependent upon major research and technological advances in the medium and long term.

c.) Are the ETPs input/priorities useful for more international S&T cooperation?

As international cooperation is established within many of the ETPs, these contacts can surely help to intensify international S&T cooperation. The cooperation of the numerous ETPs already in place should be coordinated and an intense information exchange should be established in order to identify relevant organisations / stakeholders outside Europe. At the same time these activities should not overlap or duplicate each other. If Europe wants to be successful it has to follow a global approach to real global

challenges such as environment, energy and transport policy with partners outside Europe.

d.) May ETPs play a role in the search for one voice for Europe?

The wide stakeholder base, industry, public authorities, research community, financial community, standardisation bodies, regulators, civil society, consumers / end-users ensures the involvement of partners throughout Europe. An active role by policy makers is needed in order to identify the “one voice” for Europe. One of the main goals of the ETPs is to structure and organize European S&T efforts; this for sure will contribute to finding one voice for Europe. Nevertheless the national implementation of the ETPs strategies and goals seems crucial for the future success of the S&T strategies developed by the ETPs. To abolish member states from all energy related ETPs due to the new SET-Plan should be critically analyzed. The intention of the EC to replace the mirror groups by the steering group of the SET-plan seems not realistic as just one national delegate in this high-level group cannot be an expert in all energy technologies (like photovoltaics, biofuels, wind, solar or geothermal energy) and a detailed dialogue between industry, research, EC and MS would not be possible any more. A good practice example for a better approach is the ETP ERTRAC as it directly involves MS in all decision making bodies. This motivates MS to cooperate closer with ETPs.

In addition I would like to make some suggestions for general recommendations based on my experience as national delegate in several ETPs, JTIs, ERA-NETs, IEA-Implementing Agreements and FP7:

Although we received the request from the EC to focus on the further development of ETPs we should consider how these platforms should be embedded or linked to other R&D-instruments. We must give our view on what is the relationship and difference to existing (ERA-NETs, JTIs, FP7, IEA) as well as emerging instruments (Joint programming, Industrial Initiatives).

My experience in ERA-NETs and ETPs has shown me that the member states (MS) are underrepresented in most ETPs and put aside in “mirror groups” (MG) which eliminates them from many information flows and decision making processes. As chairman of the MG of the ETP on biofuels (EBTP) I have the experience that this fact demotivates most national delegates. As consequence they don’t show up at our MG-meetings any more and the important link to national technology platforms and R&D- programs is interrupted, which I consider problematic if national implementation of SRA-priorities is desired by the EC and industry.

Experience suggests that ERA-NETs as cooperation between national R&D program representatives have a tendency to neglect to some extent the needs of industry and research institutions in the process of aligning different national program activities. This has led me to the general recommendation: keep industry in ERA-NETs and MS in ETPs!

That does not mean that I suggest that ERA-NETs and ETPs should become equal. On the contrary I support that they should keep a clear profile distinct from each other. But we should recommend that a comprehensive and coherent overall strategy for all RTD instruments

in Europe is necessary where ETPs, NTPs, ERA-NETs, JTIs, Joint Programming, Industrial Initiatives and FP7 cooperate in the most efficient way. Some of these instruments should follow a bottom-up, industry-driven approach, like ETPs, and some a more top-down, policy-led approach, like ERA-NETs. But somewhere these 2 streams have to come together and should be linked to national, EU as well as international activities beyond Europe, paying attention to the needs and expectations of Europe's consumers and citizens.

I referred to 3 different dimensions of cooperation:

1. between MS and EC
2. between EU and other countries
3. between technology development and other societal needs/policy challenges.

But I believe that another dimension of cooperation is of utmost importance: the cooperation between ETPs. I feel a common conviction not only in our group but between other stakeholders like industry and EC that ETPs in related areas should maintain contact and enter in a dialogue in order to avoid overlapping activities with the potential threat of arriving at contradicting conclusions on the same topic or just the opposite danger that ETPs leave topics open as 2 ETPs might believe that the other ETP and not itself is responsible for this issue. Many concepts of clustering ETPs have been proposed and dropped after some time. The main reason is that clustering can take place along many lines (industrial sectors, policy fields, consumer point of view,…). For example if you see biofuels as energy source, it makes sense to cluster EBTP with other energy related ETPs. But biofuels have definitely a strong relation to transport related ETPs and

the vehicle industry as well as with the forestry and agro-sector. So by clustering EBTP in the energy group we lose immediately the synergy potential of a cooperation with the transport or agro-sector. Of course it is not feasible to relate everything to everything. Therefore I strongly recommend that ETPs should interact in the way of a variable geometry with related ETPs. Experts of EBTP coming from the feedstock supply could meet with experts of ETP PLANT or FORESTRY with an interest in the application of these sources in the transport sector.

A second recommendation is to organise regular meetings of leading representatives of all ETPs (chairpersons and their deputies, mirror group leaders, secretaries) for strategic discussion and alignment of ETP activities. This should be restricted to 3-4 persons per ETP as – although I oppose the solution the EC proposes in the SET-plan for the reasons explained above – I nevertheless understand and share the EC concern that too many different advising bodies as well as too many participants in a specific meeting can endanger the efficiency of the whole process due to its complexity. Therefore my proposal is to install

1. Experts Groups with variable geometry of ETPs with related ETPs
on specific overlapping issues
2. Strategic Alignment Group of 3-4 leading representatives of all ETPs

Summary:

- Cooperation between regional, national, European and global

R&D policy makers is crucial for success in technology and innovation policy.

- Synergies between securing industrial competitiveness and achieving sustainable development and other societal needs.
- Importance of technology foresight and assessment.
- SRA and DS of ETPs are balanced and comprehensive and of high value for national policy makers.
- ETPs achieved added value in structuring industrial sectors and by stimulating strategic cooperations with R&D institutions, but suffer from different degree of commitment of stakeholders.
- Look for better coordination between similar ETPs in order to avoid overlapping, contradicting conclusions as well as blank spaces with nobody feeling responsible for vacant topics.
- Suggestion to leave room for flexibility in individual ETP organization as no single structure fits all.
- Mirror groups have a tendency to demotivate MS participation. Positive exception is ERTRAC involving MS directly in Plenary Group.
- Abolishment of mirror groups in energy related ETPs will eliminate any cooperation between the EC and MS on these specific issues.
- For broader topics more than one MS representative might be necessary.
- Stronger cooperation between ERA-NETs and ETPs would be beneficial.
- Keep industry in ERA-NETs and MS in ETPs!

- Technical experts as national delegates with direct power to decide on orientation and financing of national R&D funding programs achieve much quicker negotiation results than multi-stakeholder responsibilities leading to detrimental time to market delays.
- Follow a global approach for really global challenges in environment, energy and transport policy also with partners outside Europe.

Appendix 6: Commentary from Monique Goyens (BEUC - European Consumers' Organisation)

The civil society challenge in ETPs – some food for discussion for the ETP expert group

The participation of civil society in research and innovation

The genuine participation of civil society in research and innovation constitutes a major asset for research platforms: it enables them to test their thinking with broader challenges, in terms of relevance, legitimacy, credibility, acceptance, etc. It also constitutes an important opportunity for civil society to be closer to progress and development and to learn from innovators and researchers. This cooperation has huge potential for contributing to a society-based innovation and research policy.

What is civil society?

This word is very trendy, but diffuse. It however is used by many stakeholders without more thought to its effective meaning. Civil society refers to a broad range of interests situated between the State and the market, and the organisations that represent those interests are manifold and represent sometimes even contradictory interests : trade unions, consumer organisations, human rights associations, ecological and environmental organisations, NGOs for development cooperation, transport users, associations of disabled persons, women associations, etc.

To embrace those various interests within a given policy or strategy constitutes a major opportunity for enhanced credibility and legitimacy. It also constitutes a major challenge as it will lead to slower decision making

processes, compromise solutions, higher preparation and meeting costs. More fundamentally, the opportunity should not be missed, by announcing a multi-stakeholder approach without giving civil societies the means to effectively participate in the policy making. In doing so, confidence would be broken and civil society would turn away from the policy, not support it and even question it fundamentally.

Diffuse interests : the example of consumers

Having a legitimacy only to speak for the most important consumer organisations in Europe, the reflections that follow are limited to my experience in the consumer area. Some of them could probably be extended to other areas (workers, gender…).

Consumer interests are very diversified : some consumers are more aware of the implications on their health of their eating habits, some want to go on driving fast cars, some consumers are very anxious about chemical exposure, others just don't bother.
Representing consumer interests is therefore not an easy task. Consumer organisations have to manage both education and information, protection of legal rights and promotion of economic and health interests. While believing in market forces and the importance of consumers' ability to chose, there are fundamental elements on which it is not acceptable to compromise : health, safety, protection of most vulnerable consumers, sustainability.

The European market model is based on the rational and mobile consumer. However, behavioural science demonstrates that the consumer does not act as rationally as he is expected to do: there is a big gap between awareness and action: consumer inertia. many awareness raising campaigns, on which incredible amounts of money have been

spent, appear to be useless. Also, another finding, rather recent, is that people turn away from scary messages. They need more constructive communication

Do consumer organisations represent civil society ?

Consumer organisations check policy with regard to consumer rights and interests :

- health and safety
- consumer choice and position in the market place
- balance in rights and obligations
- access to redress
- sustainability and particular attention paid to vulnerable groups of consumers.

These interests are very often in line with that of other representatives of civil societies. Sometimes however they do conflict: consumers and workers do not have the same interests in global markets, for example: consumer organisations are against protectionism because it limits consumer choice, while worker organisations defend local job opportunities.

The dangers of the trend to refer to civil society

EU institutions speak a lot about civil society, because it is a factor of legitimacy. But when it comes to concrete implementation of that policy, the difficulties begin. Our current experience shows that the EU struggles with the concept and with its practical implementation. The dangers are the following :

Beware of cosmetic legitimacy

If policy and decision makers wish to engage in dialogue with civil society, they have to adapt their structures and procedures in order to effectively allow for input.from civil society organisations. If this is not the case, participation of those organisations is just cosmetic and does not lead to policies that are indeed closer to the citizens. Also, there should be a balance in participating stakeholders. In too many instances, it has been observed that advisory groups that exist at EU level are heavily influenced by the industry concerned, and that those NGOs who participate in the process have no possibility to make a difference (see Friends of the Earth Europe report : “whose views count ?”, http://www.foeeurope.org/corporates/pdf/whose_views_count.pdf)

Liberal democracy does not equal healthy democracy

In this context, it is not enough to provide civil society organisations with formal access to meetings and decisions, without taking account of the specific difficulties they have to face in order to contribute constructively to the work. There is a need to build into the decision making system the specificities of civil society participation.

There is a need to change mentalities at EU level : policy making is not just a closed shop where any initiative that could delay anticipated results is to be seen as counterproductive. Legitimacy is at this price.

Is there a case for civil society input into ETPs ?

Research, innovation and technology are not a goal as such. They have to respond to societal needs and expectations and they certainly should not go against societal values. Therefore, it is important that research planning is not led unilaterally by scientists, researchers and technical

experts. Planning has to pass the civil society test and must not overlook societal aspects and respect of our fundamental values.

How to involve civil society?

It has to remain manageable for all stakeholders. Mentalities have to be changed at EU level : policy making is not the privilege of a club the functioning of which could be delayed

Involve from the start, not just at the end to provide an imprimatur

It happens too often that civil society representatives are involved in the process at its final stages. It then becomes difficult to contribute to the process without disturbing the previous work already undertaken, as well as the deadlines set. More fundamentally, this means that the role of CSO is limited to commenting on trends and decisions, the framework decisions having been defined without them. It is much more efficient (and motivating) to involve CSO at the earliest stages of the decision making process, in order to design the decision to be taken or the policy to be adopted so as to take account of concerns of civil society from the start.

Provide funding for participation : expertise must be upheld

CSO have major challenges to face. On the one hand, they are non-profit making organisations, with limited financial resources and funding possibilities. On the other hand, they are, under the current approach for more participation of different stakeholders, more and more often invited to participate in working groups, advisory or high level groups, fora. They have to face the specific challenge to participate into meetings with those representatives from industry or public authorities who are specialists on the issue dealt with. In comparison to those specialists, CSO have to contribute to many works in many different sectors. They therefore have

to build up a multisectoral expertise[1]. For them to build up, maintain and expand their expertise, and in order for them to participate usefully in the works, adequate funding is needed.

Provide for some balance in the decision making process

In order to take account of these specific difficulties, and in order to introduce procedures and structures that go beyond just formal involvement of CSO, the following steps can be envisaged :

- ***diversify participation of CSO*** in a given structure : there should not only be one CSO participating into the work, but more. It is not adequate to state that where you have a consumer organisation and an environmental organisation, you have satisfied the CS legitimacy requirements. This makes it possible to take account of the various interests of civil society but also, it will make it possible for civil society to more strongly express its views when facing and sometimes confronting, private interests.
- ***Timing of works*** : (setting of agendas, invitations to meetings, requests for comments, …): Organise works at EU level such as to provide those CSOs that have EU coverage with sufficient time to obtain feedback from their experts in Member States.
- provide for possibility of ***dissenting opinion*** to be recorded : in the past, CSOs have been invited to meetings and groups with the simple intention that their attendance would legitimize the process. This has led to major reluctance by the organisations concerned to participate in such forums. One answer to this is to make it possible for dissenting opinions to be officially recorded in the documents that are to be circulated.

[1] For example, consumer organisations work in the areas of financial services, telecommunications, competition law, product safety, health, sustainability, energy (markets and environmental challenges), data protection and privacy, agricultural policy, biotechnologies, etc.

- ***Organise meeting agendas*** that allow for CSOs to only participate in those meetings that are strategic for them and where they can bring an added value to the process.
- ***Cluster ETP meetings*** in order to address common civil society concerns together: the interdisciplinarity which flows from clustering and cooperation with external stakeholders will lead to very good opportunities for all parties (more visibility, economies of scale for NGO experts, more impact). In this context, it is essential to raise awareness on the need and opportunities to cluster, on the need for coordination with Commission services and on the need for ETPs to develop a joint vision on societal issues.

Appendix 7: Commentary from John Hontelez (European Environmental Bureau)

Grand Challenges & Responses from European Technology Platforms

What are the big challenges the EU is facing? The formally adopted EU Sustainable Development Strategy (2006) offers a list on which consensus was reached:

1. Climate Change and clean energy
2. Sustainable Transport
3. Sustainable consumption and production
4. Conservation and management of natural resources
5. Public Health
6. Social inclusion, demography and migration
7. Global poverty and sustainable development challenges

In addition to these, we can add the general challenge of the objectives we might have taken for granted in the EU, but which are not always guaranteed, as the current financial and economic crisis shows:

8. Well functioning economic and financial system
9. Democratic, transparent society which respects citizens' rights
10. Good and stable international economic and political conditions and relations

What is - potentially - the role of technology in these major challenges? For energy conservation it might at first glance be more evident than for

social inclusion. However, the application, availability and price of certain technologies might have large impacts on each of the 10 challenges.

With the following checklist, the ETPs could be invited to frame their work, and see technology development in various perspectives, thus hopefully evoking new ideas, new cooperation and applications.

Checklist

Can new technology contribute to:

1. Climate and energy
   - Limiting climate change by drastically reducing GHG emissions
   - Increasing absorption of GHG (enlarging or creating natural and artificial safe sinks)
   - Cost effective, clean, safe, resource efficient and socially responsible sources of renewable energy
   - Zero energy, or energy producing buildings; intelligent buildings adapting to climate, and to inhabitant's activities
   - Adaptation to climate change in various climatic regions of the world

2. Mobility and transport
   - Better spatial planning, reducing urban sprawl and vehicle kilometres
   - Alternative ways of access for people instead of physical movements
   - Safety (physical and social safety, for users but also for others)
   - Reducing the use of space, of energy and materials and limit pollution

- Logistical efficiency for the transportation of goods (less vehicle km per item);
- Optimising the organisation and location of production – transport – retail chains

3. Sustainable consumption and production

- New or improved products and services with a significant smaller ecological footprint
- A consumption pattern which is affordable for the poor and does not cost the earth
- Lower psychological or social barriers for consumers and businesses to adopt sustainable behaviour, products and services
- Better informed public and businesses on sustainable consumption and production

4. Conservation and management of natural resources

- A better insight in the carrying capacity for various major, crucial resources
- Reducing the pressure on the use of land and water
- Similar or better quality products which use less resources and produce less pollution through re-use, dematerialisation, recycling, longer life time or safe biodegradability
- Avoiding waste in all stages of the life cycle: close the material cycles (cradle to cradle)
- More effective biodiversity protection and enhancement, also related to climate change
- Sustainable management and exploration of natural resources which deliver renewable materials (food, fibre, fish, wood, etc)
- Replacing resource intensive products or substances with less intensive products of a same or better quality (e.g. meat)

- Closing organic materials/nutrient cycles at an optimal scale (e.g. fee fodder streams, human waste streams)

5. Public Health

- A better response to upcoming health threats, with special attention for obesity
- Improving food and feed quality to improve health effects (e.g. attractive food products to reduce the intake of calories and especially animal fats and sugar)
- Reducing lifestyle (e.g. smoking, calorie intake) related and chronic diseases, especially among disadvantaged social groups
- Avoiding or replacing hazardous chemicals – including in food, cosmetics, toys, etc - which adversely influence the health of consumers, with special attention to (unborn) children.
- A better informed public and business on the health effects of substances, products and lifestyles
- Better research to enable or improve risk assessments for new materials, cocktails and residues of chemicals.
- Improved urban design: inviting people to enjoy the outdoor area (attractive nearby green spaces), stimulating exercise as part of daily life (walking, biking, using the stairs)
- Safer and more effective use of medicines

6. Social inclusion, demography and migration

- Improving access: all crucial services (food, health, education) nearby, travelling by foot and bike; affordable, safe and clean transport for further destinations
- Affordable, resource efficient and comfortable housing
- Housing designs that encourage social inclusion and positive social behaviour

- Better urban design in terms of social inclusion, road safety, reducing pollution & noise
- Means of helping elderly to stay involved, stay healthy, living independently longer
- Improving support for the elderly; more effective and easier support by care workers and family/friends

7. Global poverty & governance

- Improving governance, democracy, basic human rights
- Enhancing fair trade production and products
- Developing and enhancing sustainable business opportunities for/ by the poor

8. Well functioning economic and financial system

- Improving transparency of financial products and services, for consumers and business
- Improving insight and stability in the financial and economic system

9. Democratic, transparent society which respects citizen's rights

- Increasing transparency and citizen's information on governments and businesses
- Enabling more people to better use the internet but also protect their privacy and integrity
- Involving more people in public decision-making, especially relating to their own neighbourhood

10. Good and stable international economic and political conditions and relations

- Better international communication, understanding and cooperation
- Improving international information exchange on citizen's rights, democracy, conflict management, sustainable development, etc.

Appendix 8: Commentary from Karin Metzlaff, Fiona Williams, Gernot Klotz, Henning Kruse

Thoughts on ETP experience and further development

ETPs were created to develop a joint vision and SRA on R&D for certain economic sectors addressing societal challenges

- They developed the Vision paper, SRA and Implementation Plan respectively
- They started to have impact on R&D agenda in FP7

Key recommendations for further development to better address the grand challenges are:

What should be improved? Actions supporting R&D:

- The impact of ETPs on R&D agendas at European level needs to be improved to achieve a more strategic approach and thus a much better impact with existing resources:
  Recommendation: ***A major part*** *(at least 50% and at the end of FP7 at least 75%)* ***of call topics*** *(not project proposals)* ***for the FP7*** *cooperation and research infrastructure* ***Work Programmes should be articulated by the ETPs****.* ***The Member States are encouraged to follow this example*** *and draw input to their research programmes increasingly from the strategic input of the national TPs and the ETPs. Two principles support this recommendation: ETPs address societal challenges; and the European treaty defines the role of the FPs to increase European competitiveness.*

- The support for ETPs should be linked to quality criteria and more coherent across the services:
  Recommendation: ***Develop and apply common quality criteria and support mechanisms to ETIPs across the Commission services****.* ***Give credit to Commission staff encouraging and easing the work of and collaboration between ETPs in the ETIP clusters.***

What should be added? Actions supporting innovation:

- Major shortcomings for the various sectors are hurdles to bring the R&D towards innovation and products on the market. This is a matter of URGENCY.
  Recommendations: ***To bring products to the market from existing R&D, the European Commission should give incentives to ETIPs*** *(e.g. publish support action calls)* ***to develop Innovation Action Plans.*** *Such plans should include actions along the innovation chain on legislation and their implementation (e.g. in agriculture), on systems integration (e.g. in IT), on IPR etc. key to bring products to the market based on existing R&D. Products should address societal needs across the ETPs that can contribute, such as food, water and energy, transport, climate change etc.*
  In a second step, the Commission together with interested Member States, should find resources to translate indentified actions into reality.
- For the longer term, foresight studies across ETPs addressing societal challenges will be crucial.
  Recommendation: ***The Commission should provide incentives*** *(e.g. calls)* ***for ETPs*** *addressing a common societal challenge(s)* ***in an ETIP cluster to jointly undertake foresight studies and link with Commission service foresight activities*** *(e.g. IPTS Seville)* ***including economic, environmental and social aspects.***

- Clearly ETPs have the potential to improve European Competitiveness and addressing societal needs far beyond R&D. Therefore, in addition to their coordination and support in DG RES, a higher level coordination of support from the various Commission DGs is crucial. *Recommendation:* ***Collaboration between ETPs addressing societal challenges in ETIP clusters and*** *the respective* ***support mechanisms from the various Commission DGs and services should be coordinated by a dedicated higher level office,*** *e.g. in the Commission President's offices. Such an office should give guidance to ETPIs and provide ad-hoc funds to encourage collaboration between ETPs in ETIP clusters. It should provide guidance to Commission services and help identifying programmes to support respective actions inside the services. One example is the SET Plan.*
- To bridge the gap between R&D and products on the market, a European Innovation programme will be key. *Recommendation:* ***The Innovation programme will address actions identified in the ETIPs' Innovation Action Plans,*** *such as regulatory, systems integration and IPR issues that address hurdles / shortcomings along the innovation chain****. In addition to the ad-hoc resources that should be made available, a dedicated programme parallel to FP8 will be crucial.*** *For instance****,*** *in DG ENTR a European Innovation Programme that can follow results from the European Framework Programme and others for Research and provides feedback to these, should be started. Again, Member States are encouraged to follow this example. One component of the EIP could be a European Innovation Council (EIC), providing support to SMEs, another component could be European Innovation Actions (EIA) addressing whichever needs a certain sector has to bring products to the market.*

What should be added? Actions supporting education:

- A cluster of ETPs addressing one grand challenge, an ETIP, is well positioned to identify as well the shortcomings in skills and areas of expertise that will be needed in future to perform the research and undertake the innovation.

  Recommendation: ***Education Action Plan - each ETIP activity cluster should identify where there are shortfalls of skills that are required for the effective undertaking of the planned research programmes and innovation activities.***

  The ETPs and ETIPs should determine the skills / areas of expertise that are in short supply, numbers and levels of educational requirements that are needed and, where possible should recommend approaches that would redress these shortfalls of skills.

  This will be assembled as the Education Action Plan of this ETIP.

  In a second step, the ETIPS need to discuss these shortcomings with relevant authorities that are responsible for the education – mainly the national or regional ministries for education.

  This could be facilitated by the EC by for instance holding a conference at which several ETIPs present their Education Action Plans that are then discussed with representatives from the ministries of education from the Member States.

  It will be then up to the Member States to address these shortcomings and possibly discuss again with the ETIPs and EC after 1-2 years.

European Commission

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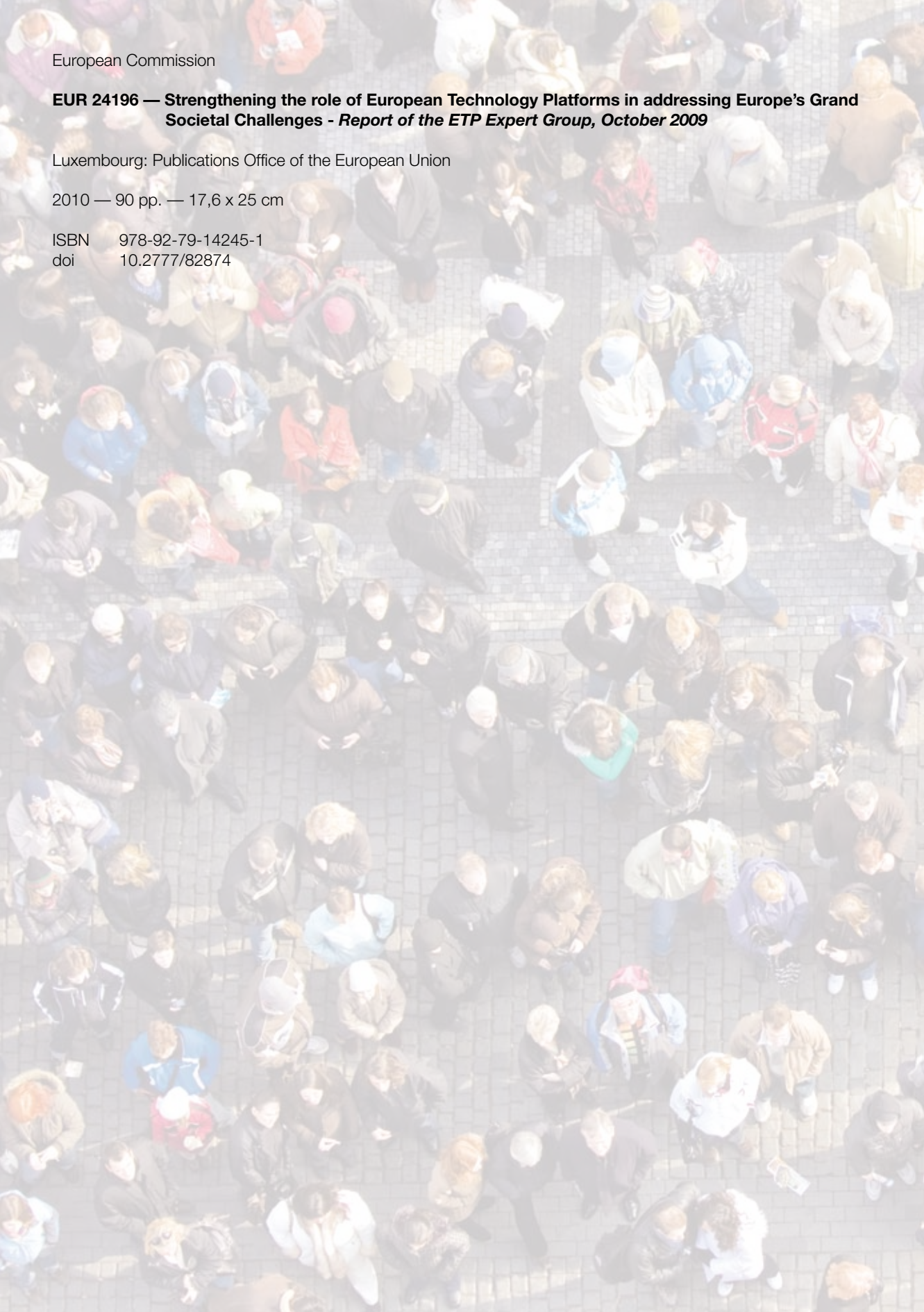

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This report summarises the work of an Expert Group on European Technology Platforms (ETPs), convened by DG Research in early 2009, to examine how the activities and achievements of the current 36 ETPs should evolve in the near future. The Expert Group recognised that ETPs have already achieved considerable success and that recently many ETPs have formed joint activities to address themes beyond the scope of a single platform. The Expert Group proposes that in future all ETPs should be encouraged to work in flexible clusters focused on addressing the key societal challenges facing Europe. The clusters should involve all relevant stakeholders, work across all aspects of the knowledge triangle, and be responsible for implementing potential solutions. ETPs will be able to contribute more to focus research programmes towards the challenges faced by European society and also to bring the results of that research to the global marketplace.

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