Following the request of Professor Graça Carvalho concerning how we can improve global efficiency on existing RTD programs at EU level as well the existing procedures, hereby I am presenting a contribute that involves mainly information supplied by the European Materials Research Society (EMRS) via its General Secretary, Professor P. Siffert and past president, Professor H. Grimmeiss added with contributions from CENIMAT/I3N, Portugal (R. Martins and E. Fortunato).

1. European Research Infrastructure

Due to its economical and scientific global importance with respect to efficiency and global competition, the European research infrastructure (RI) is one of the main reasons for the fragmentation of European research and the inefficiency of the research funding, which is not able to resolve the European Paradox and, hence, to improve innovation.
Here, special emphasis should be put on the role that materials science and engineering has as a driving force towards broad areas of research where they play a key role, going from Electronics, to Nanotechnologies where the discovery of novel materials and devices with exceptional properties are relevant towards both type of envisaged approaches: Bottom, up, as typically in academy and top down, as required by enterprises. Thus proper articulation with existing programs is required, such as the European Research Council, a typically bottom up research approach where discover is the key issue while others, like EIT (European Institute of Technology) or the existing European technological platforms, the driven force is innovation and to turn them available to marked in a medium/long term range.

Thus, from existing RI across Europe a better articulation is needed among them, EU national programs and created novel RTD strategies, as the ones mentioned above, besides to reinforce some of them in novel/strategic fields, with a clear global inter-states, subsidiarity and international European view.

Apart from those listed within the roadmap of the *European Strategy Forum for Research Infrastructures* (ESFRI) there are others, often identified in national roadmaps or recognized by national agencies that are the key to the framework of the *European Research Area* (ER). ESFRI, whose delegates are nominated by the Research Ministers of the Member and Associate Countries, has recently established a roadmap that identifies a total of 44 RI projects, which are considered as priorities for the European scientific community. The overall construction budget for these facilities is in excess of 20 billion€, and the operating costs will be around 2 billion€ a year **(**Ref. 3). Out of these 44 projects ten projects have effectively started, although much remains to be done to finalize all the details. In spite of receiving a large part of the European research funding, the efficiency of ERA concerning innovation is questioned considering that *only 15% of high tech products* are coming from Europe.

Most of the proposed RI comprise “large facilities” to support or host international research consortia in reaching their research goals. This will no doubt have an important and necessary impact on European research but since the primary aim of the planned research infrastructures is not to establish closer ties between science and the private sector it will not solve the European Paradox. This needs effective articulation with the launching ITE EU program.

It is generally presumed that the impact of RI relates to the impacts of the research and innovation they make possible. However, according to a recent report of the Expert Group on RI, these impacts are classified as (a) direct scientific impacts and (b) indirect or technological impacts. In this perspective, indirect or technological impacts are understood as innovations in the production of goods and services that arise as spin-offs from the development of RI or the benefits accruing from the advances in scientific knowledge that stem from their operation. It should be observed that in this context innovations are considered as an indirect and not as a direct impact.

2. Improve European RTD coordination at Academia and Industrial level

Former Vice-Commissioner Günter Verheugen, for example, emphasizes: "*As a matter of principle, **innovation is the cornerstone of the European economic strategy**. The whole strategy is based on the idea that we have to compete in the globalised economy*". And he adds: "*In my view, in the future, we need to coordinate better. We need to **pool better the existing resources at EU level and Member State level**. And there is one problem, and I'm not proud that I have to mention it. We still have not solved the **intellectual property rights** question, which is absolutely crucial for successful innovation policy. The Community patent is indispensable*".

Collaboration between academia and industry on a European level is complicated by the fact that intellectual properties are presently not treated equally in the 27 member states of the European Union. Europe needs to improve coordination. Provided this can be achieved, there are still different rules at European universities regarding the ownership of IP rights. In countries like Sweden, it is the inventor who owns the IP right whereas in other Member States they are owned by the university or shared between the inventor and university, like in Portugal. In order to facilitate the cooperation between universities and the private sector, the owner shares of IP rights should be negotiated by the partners involved in the innovation process (i.e. the researcher(s) at the university and the company) and not be regulated by intricate national or regional regulations.

Furthermore, improving the European industry's competitiveness and increasing European productivity, as claimed by the EU Commission, ***it is paramount to resolve the European Paradox***. We believe that the critical need for closer ties between MS&E and industry is of such great importance that we should devote special attention to this subject. It is of paramount importance to identify European targets where Europe could be competitive, not just based on existing and established enterprises but the ones that will be generated in full high risk and innovative fields where EU should be involved, by supporting the inventive, creativity and entrepreneurial EU spirit.

Commissioner Janez Potocnik therefore underlines in one of the papers from his Expert Group: "*in thinking about research and innovation, we must focus on the following areas and issues:*

Creating a single market for knowledge, *allowing researchers, ideas and technologies to flow freely across Europe, which encourages better and stronger collaboration between industry and the academic world in an environment of 'open innovation'. We call this the* **Fifth Freedom** *and once fully established will create more competition and therefore support* ***excellence in research - the basis for a competitive knowledge economy***.*"*

Fifth freedom and excellence of research has often been brought up in public discussions but also repeatedly criticised. The reality is that there are finite resources. It is naïve to think that just calling for more money to be ploughed into science without strong evidence for social benefit will open any politician's purse strings. Research is to a large extent paid with tax money and, hence, "*citizens have an increasing stake in the European Research Area and in science in Europe in general. There is a*

Europe-wide agreement about the value of science for the benefit of society and for the development of the economy". Or in other words: Science is indebted to reimburse the benefits of the taxpayer by transferring knowledge into new products and to be accountable to those that provide.

In Europe research is performed at three levels, the regional, national and European ones. Because of the different cultures in European countries, it would be reasonable if the national research councils could oversee the regional and national levels whereas European agencies should focus on the European level. Within investigator-driven frontier research, the *European Research Council* (ERC) is one of these agencies. Its main aim is to stimulate scientific excellence by supporting and encouraging the very best, truly creative scientists, scholars and engineers to be adventurous and take risks in their research. The sole criterion for selection of grants is "*scientific excellence*", which, however, is not different from the criteria of national funding agencies. *The ERC expects that its grants will help to bring about new and unpredictable scientific and technological discoveries. No doubt, this will inspire the innovation process but it is not offering closer ties between science and the private sector*. <u>To "bring research results closer to the market" additional steps are needed. This should be one of the EIT missions, we believe.</u>

Though many more statements of this kind could be quoted, these few should be enough to alert us Europeans that there are reasons for the lack of sufficient capacity and coordination to transfer knowledge into products and services and why today's infrastructure in Europe does not always meet the <u>requirements of industry</u>. However, there is an emerging consensus among the scientific community in Europe that the European Paradox is not the result of insufficient creativity, intelligence or money but may primarily derive from weaknesses in the research structure and coordination.

3- The Energy field

Energy is another important subject not only from the scientific point of view but also for political reasons. Renewable energy resources have been discussed since many decades but mostly from political point of views, which are not always taking into account the industrial and economical aspects. <u>Solar energy</u> is a typical example. A closer look on European energy companies like Vattenfall shows that solar energy (at least as discussed when I met the company's chief of research recently) covers less than 1% of their products whereas they put a lot of money in new coal power stations. The <u>CO_2 issue</u> is therefore another subject well worth to be discussed in more detail. Research on photovoltaic solar cells is performed quite intensively in Europe; <u>*however, the industrial impact is not based on economical competition but paid by the European taxpayer*</u>. Considering the competence we have in Europe in the field of <u>PV and CPV</u> we would appreciate if we could come up with recommendations for the future development and implementation as well as research programs of both PV and CPV. Personally we would also be glad if we could take positions in <u>atomic power</u>.

Of course there are many other subjects, which should be taken up within this subject. <u>Batteries</u> are one of these issues. In comparison with other global competitors, our impression is that Europe is not doing very well within this area. <u>For example</u>, in the past, researchers have improved the speed of ion flow in lithium-ion batteries by employing nano-structured electrodes. However, the power delivery of these has still been less than capacitors. Now researchers at MIT in the US claim to have created electrodes from carbon nanotubes that can make lithium-ion batteries some ten times more powerful than conventional models. The new electrodes were made with a novel layer-by-layer technique, which allows high control of electrode thickness and other properties. A battery incorporating these electrodes could store five times the energy of a normal capacitor, and could deliver **ten times the power of a**

lithium-ion battery with standard electrodes. Also, the energy capacity did not fade over more than a thousand recharge and discharge cycles.

4- ITE

ITE is in our opinion another subject of high importance. The recent statement of the German BMBF, which was wondering, should alert us all: Why funding research on nanoelectronics if there is no production in EU? At the ExCom meeting this spring we discussed a report, which was published by a EU Expert Committee and summarised the outcome of the FP7 Workshop on "Advanced Nanoelectronics Technologies". We all agreed that this report, delivered by an expert group, which included experts from CEA-LETI, Infinion, IMEC, Fraunhofer-IZM and even IBM, was not presenting any new aspect (see ITRS); was not addressing the European problem (in spite of many programs no real strategy); did not address the main problem: The European microelectronics Landscape has changed considerably (why research if there is no production in several areas?); presented recommendations which are difficult to understand (the role of future FP7/8 goals: "convergence of beyond CMOS and More than Moore should be stimulated..."); presented in the annex "Application scenarios", which are already given by ENIAC (CATRENE) and, hence, cancels the criteria of differentiation.

The comments of European funding agencies were:

1) On the European level there are too many structures/programs on nanoelectronics without strategic contents (cf. the 2 parallel activities CATRENE (Eureka) and ENIAC (Joint Technology Initiatives)) and
2) questions like
   - where are the focal points and future goals in nanoelectronics?
   - which programs should be developed to reach these goals? etc.

were raised but answers were missing (though both programs are industry-driven).
We should really reflect on questions like: Why is the visibility and competence of EC-representatives within this area so low? The useless parallel world of programs is well known and it should be their interest to focus on future challenges.

We should stress that research in general is important, not only for scientific but also of economical reasons. However, without concepts, roadmaps and an active involvement of industry there will be no benefits for the society. Could an alliance between (public) research policy agencies on the one side and the private sector and research institutions on the other side be one alternative for solving network problems and finding solutions for future challenges?

Subjects which were not completely described or even missing in the report, are:
- ✓ Integration of CMOS or BICMOS with photonics (for example, by combining Si- and III/V technologies)
- ✓ THz ICs
- ✓ Local integration of grapheme
- ✓ Sensor networks.

These are only a few examples, which can be extended quite considerably. I am surprised that Barbier did not mention these subjects. Are MEMS and CMOS which he described very well, his research areas?

For us, as conventional microelectronics is concerned, the most chocking outcome of our discussion was the fact that 300 mm wafer production in Europe is presently less than 1% of the global production (see Fig. 1). Similar figures are valid for the 200 mm wafer production (see Fig. 2). The opinion of the industry was that existing wafer production facilities in Europe (such as IFX) will be used for specified technologies also in the future but larger growth is not expected. Due to the high degree of automation, salaries are no longer a convincing argument for having CMOS production placed in Asia. GlobalFoundries therefore intents to start an additional wafer production in the State of New York (USA), which I find is the most convincing argument that salaries are no longer of importance. Hence, capital costs are the main issue for choosing the place of fabrication. This means, taxes as well as funding are the prerequisites for the decision on the venue! This implies that Europe would still have a chance if the research infrastructure and, hence, its funding would be made more efficient.

This is only another example, which shows that most of the European weaknesses are connected with the research infrastructure. **Just for the sake of discussion**, let's take one example: ESS in Lund (Sweden).

Wafer production facilities (Europe)

300 mm

Venue	**Company**	**WSPM** Waver starts per month	**Comments**
Dresden	**GlobalFoundries (GF)**	**0,05 M**	0.06 M Singapur 0,07 M USA
Dresden	Qimonda	0	Insolvency
Dresden	AMD	0	Production transferred to GF
Landshut	L-Fab	?	small
Catania	ST	?	Flash

Global 2009		**3,5 M**	Logic, memories, microprocessors etc.

Fig. 1

200 mm

Regensburg Villach	IFX	0,05 M	Power-Technology
?	ST NXP	0,05 M 0,05 M	
Global 2009		**4 M**	

Fig. 2

The ESS Lund project itself will generate

- **1 338 M€** construction costs and
- **93 M€** annual operating costs together with
- **172 M€** decommissioning costs

at 2007 prices.

30 years of operation means **2800 M€** or a total of 1338 + 172 + 2800 = **5 110 M€ !!**

On the other hand, the foundry wafer production capacity is 500 K Wafer starts per month (WSPM) on a global basis.

If 10 % of this foundry capacity has to be built up in Europe we are talking about **50 K WSPM.**

50 K WSPM corresponds to 600 k wafers per year.

Assuming a price of 4 k€ per wafer, we have a selling prize of **2,4 B€ per year.**

Assuming a margin of 40 %, the costs are **1,5 B€ per year**.

If 2/3 of the costs are due to investment and depreciation over 4 years, then the investment for such a factory will be 4 B€.

We are not against ESS, but this example shows that the replacement of only one of the many projects within the EU RI (for example ESFRI) would save the future of European wafer production.

I have got the above figures from high positions in industry and colleagues in our academy. But I am right now in the process of checking these figures again to be absolutely sure that they are correct.

Another very important subject of interest for us is related to novel emerging areas to which Europe should be involved since the beginning aiming to have a leader role.

5- Away from conventional silicon technology

The backbone of the current microelectronics industry are components based on silicon semiconductors: modern data processing and telecommunications almost exclusively relies on the use of these single crystalline materials, therefore large sectors of global industry are engaged in their production, further processing and application. However, the perspectives for further developments are limited, especially for low cost flexible electronics consumables since the constraints of the material such as its non availability for flexible devices processed at low temperatures are obvious. The emerging class of oxides, covering the all range or required material properties, going from dielectrics, to conductive and semiconductor characteristics, it is able to overcome many of those restrictions, especially because some of them can be prepared as thin films under comparatively moderate process conditions and can even be thought to be used in the future CMOS like technology. This opens a pleura of new ICT applications, relevant to boost the oxide based ICT EU industry into a new era of growth, using low cost and environment and human friendly green materials, complemented the today’s master semiconductor that will still remain to be Si, at medium range time schedule.

Another area where Europe could be leader concerns the area of so-called paper electronics where paper-based products with specific autonomous functionalities aiming at interacting with their users and/or reporting changes in their environment can be developed. A major focus should be placed on the development of new and flexible manufacturing concepts based on printing technology to produce large area hybrid organic/inorganic papers with improved performance at competitive cost, able to perform electronics functions such as battery, sensors, display, memory, etc. in an integrated manner, highly relevant for the future of the disposable electronics.
In a more long term vision, we have to consider the expected advances in Graphene electronic applications as well as in a myriad of novel discovers, boost by the nanotechnology advents.

As far as technology is concerned, Europe is targeting a global leadership in printed electronics that is expected to grow to a market size of 57 billion USD by 2019 with long-time potential of up to 300 billion USD by 2030. This is an ambitious goal with the strong competition from developments outside Europe.

For this purpose, break-through advances in the state of the art in terms of development of new low-temperature printable materials with enhanced performance based on combining the best properties of organic and inorganic materials into hybrid structures at both the molecular and at structural-interface level, having a large application spectrum is required and so, to have the focus of the EU.

The field of printed organic electronics has made impressive progress in the last 10 years. In particular, (i) the field-effect mobility of solution-processed, organic TFTs has increased to levels exceeding that of thin-film amorphous silicon TFTs (~1 cm2/Vs), (ii) the performance of polymer LEDs is surpassing that of fluorescent tubes and (iii) the efficiency of printed organic solar cells is now reaching levels of 5-7%. However, it has also become clear that significant further improvements in performance and reliability are needed to enable long-term development of the field and new applications.

As stated before, transparent metal oxides are a class of inorganic conductors and semiconductors that has recently attracted significant attention for use in thin film transistors (TFTs), conductive electrodes,

optoelectronics, and sensors. To make use of these superior properties of inorganic materials while retaining the processing benefits of organic materials, i.e., compatibility with low-temperature solution processing and printing on plastic/paper substrates as well as good adhesion properties, hybrid organic-inorganic materials are essential. To achieve sufficient solution processability, the inorganic elements need to be attached to organic ligands and mixed with organic binders that either are eliminated during thin film processing, e.g. by thermal, laser or electrical annealing or remain in the structure for enhanced operation.
The above given examples are the emerging ones that Europe should track their developments and so considered as hot topics concerning novel RI or in EIT KIC, besides being clear contemplated as key strategic areas within the 8th RTD EU program.

6- Interdisciplinary.

If there is any area in science, which is characterised by interdisciplinary, it is material science. For this reason, difficulties in communication and, hence, transferring knowledge from the academic world to the private sector are often generated by the increasing interdisciplinary in material science which often has become a dominant factor. Materials science is no longer defined by a single sector but is now covering several classical areas such as physics, biology, chemistry, mathematics, medicine, mechanics and nanotechnologies. This complexity has caused considerable disturbances and worries within materials science both with regard to research and education as well as relating to university structures. The different areas within materials science do not perform primarily *basic research but also engineering science and are therefore closely connected with technology*. Many companies, not least small and medium sized enterprises, have problems with the complexity and interdisciplinary of such disciplines, which often causes frustration and unwillingness among university researchers when communicating with the private sector. Since most professors at European universities are on a tenure track they see no direct need to endure the troubles of cooperating with the private sector, as experienced, for example, by the Fraunhofer Gesellschaft.

Interdisciplinary has also often a negative effect on innovation though it should be the other way around. Taking into account that in many *European member states the number of university professors with a background from the private sector is very limited and that most companies are not always aware of the latest research development,* it is not surprising that transfer of knowledge from the academic world to the private sector within material science too often is hampered by difficulties in communication. These difficulties are based on the fact that the **objectives and goals of the private sector** are completely different from those of universities and that due to the different background neither university researchers nor companies are always aware of the practical aspects of new ideas or research results.

Interdisciplinary is also causing problems for research institutes like IMEC or LETI. These research institutes are supposed to focus on well-defined aims, which are driven with high flexibility. But for obvious reasons this can only be done within a limited number of research areas. Yet cooperation with universities would allow them – based on the support of the university researchers - to broaden their views and to get a better understanding of new ideas and their possible applications. However, experience shows that research institutes are not always satisfied with their cooperation with the academic world.

In concluding this short list of possible subjects for report, we should to put your attention on a further interesting subject:

7- Mobility.

In a creative environment, knowledge and ideas are flowing between researchers at seminars and informal meetings. Each individual researcher contributes with their experiences and special interests as well as networks that she or he has established during the career. Networks can accommodate contacts within a specialty, but also to other disciplines and activities. The more extensive the networks are, the broader the knowledge and experience bases the environments have access to. How extensive and well functioning such a system can be depends on mobility within the research society.

Free movement or mobility has several dimensions. Recruiting research leaders and collaborators from other departments and universities increases external contacts and gives possibilities to obtain group members with a different background than the one prevailing in the home environment. I have earlier pointed out that the promotion system at Swedish universities has essentially led to a ceasing of external recruitments, and hence Swedish universities are now lacking the advantages that come with this type of mobility.

External recruitment is a route to enriching an environment with new competence. Another possibility is to have a visiting fellows program so that prominent national or international researchers can be invited for shorter or longer visits at a department. A programme, which gives researchers the possibility to spend time at other institutions, can in the same way increase the breadth of their department's research. In Sweden, for example, professors were once entitled to a sabbatical on a regular basis for precisely this reason, but tighter economic conditions have resulted in the system being abandoned.

In the US a system was early implemented with postdoc positions given to young researchers with fresh PhDs to offer them possibilities to do research at some other university. The reason for awarding postdoc positions at other universities was in order to give the young researcher a widened horizon. With the American system as role model, a postdoc programme has with great success been implemented in many European countries, and this has without doubt been an important effort to increase mobility. Several stipend programmes for shorter or longer visits at foreign universities have served the same purpose.

When it comes to mobility and contacts between disciplines some new thinking is probably required. *Mobility between disciplines is particularly urgent and is of decisive importance for areas such as materials science*. However, increased mobility between different disciplines has so far received limited attention. It occurs on a more practical level at the boundaries between physics, chemistry and the life sciences including medicine. Technically it can work well, however, the communication problems are too large for a more genuine interaction to occur, and most research funding systems do not encourage such activities.

In comparison to our global competitors such as the USA, mobility of scientists and engineers between the private sector and the academic world is extremely limited in Europe for several reasons. One of these is based on the different promotion systems at European universities. Though we are dealing with the European Union, university regulations and configurations, both with regard to education and research, are still rather different in the 27 Member States. These regulations complicate the possibilities for universities to hire people from outside the academic world. Like in the USA, European universities should be more open for applicants from industry and judge their experience and knowledge in a similar way as for applicants from universities. Right now the number and citations of published scientific papers are often more important than experience or patents for the filling of university positions. Furthermore, the interest of companies, no longer performing research, in people with merely experience in basic research has decreased considerably.

Improving mobility between the academic world and private sector with a long-term gain and strong impact on Europe as a whole as well as on each single European country is therefore paramount. However, to achieve such an improvement on a European level, it is strongly suggested that the red tape is abolished in connection with the exchange of scientists in Europe. All efforts should be taken to make it easier for researchers, in particular for the young ones, to move from one laboratory to another and not being hampered by differences in taxes, pensions, social coverage and time-consuming applications.

However, improved mobility between the academic world and the private sector will only be possible if the European industry is willing to cooperate. Most of the European companies are showing an insufficient willingness to perform joint research with universities in a constructive manner. Even more surprising is the fact that high-technology companies often ask for research funding (both on EU, national and regional level) as subsidy for their entrepreneurial objectives. Many examples can be given showing that new ideas generated in Europe have been transferred to other countries like the US or Japan and transferred into industrial products instead of being used for new goods and services in Europe. All this shows that a change in attitude is needed, which cannot be stimulated by EU funding alone.

Let me give you one example. In Sweden the present academic structure is flat and leaves limited natural space for academic leadership. The present promotion system has led to open competition in appointing top positions to be a rarity. The already insufficient ***mobility*** of researchers between different universities has in practise completely stopped, and many departments today constitute quite closed environments.

In contrast to American research, Swedish research is also characterised by a lack of openness, with limited possibilities for interaction across the traditional borders between different disciplines and areas of competence. Today’s research requires access to extensive and often expensive equipment and specialist competence. A single research group, which for its activity finds a need for complementary expertise or instruments, could in many cases accommodate its needs by interaction with other research groups. This occurs to some extent but could be increased considerably like, for example, in the US.

II- HOW CAN WE IMPROVE THE EFFICIENCY OF THE EUROPEAN R+D+T

INTRODUCTION

A recent special issue of the European Commission "RESEARCH EU" November 2009 shows that despite the billions spent Europe plays "KEY ROLE BUT PERSISTENT WEAKNESSES (page 9) still exist, and "Did You Say Lisbon" (page 10) clearly shows that no progress has been really achieved in the world competitions by Europe.
Does that not just indicate that we have not yet been able to find the right procedure, despite more than 25 years of Framework programmes (started 1983)?

This short report objective is to propose certain modifications, largely inspired from our experience at the world level.

Let us start from the preparation of a call to the final decision to sign a contract.

a. PREPARATION OF A CALL:

This is everywhere a rather long process, largely defined from inputs coming from the member states. Overseas the contains of a call is mostly defined by HIGH LEVEL SCIENTISTS well recognized. In Europe that is not always the case, certain are sitting there since years. What is also strange is that the adopted text can still be modified by Commission's agents just before publication, probably the role of lobbying.

PROPOSITION: High level scientists and engineers changed for every call.
When adopted by the ad hoc committee the agent cannot introduce any change.
In addition, the calls should reflect the EUROPEAN PRIORITIES and include a strategy covering several years, watching the longer term future. For example: if Europe has the best sensor for medical imaging a whole very important market could be covered by the medical instrumentations. Unfortunately, sensors play a minor role in the calls.
Other examples are the so-called transparent/oxide electronics or the paper electronics, with pleura of novel applications, away from the traditional silicon, filling an existing gap as the one related to the so-called flexible and disposable electronics. Those areas should be clear back-up by existing and novel EU programs as RTD steam towards the future EU industry of knowledge, as a medium and long term strategy.
Similar example could be given to printing electronics where Europe needs to make a strong effort if does not want to be moved away from world stream concerning this powerful and low cost technology.

b. SUBMISSION OF PROJECTS:

The European Commission is really the only place where the scientists and company have practically to hire a specialized company to write the project, since certain keywords have to appear. THIS IS NOT ACCEPTABLE.

PROPOSITION: use the procedures which are used both overseas and in various European countries: DFG, ANR etc...Implement a two stage call where the first step should be clear visible concerning the scientific and technical merit of the proposal.

c. EXPERTISE OF PROJECTS:

* EXPERTS: motivated by a false democracy, everybody can apply to be an expert in Europe's calls. This is not acceptable, since most of them are not really qualified.
* PROCEDURE: a given project is generally analyzed by several experts who are discussing together and the representative of the Commission does generally not remain silent. (Even if in a first step the different experts act individually, they come together with the functionaries to adjust the notation).

PROPOSITION: use the same procedure as internationally recognized, for example the expert should be either a well recognised specialist of one of the names recorded in the literature within the submitted project. This means to change the actual data basis.
This procedure induces the possibility to use experts even from overseas (in USA for example), as already happens in some evaluation areas.
These experts should not know each other and the note given by the different experts collected by the administration without any possible modification, and then it will be responsible to elaborate the so-called consensus report, involving either the first evaluators or a limited number of them. That is, promote the remote evaluation as much as possible, for all first stage evaluation.

d. STRATEGIC /POLITICAL ISSUES:
We all know that the "Lisbon Strategy" has failed because around 80% of the effort should have been done by the member states, which did not really take any action.
It is essential that Europe defines a certain number of PRIORITIES: telling to the population that we should always have one foot advance on the overseas strong countries does no longer apply (example: the fast trains with China, exporting now their technology; tomorrow it will be the aeroplanes ...)
These priorities i.e. the fields were Europe has some strength if well known by learned societies (like our E-MRS, a member of a world structure IUMRS). These people should contribute to suggest priorities.
If Europe continues on the same track as presently, INNOVATION will completely disappear; especially they are generally not made by the biggest companies or by innovative small groups. In this respect, how is it possible that certain large companies, like THALES are in around 70 projects, among them about in 30 as leader?? (Appendix 2)

The selection of the PRIORITIES is another matter of POLITICAL decision. For example IMEC has a success rate in the calls of nearly 50 % (Appendix 3) in the field of advance integrated electronics. However, their customers are essentially non European companies. Is it the role of Europe to develop jobs overseas?

e. ADMININISTRATIVE AND BUDGETARY MATTERS

We all know how administration matters consume time and resources to the researchers and to the institutions, such as the time-sheets; allocation and control of expenses; men-month costs; overheads. Without losing the need of control, there are some points that could be clear improved, aiming to turn the process consistent and less administrative heavy.
PROPOSITION. Allow institutions to select the process control that should be preferentially selected from an upgrade Lump sum model, in which countries and industries should define costs.
Avoid the use of time sheets and allow changes between cost items up to 10% without the need to require permission at EU headquarters. Improve the follow-up of projects by experts in the field.

SUMMARY OF OUR PROPOSITIONS
(which do not need a modification of the treaties, for most of them).

* MODIFY THE ROLE OF THE E.C. AGENTS :if a HIGH LEVEL SCIENTIFIC COMMITTEE has established the content of a call, they should be able to modify it afterwards. Their role is to facilitate the ADMINISTRATIVE part.
* The TWO STEPS CALL should be mandatory; however, the first step must be EXPANDED to give the possibility of the proposers to explain what they do.
* the SUBMISSION by companies hired just to write a proposal should be forbidden.
* EXPERTS should be selected by their qualification and not just by filling up a sheet on internet. Several experts should analyze a given project, but without any contact one with the other and no interference by the Brussels agent.
Here again, the learned societies should be able to identify, if necessary, the right persons.
* DEADLINE FOR SIGNATURE OF A CONTRACT should be drastically reduced, especially if Post doc students have to be hired.
* NO LUMP SUM PROJECT should be accepted , but the cost quoted for manpower in a project should reflect the exact cost of salary including social costs. NO difference should be accepted, even for SME's .
* During the operation of a contract, the agent in charge should not be moved all the time.
* INNOVATION is generally not the result of a mega world company, but rather the result of smaller groups, either in Universities of SME's.
* NATIONAL COMMITTEES if we wish to integrate the R+D+T in Europe, there is no reason why national administrations should interfere with the scientific community.

WITHOUT A STRONG MODIFICATION OF THE PROCEDURE , EUROPE WILL CONTINUE TO DECLINE !

NOTES
We asked (EMRS) people who is used to have contracts since several Work Programmes. Here a typical answer in APPENDIX 1. As you can see the reduction of control is not true. This is confirmed by reports published by a specialized newspapers in France: APPENDIX 2.
Concerning the reduction in time after the experts have accepted, this is not true too. See APPENDIX 3, the time is increasing, coming close to ONE YEAR. This is not acceptable, especially for Marie Curie: no good student can wait for such a long time before he knows if he will be supported.(APPENDIX 3)
NB: ERC and EIT will not be considered since no contract has come to its end presently

2. FUTURE POSSIBILITIES :

A. STRAND 1: as already pointed out in appendix 3, the time is not reduced in FP 7, it is just the opposite which happened.
* UNIFORM APPLICATION OF RULES: in addition to what is said in this section, it appears that the officiers in charge are changing all the time: frequently more than three successive are involved in a project.
* OPTIMISING STRUCTURE & TIMING:
in our opinion the two stage submission is not working properly because not sufficient space in stage 1 to describe for a non specialist the objectives.
* SIZE : this is a second order question
* SCIENTIFIC PRIZES are already very numerous also in Europe. This has nothing to do with a research project, since is a individual PRIVATE recognition.

B. STRAND 2 :
* BROADER ACCEPTANCE: it is clear that progress should be made in this direction, it may explain why big organizations like CEA or CNRS end up at the European Court.
* broader acceptance accounting rules, average personnel costs: since the names of the persons involved in a given project are known, why not just use their salary including social costs in the budget. That would make the whole transparent.
* INTEREST OF PREFINANCING: the present rule is not good since it is the bank which collects the interests of the pre-payment .This rule has to be suppressed !
* LUMP SUM: this is not a good idea and will open too many issue of the project's money. Since all salaries are well known (even in SME's) why should a forfatary amount of money be given. Please, try to evoke a new tinny rule based on Industry and institutions budgetary affairs
* TIME PROJECT SELECTION: we are not convinced at all that the meeting of the member states is the cause of delays. They give a perturbation in the projects selected: this may explain why some companies have over 70 projects in France and others over 100 in Italy, within the 7th FWP.
We propose a complete modification of the evaluation and selection of the projects.

C. STRAND 3: Moving to result based instead of cost based funding.
This is completely UNACCEPTABLE since the achieved results cannot be evaluated with accuracy. This will open a lot of non adapted spending of the contract's money. The costs can always be verified through the invoices, but the results are impossible to be checked carefully.

CONCLUSION:
In short, most of the proposed modifications / innovations will not create the conditions of a successful European R+D+T situation. They do not reflect the expectations of the scientific community.
Therefore, if the policy is not changed the international press can still put "billions spent and nothing to

show" for the European R+D+T policy. In a second part, some suggestions will be proposed to improve the situation.