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Accompanying document to the

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE PARTICIPATION BY THE COMMUNITY IN A EUROPEAN METROLOGY RESEARCH PROGRAMME UNDERTAKEN BY SEVERAL MEMBER STATES

SUMMARY OF THE IMPACT ASSESSMENT

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EXCECUTIVE SUMMARY

Introduction and Procedural Issues

The earliest example of the importance of quality of measurement in the construction of society can be traced back as early as 3000 BC. The "*cubit*" introduced as the first known unit of length and used to construct the pyramids, was defined as the length of the Pharaoh's forearm plus the width of his palm. During the time of King Cheops, the great pyramid of Giza was built with this system and the uniformity of length measurement was achieved to a relative accuracy of 0.05 % over a distance of 230 m. Modern European metrology has its roots in the French Revolution, with the political motivation to harmonize units all over France and the concept of establishing units of measurement available "*for all people, for all time*".

In today's global economy, metrology is vastly contributing to technological and economical development of many nations in the world. Metrology research is needed to solve societal problems, and examples affect areas such as satellite navigation, healthcare, semiconductor industry and climate change. The European Union was confronted in the nineties with the "mad cow disease" or BSE crisis. We all remember the urgent need for metrology research and new reference materials in support to regulation and in order to re-establish consumer confidence helping to save the European beef market. Metrology research being a key supporting activity for regulation and standardisation has therefore traditionally been a high national priority in many economies. However looking back to the French Revolution, European countries are since that time operating their national metrology research activities in full isolation. Still today EU Member states have been unable to get their acts together and to create on their own a single, modern and truly integrated European Metrology Research Programme (EMRP).

For many years, the Community has made use of the various provisions of the Treaty in order to encourage greater coordination and cooperation between national research programmes. In 2000 the Lisbon European Council concluded that research activities at national and Union level must be better integrated and coordinated to make them as efficient and innovative as possible. In 2006, the European Parliament put emphasis on better coordination of national and European research programmes. In the FP7 Cooperation Specific programme an Article 169 was announced to implement a joint European metrology research programme via the existing National Metrology Laboratory networks.

Beside the well documented support from European Parliament and Council for such an initiative an extensive stakeholder consultation confirmed the need for Community action in the envisaged direction of integration and modernisation of the European Metrology system. The concerned Commission services using metrology research results in their respective fields to prepare modern regulation/legislation (e.g. SANCO, ENV, ENTR) also confirmed in inter-service meetings the usefulness of an integrated programme embedding largely the existing national research programmes.

Problem Definition

Metrology is hidden from public view yet it is essential for the facilitation of modern trade and communications. Access to markets can be hampered by incompatible standards or the lack of uniform and accurate weights and measures. Metrology research has a strong *public good* character and is a main supporting activity for government regulation and standardisation. All major economic powers in the world have recognized that technology R&D in metrology is critical to an advanced nation's long term economic growth. Against this background Europe is facing what is called the European metrology dilemma; the *"European metrology dilemma" is to permanently align metrology research efforts with societal needs which both are more demanding, more complex and therefore more resource intensive whilst still servicing existing "traditional" demands without any new or additional resources. At the same time, global needs for accurate and speedy measurement in traditional industries are increasing, new, emerging technologies put additional pressure on the measurement system and necessitate "entirely new types of measurement" and in many societal areas such as*

health care, environment protection, food safety or transport the recognition as to the importance of standards and measurement is growing rapidly and relate directly to legislation, while available European resources are not increasing nor used in an optimal manner.

The European metrology research community is a specialised community only loosely linked to research organisations or academia. It is largely fragmented comprising a few centres of global excellence which would benefit from wide competition on an international scale. Duplication of research clearly exist as for example in the so called "Calibration and Measurement Capability Statements" (CMCs), where the "big 4" European metrology R&D performing countries (Germany, UK France and Italy) hold 4050 CMCs compared with the a total of 2250 CMCs for the whole U.S. Smaller Member States have excellent scientific knowledge in different metrology relevant fields (e.g. Nanotechnologies) but are unable to build their own metrology research capacities due to the lack of critical mass and the huge start-up investments. System failure has been recognised also at national level, and an Europeanization and modernisation of programming can change this situation and solve the key **problem**:

The European metrology research system supported by solitary national intervention logic concerning research programming has to overcome the "Metrology dilemma". The European potential in metrology research is not fully exploited to assure the optimal answers to societal challenges. Joint action between Member States and Community is missing in order to provide for a modern and challenge oriented research effort in metrology. Any new approach needs to increase the available resources and can only be successful if it takes fully the existing national systems into account, integrates them into a true European programme which should lead to a real step-change and modernisation for the existing national systems.

The right for the Community to act in this field is set out in several articles of the Treaty providing for research coordination and cooperation between Member States and the Community. Article 165 stipulates that "the Community and the Member States shall coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent". Obviously Article 169 invites the Community to make provision for participation in research and development programmes undertaken by several Member States. Community action seems highly justified, as Member States are unlikely to be able to address these problems acting alone. Secondly the rationale for EU action stems partly from the trans-national nature of some of the key challenges (for example, health care, environment protection or food safety) where Member States need to act together to properly tackle the problems at trans-national level.

Objectives

The **general policy** objectives of the initiative is to enhance the EU's capacity to achieve its high level policy goals and respond to the major challenges it faces in the coming years:

- To contribute to the achievement of the objectives of the revised Lisbon Strategy
- In particular to invest more and better in knowledge for growth and jobs.
- To contribute to the realisation of the European Research Area (ERA)
- To help Europe respond more effectively to key societal challenges such as environmental protection, health care, food safety, or public security

In order to contribute to achieving these general policy objectives, it will be necessary to improve the efficiency and effectiveness of public metrology research. **Specific objectives** are:

- Structuring the ERA through coordinating and partly integrating national public metrology research programmes.
- Improve the efficiency of Europe’s fragmented public metrology research approach.
- To increase the impact of these programmes.
- To remove barriers between national metrology research programmes.

In order to promote the above improvements in impact and efficiency, the **operational objectives** are:

- Cross-border public research programme coordination and integration.

- Address the grand challenges (e.g. climate change) and areas with pressing metrology needs (e.g. new and emerging technologies like for example nano- biotech- healthcare- metrology).
- Enable some “new” MS or candidate countries to build metrology research capacity.
- Open access to unique research infrastructures and facilities
- Increase generic collaboration between national metrology research programmes with the relevant science community at European level.
- Modernisation in the programming of national and European research priorities.
- Foster mobility of "early-stage" researchers from National Metrology Institutes (NMI) and Designated Institutes (DI).
- Europe should speak with one voice to strengthen its influence at global level.
- Metrology research has to become a supporting activity for government regulation.
- Support to industry and economic growth through up-front public metrology research.

Presentation of the Policy Option

The options for Community action are guided by the logic and intervention mechanisms of the Framework Programme 7. Beside no action these options therefore refer to either indirect or direct Community actions (research funding) under FP7, which would match the existing national intervention logic concerning research programming in different Member States.

The options are labelled as follows on the basis of their main characteristics.

(1) Policy Option 1: "No further Community action"; status quo, no further action on EMRP - may lead to intergovernmental approach

(2) Policy Option 2: "Bottom-up community indirect action – light coordination" under FP7 programmes and themes (Cooperation – Capacities Programmes). The aim would be to use the ERA-NET scheme and/or the ERA-NET Plus scheme but addressing isolated issues theme by theme and in the FP programme part by programme part ("business-as-usual" option).

(3) Policy Option 3: "Top – Down" community indirect action – Reinstall metrology theme in the FP – Part under FP7 or preparation of FP8 and reinstall a Community Programme on Metrology

(4) Policy Option 4: "Article 169 – programme integration through community indirect action"; Community action to achieve MS programme integration via Article 169, as indicated in the F7 Cooperation specific programme

(5) Policy Option 5: JRC – direct action; a single European metrology research programme to be implemented via JRC to cover metrology needs at European level

The difference between these five options lays in the way in which the Community intervention is set up – either as an indirect action or a direct action. The main characteristics of each policy option are discussed in detail in the following sub-sections.

Analysis and comparison of the Options

Should **Policy Option 1** be chosen, the situation as we find it today may not remain in place due to the absence of any political and/or or financial Community intervention (ERA-NET or other coordination tools). It will most likely deteriorate as it could be foreseen that Member States will invest less if the domain of metrology research as the area does not to appear as a European priority area. The status quo and separation between the Member States' programmes will remain; the likelihood of research groups of newcomer countries to hook up with experienced and high level research teams in more advanced countries will be low. **Policy Option 2** would continue the route that has been taken with the ERA-NET in FP6 and ERA-NET-Plus at the start of FP7. EU policy domains and research fields (e.g., energy, environment) can be easily involved directly into the coordination with MS programmes and well conceived interaction mechanisms with various metrology oriented ERA-NETs will be key. A coherent joint long term programmatic approach will not take place as in the case of a genuine European research programme. **Policy Option 3** needs no major institutional set up. It would create a dedicated research programme for metrology where the metrology community and the whole science community as well as industry in general can compete for funding under FP rules. It provides the opportunity to focus in particular on new technological challenges in emerging fields, thus

contributing to the modernisation of the sector. This route is similar to Option 2. It will have no effect on the existing national metrology research systems and integration between the national programmes and infrastructures. **Policy Option 4** creates a platform for joint EU and Member State research programming, thus creating a coherent and long term research agenda with critical mass. The active participation of the European Commission can safeguard an emphasis on mobility, openness and a focus on emerging areas. The combination of EU and national funds creates a critical mass that has certain likelihood to stimulate structural changes in the national metrology research systems. The linkages with industry are not explicit at EU level and stay rather at national level. This option will require substantial institutional changes that will likely take time and complex negotiation with MS to implement. **Policy Option 5** implies that metrology research will take place in isolation from the Member States their respective research programmes and related infrastructures and thus having little influence on restructuring the national metrology research systems and no feeling for the needs of Member States. Additional bottlenecks are the recruitment requirements for JRC and the lack of competition in the metrology field, which by its nature needs competing research tracks to find the most reliable solutions.

Against this general comparison of all five policy options we are of the opinion that Options 1 and 5 are not viable alternatives to address the problem stated above and we will therefore limit the further detailed discussion to options 2, 3 and 4 to compare the remaining options directly. A wide range of impacts is described in relation to the operational objectives. The following table summarises the analysis made and shows how the three viable options compare in terms on impact on the objective of a Community action in metrology research.

Table: Overview of potential impacts of three options

Impact on:	**Option 2: Light Coord.**	**Option 3: FP**	**Option 4: Art 169**
Efficiency of co-ordination, integration of NMI and national programmes	Medium	Very Low	very High
Effectiveness of co-ordination, integration of NMI and national programmes	Medium	Low	High
Grand Challenges	Medium	High	High
New MS: capacity building	Low/Medium	Low	Medium/High
Open access to infrastructures	Low/Medium	Low	Medium/High
Interaction with science community	Low/medium	very High	Medium/High
Modernisation metrology system	Medium	Low	High
Mobility and Human Resource development	Low	Very Low	Medium
Global cooperation and position of Europe	Low/medium	Low	High
Support to EU regulation	Low	Low	High
Growth: Service to industry	Low	Low	Medium
Growth: Support to emerging sectors	Medium	High	High

This comparison illustrated that the impacts of an Article 169 European on the objectives regarding a metrology action, are the strongest.

We come to the overall conclusion that time is ripe for an Art. 169 initiative in metrology. The initiative is important both for the advancement and modernisation of the European metrology research system and as support for those industries and scientific fields that need more and more sophisticated metrology activities.

The major findings of the Impact Assessment process are summarised here. The "metrology dilemma" is a reality. The examples have confirmed that the demands on the metrology research and service provisions are growing. Metrology has a direct importance to contribute to problem solving and policy goals in Europe. The more Europe is defining grand challenges, the more policy is oriented towards those challenges, and the more Europe is also the reference for crisis management that involves accurate measurement and testing. Art. 169 would mobilise additional funds, both at the European level and at National level. The Community contribution would ensure that truly European interest would be reflected in the working programme of the new Art. 169 EMRP, without limiting national activities and binding them solely to the European dimension of the programme. From all alternatives compared, the Art. 169 would best contribute to a modernisation of the national structures. The goals fit the European context to contribute directly to the Lisbon process and if implemented appropriately, metrology research could be at the forefront of creating the ERA based on joint initiatives of member states and the Commission.

Monitoring and Evaluation

The monitoring and evaluation will be accompanied by an annual reporting done by the Dedicated Implementation Structure (DIS) referring to recordable integration indicators and qualitative progress indicators on the basis of the expected actions within the EMRP programme. The DIS will be asked to submit on a call by call basis the information required for the indicators and for the self-assessment, starting with data for the year before EMRP begins. An expert group in charge of a mid-term and an ex-post evaluation will be asked to evaluate the progress in the different actions of the planned programme and base its assessment on 13 well defined indicators. The expert group will further assess impact of EMRP on the integration of national metrology programmes, restructuring of the metrology networks and programmes, impact on ERA in general.