

Sixth Framework Programme
Co-ordination of National and Regional Activities
(ERA-NET scheme)

Annex 1 “Description of work”

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1 Project Summary

The ERA-NET **iMERA** will enable the national Governments from 14 countries to increase significantly the national and European impact of their investment in R&D in metrology (measurement science). Collectively they spend in the order of €400M annually to ensure cutting edge top-level metrological capability across a multiple of disciplines – a vital tool for industrial innovation and competitiveness and to support health, safety and environmental regulations. About half of this funding is direct spend on R&D projects (the balance on R&D infrastructure), executed through the national programmes supporting more than 2000 researchers in the respective National Metrology Institutes (NMIs). Though the institutes have collaborated, particularly on scientific comparisons, there are currently no links between these national programmes. The investment underpins expenditure of more than €83 billion per year, or nearly 1% of EU GDP, on measurement activity from directly quantifiable sources alone, generating almost €230 billion of directly estimable benefits.

The NMIs within EUROMET - the European NMI Regional Metrology Organisation - have a strong track record of collaboration in scientific comparisons, and EC supported R&D (albeit on an *ad-hoc* project-by-project basis). The ERA-NET builds on an exploratory study that demonstrated the necessity and feasibility, in principle, of collaboration beyond historical levels across the many disciplines that make up metrology research.

iMERA pursues a step-by-step approach. Exchange of information between the national programmes will enable best practice to be identified and adopted, increasing the impact of the national programmes. Building on this a substantial increase in project level collaboration is foreseen. Strategic activities will lead to the launching of joint research projects, with defined work plans, resources, responsibilities and time scales - funded by the existing national programmes. Access to special metrological facilities available in just a single or few countries will be opened and the viability of joint investments in new facilities explored. Foresight and road-mapping will ensure there is an appropriate direction for these activities.

The final aim of the project is very ambitious - a joint metrology R&D programme. Scope, stakeholder needs, national funding contributions, legal issues, obstacles for national participation and appropriate organisational structures will all be addressed. This phase culminates in the preparation of a multi-disciplinary European Metrology Research Programme (EMRP) with the prospect of launching the initiative in a joint action between the European Commission and interested countries utilising Article 169 of the European Treaty. Care will be taken to ensure the changes are sustainable beyond the time of any financial support of the Commission.

A high-level policy group - the Network Steering Committee - consisting of senior representatives of the national governments and their NMIs plus the project coordinator will meet regularly to oversee and develop the appropriate conditions for a successful project.

Associated activities that are necessary to create the appropriate climate for in-depth research collaboration have not been overlooked. Mobility, stakeholder consultation, needs analysis, knowledge transfer, impact assessment and IPR are all addressed.

Not all countries within Europe have well-established metrology programmes or the facilities needed to support such a programme. Yet these countries have excellent scientists who could contribute and benefit their own country, at the same time increasing the scarce pool of metrological expertise available in Europe. iMERA will ensure that, although not contract partners, these countries are able to participate in key activities if they so choose.

2 Objectives of the ERA-NET and State-of-the-art

2.1 Objectives of iMERA

The programme comprises five main objectives plus activities associated with dissemination, governance and management. The specific objectives are:

1 Systematic exchange of information and best practice for metrological research programme owners and national metrology institutes.

- Understand the different approaches to the metrics that underpin the rationale for and exploitation of metrological R&D, and the mechanisms to achieve them
- Provide opportunities for national programme owners and managers to review and adopt best practice in other countries
- Provide the understanding to enable high-level policy input necessary for increased commitment to the ERA-NET objectives
- Develop the climate to foster a common approach towards Article 169 joint activity in metrology during the 7th Framework programme

2 Strategic activities

- Assess existing foresight information
- Build the environment and processes, particularly amongst the “owners” to facilitate joint activities
- Identify the activities best addressed collaboratively
- Overcome legal or other issues (e.g. IPR) necessary for the joint activities
- Identify options to overcome other barriers to joint activities
- Enable European countries with emerging metrology programmes to participate successfully in joint research activities
- Facilitate European countries facing special needs
- Understand in which circumstances it is appropriate to collaborate with researchers beyond Europe, and to evolve the mechanisms to do so
- Ensure societal and gender issues are appropriately handled

3 Joint activities

- Interact with European stakeholders to develop and execute a systematic and on-going dedicated European metrological foresight process
- Improve the mobility of European metrologists, in particular for countries with emerging research programmes
- Enable European metrologists, in particular from smaller countries, to participate successfully in joint research activities
- Initiate jointly planned research projects in selected pilot areas.

4 Transnational activities

- Identify, with the agreement of all stakeholders, the strategic European metrology research activities
- Adapt the existing organisational structures of EUROMET according to the needs of joint research

- Open state-of-the-art national metrology facilities to scientists from other European countries
- Start a research project on a shared-funding basis.

5 Realisation of the ERA in metrology through Article 169 of the Treaty

- Develop a European Metrology Research Programme (EMRP)
- Identify and overcome legal and technical obstacles for national participation in Article 169 funded research
- Develop the organisational structures and their terms of reference in preparation for an Article 169 based EMRP
- Ensure sustainability of the solution beyond the time of financial support of the Commission
- Prepare the national funding aspects in preparation for an Article 169 based EMRP.

6 Dissemination, Governance and Consortium Management

- Ensure that stakeholders are appropriately informed as the project progresses so that they may input with a full understanding of the issues
- Provide appropriate governance for the project
- Establish appropriate management for the ERA-NET ensuring the deliverables are achieved within the timescales and budgets and contract requirements

2.2 State of the art

A functioning system of weights and measures is a prerequisite for all trade and manufacturing. Until the 19th century weights and measures were, at best, harmonised on a national level but often local systems prevailed. With industrialisation, mass production of technical goods and increasing cross-border trade, the creation of a consistent internationally applied system of measuring units became of paramount importance. Consequently in 1875 the leading industrial nations signed, as a diplomatic treaty, the “Metre Convention”, agreeing to use and promote the Metric system of units which is now called the “International system of units (SI)”.

Near the end of the 19th century it became obvious that the traditional dissemination of units through “National Offices for Weights and Measures” was insufficient to meet the demand of industry for advanced measuring techniques, in particular in the fields of mechanics, electricity and optics. In Germany in 1887 the first institute was founded dedicated to R&D in the field of metrology to support industry and government. Other industrial countries quickly followed suit and today practically all nations operate National Metrology Institutes (NMIs) which have the responsibility:

- To realise and disseminate the SI system of units to industry and society
- To conduct research and development for improving the realisation of the SI to meet the needs of industry and society
- To develop and validate measuring procedures in support of industry and society and for government directives
- To provide advice to government, society and industry regarding metrological issues

Historically, NMIs were primarily focused on national needs. In order to promote the coordination of metrological activities and services to achieve higher efficiency, in 1987 the European NMIs created a regional metrology organisation: EUROMET. Specific aims were:

- To develop a closer collaboration between members in the work on measurement standards within the present decentralised metrological structure
- To optimise the utilisation of resources and services of members and emphasise the deployment of these towards perceived metrological needs
- To improve measurement services and make them accessible to all members
- To ensure that national facilities developed in the context of EUROMET collaboration are accessible to all members.

In 2004 EUROMET comprises of the NMIs from 30 European countries, and the Joint Research Centre (JRC) of the European Commission represented through IRMM. To achieve the above aims EUROMET has evolved four categories of collaboration:

- Comparison of measurements standards
- Consultation on facilities
- Cooperation in research
- Traceability

The research demands on the metrological community can be characterised in many of the fields as having to deliver an order of magnitude improvement in the accuracy of measurement every 10 years. Today the EUROMET NMIs have a combined work force of about 4000 employees of which more than 2000 are active in R&D. On average about 50% of the overall budget of €370M is spent annually on R&D through national activity and an additional €30M through the Institute for Reference Materials and Measurements, part of the Joint Research Centres of the EC. Regarding the effectiveness of money spent on European metrology, the study *“The assessment of the economic role of measurements in modern society”* commissioned by the European Commission¹ and published in July 2002 comes to the following conclusion (taken from the executive summary):

“Our main finding is that this area of activity is extremely important in economic terms both because of the absolute size of measurement activity and because of the significant and wide ranging benefits it produces in underpinning technological innovation, growth, industry, trade and social programmes. Europe spends more than €83 billion per year, or nearly 1% of EU GDP, on measurement activity from directly quantifiable sources alone. Adding in social spending on health, environmental regulation, safety testing, anti-fraud projects and normal day-to-day activity raises this figure considerably. By comparing these costs with estimates of the benefits of measurement, we can see that this money is well spent. Our econometric estimates of the economic impact of measurement activity show that this spending generates almost €230 billion of directly estimable benefits through application and from the impact measurement knowledge has on technology driven growth. This is equivalent to 2.7% of EU GDP. Put another way, for every euro devoted to measurement activity nearly three euros are generated by way of directly estimable benefits alone. This is true even without taking into account the very large benefits to society in terms of health, safety and the environment, which would raise the benefit to cost ratios even further.”

Exact details of industry investment underpinned directly by top-level metrology are not available; however Databuild Research & Solutions Ltd, based on a 2002 survey, estimated

¹ DG-Research GROWTH Programme Contract No: G6MA-2000-2002; Geoffrey Williams *et al.*, Pembroke College, Oxford, 2002

that the UK instrumentation sector invests €300M per annum in R&D. In % GDP terms this is likely to be representative of the other major European economies.

Today top-level metrological research within Europe is still primarily nationally financed. Collaborative R&D has been undertaken under the EC Framework programmes but this is, on average, a tiny fraction of the total and is declining since the end of the dedicated Measurement and Testing activities at the end of FP5. Whilst calibration services are able to cover their costs through fees, funding for R&D is mostly from the public purse. Programme owners are in most cases the ministries (usually Trade and Industry), though in those countries where the NMI is directly part of the ministry the ownership role is generally delegated to the NMI. The national programmes have similar objectives, however there are many differences in the processes used to identify priorities, select R&D projects, and deliver them. These differences present a major challenge when trying to increase collaboration.

Significant synergetic effects are likely to be achieved by European coordination of national research programmes in particular in areas of strategic importance for Europe. Yet co-operation in metrological research by EUROMET members has up to now mainly been conducted on an occasional *ad hoc* project-by-project basis initiated after national funding decisions have been made. This approach is looking increasingly out-of-date. Much of the Regulations and Directives (and documentary standards that underpin them) as well as measurement issues of principal metrology stakeholders in industry and science are now developed at an European level. The current approach leads to duplication in some areas while for other areas of recognized importance no funding is available. EUROMET has understood for some time that their members faced a dilemma in meeting demand for top-level metrology support, particularly in areas such as nanotechnology, biotechnology and analytical chemistry, whilst still providing appropriate support to more traditional areas of industry. With the current approach the required growth in national funding would have to exceed any realistic expectations. Therefore in 2001 the EUROMET Executive Committee launched a strategy exercise that identified the need to substantially increase collaboration to both address the funding dilemma and increase the impact from the R&D activities. A pan European approach to research would increase critical mass, share the burden and create a common scientific and technological perspective - greatly facilitating consensus in bodies such as standards committees. The issues raised in the strategy were elaborated in an EU accompanying measure "Planning the European Research Area in Metrology - MERA"². The project established the current state-of-the-art in terms of collaboration through consultation with stakeholders at national and European level. The perspective of the accession countries was studied, metrology foresight possibilities were explored, a stakeholder overview undertaken, and the willingness to change national positions analysed. Whilst not every issue was resolved, EUROMET is now in a position to move to an implementation phase.

The outcome of the MERA study can be summarised by the following:

EUROMET needs to develop a strategic European metrology research programme. In order to do so it has to improve its interaction with stakeholders and adapt its committee structures to analyse the strategic needs and identify the required research projects to meet these needs. It must then be able to coordinate the national activities to achieve a maximum impact with the available resources.

The optimum way to achieve these goals and to obtain maximum synergetic effects would be to formulate and execute a European metrology research programme, replacing that part of the national programme activities related to areas of identified common strategic European needs. A key objective of this proposal is therefore to start joint research projects in identified areas of strategic importance and then to develop the foundations for trans-national research culminating in an Article 169 activity within the 7th Framework Programme of the Commission.

² "MERA – Planning the European Research Area in Metrology", Contract G6MA-CT-2002-04012

3 The consortium

Role	Partic. No	Name	Short name	Country	Entry date	Exit date
CO	1	National Physical Laboratory	NPL	UK	M1	M36
CR	2	Department of Trade and Industry	DTI	UK	M1	M36
CR	3	Bundesministerium für Wirtschaft und Arbeit -	BMWA	Germany	M1	M36
CR	4	Physikalisch-Technische Bundesanstalt	PTB	Germany	M1	M36
CR	5	Laboratoire National d'Essais	LNE	France	M1	M36
CR	6	Istituto di Metrologia G. Colonnetti	IMGC	Italy	M1	M36
CR	7	National Testing & Research Institute	SP	Sweden	M1	M36
CR	8	Slovak Office of Standards, Metrology and Testing	UNMS	Slovakia	M1	M36
CR	9	Slovak Institute of Metrology	SMU	Slovakia	M1	M36
CR	10	Ministry of Economic Affairs – Competition Directorate	EZ	The Netherlands	M1	M36
CR	11	Van Swinden Laboratorium	NMi	The Netherlands	M1	M36
CR	12	Danish Institute for Fundamental Metrology	DFM	Denmark	M1	M36
CR	13	Swiss Federal Office of Metrology and Accreditation	METAS	Switzerland	M1	M36
CR	14	Justervesenet	JV	Norway	M1	M36
CR	15	Czech Office for Standards, Metrology and Testing	COSMT	Czech Republic	M1	M36
CR	16	Czech Metrology Institute	CMI	Czech Republic	M1	M36
CR	17	The Central Office of Measures	GUM	Poland	M1	M36
CR	18	Metrology Institute of the Republic of Slovenia	MIRS	Republic of Slovenia	M1	M36
CR	19	Centre for Metrology and Accreditation	MIKES	Finland	M1	M36
CR	20	Institute for Reference Materials and Measurements - Joint Research Centre of the European Commission	IRMM	-	M1	M36

*CO = Coordinator

*CR = Contractor

The Institute for Reference Materials and Measurement (IRMM), part of the Joint Research Centres of the European Community, does not operate national programmes, but is active in metrology research and training, particularly in the New Member States.

The following countries have formally expressed a desire for some degree of involvement in iMERA - and are classed as participants rather than as project partners:

Austria	Bulgaria	Estonia	Hungary	Ireland	Latvia
Lithuania	Portugal	Romania	Spain	Turkey	

These countries fall into a number of categories:

- Those countries where the ministries/NMIs are currently undergoing reorganisation and are unable to secure the appropriate authorities in time for the deadline, but who may wish to join the project at a future date.
- Those who do not have formal R&D research activities, but which rely on the partner countries to provide primary capability which they disseminate nationally to their industry. These countries are particularly interested in participating in a metrology European Research Area through secondment of personnel.

In the table below the “Programme Owner” has primary responsibility for deciding the content of the programmes, whilst the “Programme Manager” has primary responsibility for managing the delivery. In reality there is generally significant interaction between owner and manager. “Partners” are intended to be contractual partners. “Participants” include invited experts from outside the NMI community plus those NMIs or ministries that are not partners. Funding for non-partner participants will be limited to a contribution to travel and subsistence to enable them to participate in the workshops and other appropriate meetings.

The table below indicates the total annual R&D spend indicating the proportion allocated to project based activity (the balance being R&D infrastructure costs for equipment and facilities etc).

Country	Status	R&D activity in metrology	“Programme Owner”	“Programme Manager”
UK - NPL	Coordinator	€ 90M 50% R&D		X
UK - DTI	Partner		X	
Germany - BMWA	Partner	€ 125M 60% R&D	X	
Germany - PTB	Partner			X
France - LNE	Partner	€ 70M 15% R&D	X	X
Italy - IMGC	Partner	€ 25M 60% R&D	X	X
Sweden - SP	Partner	€ 5.3m 30% R&D	X	X
Slovakia - UNMS	Partner	€ 3.5M 70% R&D	X	
Slovakia - SMU	Partner			
The Netherlands - EZ	Partner	€ 8M 40% R&D	X	
The Netherlands - NMi	Partner			
Denmark - DFM	Partner	€ 2.9M 70% R&D	X	X
Switzerland - METAS	Partner	€ 14M 25% R&D	X	X
Norway - JV	Partner	€ 3.5M 15% R&D	X	X
Czech Republic - COSMT	Partner	€ 1.2M 40% R&D	X	
Czech Republic - CMI	Partner			
Poland - GUM	Partner	€ 7.8M 29% R&D	X	X
Slovenia - MIRS	Partner	€ 1M 30% R&D	X	X
Finland - MIKES	Partner	€ 6.4M 50% R&D	X	X
EC - IRMM	Partner	€ 30M 60% R&D	-	-

4 Relevance to the objectives of the ERA-NET part of the Work Programme

The project is consistent with the objectives of “Strengthening the European Research Area” and provides one of the essential building blocks.

Specifically the project will:

- Enable exchange of national practices in the operation of metrology research activity between the European countries allowing the identification and adoption of best practice into national programmes
- Create, for the first time, a comprehensive network involving both owners and managers of metrology research programmes and associated activities
- Facilitate and stimulate nationally funded project-based international collaboration with defined work plans, resources, responsibilities and timescales
- Establish and enhance critical mass in European metrology research and in the use of the advanced facilities that support the research
- Develop the strategic foresight and road-mapping to ensure a clear and common understanding of the goals of R&D collaboration in metrology to support European research in emerging technologies
- Underpin innovation in Europe through enhanced metrological capability as a tool for supporting cutting edge science and technology
- Provide considerable leverage on national budgets by reducing unnecessary duplication of research effort and facilities investment, thus providing better value for money
- Lay the foundations for a common European Research Programme for Metrology
- Provide an effective partner for the European Commission, considerably increasing the probability of successfully launching a joint activity in metrology under Article 169 of the Treaty in 2007/2008
- Underpin broader European policy related to health, safety and the environment through more effective metrological support to regulations, directives and the documentary standards that support them

The ERA-NET is relevant to all the major thematic priority areas for the Framework Programme.

5 Potential Impact

Policy across Europe is placing increased emphasis on the need to be competitive in the global market and the vital role that innovation plays in the creation of wealth and employment. Additionally citizens desire and expect a high quality of life through appropriate protection of health, safety and the environment in an increasingly complex world.

The technical infrastructure in Europe, of which the metrological infrastructure is a cornerstone, plays a vital role in competitiveness, innovation and actions to enhance quality of life. Even though this infrastructure support is critical to leading-edge industry, its benefits are generic in nature and governments accept the need to provide support with public funds³. With new and emerging technologies and the need to support existing industries and policy-making, the system must look for synergistic improvements if all expectations of the European citizen are to be fulfilled. The MERA project identified that:

- The aims of the various national programmes have great overlaps
- Many of the research teams are sub-optimal in terms of critical mass
- Major/special metrological facilities are expensive to establish, and may then not be fully utilised through national demand alone
- Many of the topics tackled by research would best be addressed collaboratively
- The current track record gives confidence this can be done, but only if collaboration can be planned and executed as an integral part of the national processes
- There is potential to go beyond improved collaboration between national programmes and it is feasible and desirable to establish a coherent European metrology programme for core strategic research.

iMERA is expected to have a major impact on metrology research programmes in Europe. The impacts will be realised at a number of levels:

Structuring the European Research Area

- Creating a European strategy for metrology research
- Creating research teams above critical mass
- Launching joint research projects
- Providing access to existing special facilities for researchers across Europe
- Encouraging joint planning and investment for new special facilities
- Complementing national programmes by constructing the basis for a joint research programme for Europe in FP7 through Article 169

National programmes

- Providing transferable lessons to improve efficiency and impact of the national research programmes
- Encouraging those countries that cannot directly support a metrology research programme to participate in the activities of other national programmes, particularly through mobility schemes
- Providing access to facilities that cannot be afforded nationally
- Avoiding unnecessary duplication through better information exchange and access to research results
- Enabling the launch of and participation in more ambitious research projects
- Allowing national R&D activities to be planned within a wider context

³ PREST 2002 "PREST – A comparative analysis of public, semi-public and recently privatised research centres", CBSTTII contract ERBHPV2-CT-200-01, Final report July 2002 [<http://les.man.ac.uk/PREST/>]

- Providing more “leverage per €” – accessing the collective benefits whilst only funding part of the cost – thus releasing resources to tackle the emerging areas.

Industry and other major metrology stakeholders

- Access to a wider metrological knowledge base
- Knowledge will be leading edge
- Ability to access metrological facilities and capabilities existing beyond the national borders
- Increased metrological critical mass and subsequent improvements in the research output facilitating innovation, competitiveness and the ability to adopt and adapt to emerging technologies.

Policy

- Metrology underpins many areas of policy which will benefit from improvements in the technical infrastructure, particularly those parts which rely on data quality, metrology, measurement or testing such as:
 - Regulations
 - Directives
 - Documentary standards that support themRelated to areas such as environment, medicine, health and safety and security

Metrology Researchers

- Increased opportunities to participate in world class research
- The possibility to formulate and participate in more ambitious R&D projects
- Access to facilities not available nationally
- The ability to contribute to foresight and road-mapping that results in a coherent R&D strategy within their domain

5.1 Contribution to Standards

Not all documentary standards require measurements, data, validated test methods or reference materials to function, but many do. For example, regulations and Directives related to the environment, health and safety etc and the standards that underpin them are often key drivers of the research agenda. Additionally breakthroughs in technology pioneered by the NMI research community are often disseminated to industry through documentary standards, with the NMI researchers providing a vital link between academia and industrial applications. NMI researchers provide a vital resource to documentary standards makers. For example, in the Coordinating Organisation (NPL) researchers are members of over 150 technical and documentary standards committees. These include committees and working groups of CEN, CENELEC, ETSI, ISO, IEC, ITU, bodies such as IAEA (International Atomic Energy Agency), as well as the national standards body. In smaller institutes, whilst the number of committees supported may be less, the representation is just as important. The researchers often provide key expertise within the committees on measurement or testing issues, and related activities such as sampling, data quality and the statistical treatment of results. Thus the contribution to standards is through both expertise in the committee work and direct R&D such as generation of data, development and validation of techniques and test methods.

5.2 Contribution to Policy development

iMERA will assist the construction of the ERA by creating links between similar national research activities that currently operate entirely in isolation. These links will cover hundreds of millions of € research funding, two thousand researchers and a further two thousand related staff. However based on national analysis of the benefits, the impact on policy is likely to be much greater. For example, as described above, metrology is a vital support to many Directives and standards, and improvements in the European capability will enhance Europe's ability to develop and implement high quality Directives.

The metrological community in Europe has sufficient confidence to propose a move towards the creation of a common programme of research to tackle common challenges in the most efficient and effective way possible.

5.3 Risk Assessment

The iMERA project takes a step-wise approach to increased collaboration, and the risks to be managed are greater at each level of ambition. The main risks that could reduce impact have been assessed, and the following strategies adopted to reduce these risks:

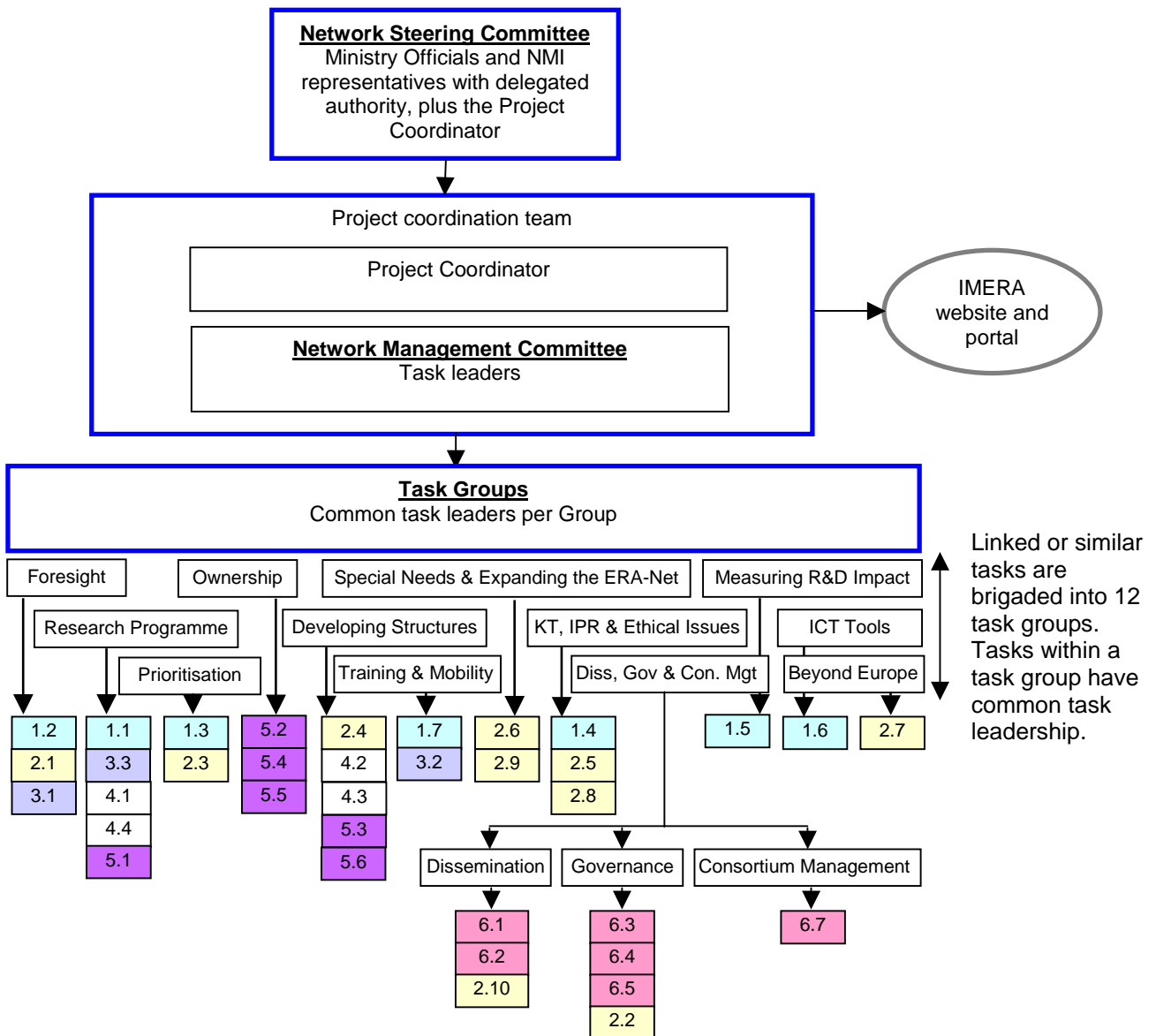
- National programme managers may be unwilling to share their knowledge – **iMERA countries have all committed to the work programme and experience from the MERA project has demonstrated this risk is not likely to materialise.**
- Whilst the objectives of the national programmes of R&D are broadly similar, ministries and NMIs naturally tend to consider “their” way of doing things to be the best way - **To create the appropriate climate for identifying best practice we will establish a Programme Owners and Programme Managers Forum including face-to-face workshops (task 2.2).**
- The current management and technical committee structure of EUROMET, vital for the long term “institutionalisation” of the increased collaboration developed in the project, are no longer appropriate – **We have recognised that this is the case, and agreement has already been reached (in principle) within EUROMET that changes are likely to be necessary and a dedicated task (task 4.2) will ensure that EUROMET adapts appropriately.**
- That with broader understanding of the issues involved as the project proceeds Article 169 is no longer considered appropriate – **despite the high level of commitment expressed in the preparation of the proposal we have recognised that, although unlikely, this may be a possibility. A Go / No Go task has been incorporated in WP 2 and WP 5 so that alternative solutions can be considered (in consultation with the Commission) should this prove to be the case.**
- The European Commission develops the operational aspects of Article 169 in a direction that becomes inappropriate for the long term aspirations of the project – **We have, following discussions with the Commission, undertaken to allow the project to act as a “test bed” for the European Commission as they develop implementing procedures for Article 169, ensuring developments are in step with Commission thinking.**
- Key project staff become unavailable – **We have asked task leaders to prepare a contingency plan should a task leader unexpectedly become unavailable. Similar arrangements are in place for the coordinator.**
- The interests of European countries who are not formal partners are overlooked – **Provision has been made within the budget to invite (with a contribution to travel and subsistence) such countries to the key workshops.**

6 Dissemination, Governance and Consortium Management

We have considered dissemination, governance and project management as linked but distinct activities.

6.1 Management structure

An overview of the management structure is shown below. The numbers in the coloured boxes at the bottom refer to the task numbers grouped under the 12 task groups.



6.2 Project Coordination

Project management is the responsibility of the Project Coordinator, aided by the Network Management Committee – made up of the task group leaders and meeting every 6 months. The Project Coordinator will monitor progress against milestones and deliverables listed in the work on a monthly basis. In addition to the written reports for the Commission, officials

from DG Research will be invited to the start-up meeting, the workshops and the final meeting.

6.3 Website

A dedicated iMERA-branded web portal will be established and used for project management, consultation and wider dissemination of the project outputs.

Two possible options have been identified. Firstly the UK Department of Trade and Industry have recently developed an advanced web-based forum management platform as part of their Micro and Nanotechnology (MNT) initiative in the UK. This web-based platform allows automatic linkage to other databases such as CORDIS and provides voice-over Internet Protocol allowing virtual meetings, document sharing. Secondly the existing EUROMET website could be expanded to host dedicated web pages and forum for the project. The two options will be explored and taking into account the availability, suitability and development time, one option will be implemented. Expert external advice may be required to assist in setting up the portal.

6.4 Network Management Committee (NMC)

The Project coordinator will be assisted by the NMC to achieve the day-to-day deliverables of the project. The NMC will consist of the project coordinator and the task leaders. The network has taken a novel approach to organising the tasks, and this is reflected in the management of the various work packages and tasks. Each of the 5 main work packages represents increasing levels of collaboration and integration rather than thematic blocks of activity. Thus management will be through task groups rather than work packages.

6.5 Task Groups (TGs)

Some topics appear at more than one stage of the process. For example, foresight activities appear in WP1 (in which the best practice *processes* currently used at national level are identified), in WP 2 (in which the *content* of the findings from the existing national foresight exercises are consolidated with the first cut exercise from the MERA project), and in WP3 (in which a new process of *joint European metrology foresight* is developed and implemented). In a similar way groups of tasks have been clustered to ensure efficient and effective execution whilst ensuring the network has a manageable number of task managers. **To ensure a consistent approach across the work package, task matrix topics that occur in more than one WP, or have some other commonality, are clustered into TGs under a single task leader.** With this approach it is not necessary to have workpackage leaders and overly burdensome management will be avoided.

6.6 Network Steering Committee (NSC)

A Network Steering Committee (NSC) will be established, composed of senior representatives from Ministries or Ministries/NMIs from 8 countries, and chaired by the Project Coordinator. The NSC will monitor the work performed, review progress towards objectives, and take particular interest in the sustainability of the proposed increased cooperation. They will discuss and propose any corrective actions necessary and take responsibility for reviewing the various reports, recommending/endorsing the implementing actions. It will also make the Go/No-Go decision regarding the continuation towards Article 169 as detailed in task 2.10 and task 5.4.

The provisional members of the NSC are as follows;

Chair	Andy Henson	iMERA Project Coordinator
UK	Denis Walker	Director, National Measurement Systems Directorate, Department of Trade and Industry
Germany	Ernst Goebel	President, PTB
Italy	Attilio Sacconi	Director, IMGC
France	Luc Erard	Director, Department of Scientific Research and Technology, LNE
Norway	Helge Kildal	Director, JV
Czech Republic	Alexander Safarik-Pstrosz	President, Office of Standards, Metrology and Testing, Ministry of Industry and Trade
The Netherlands	Anneka van Spronssen	Senior Policy Advisor for Metrology, Ministry of Economic Affairs – Competition Directorate
Slovenia	Janko Drnovsek	University of Ljubljana, Head of Metrology board in MIRS (Metrology Institute of the Republic of Slovenia)

6.7 Partners

The partners are obliged to provide the input to tasks they either lead or in which they are a participant (all partners contribute information to some tasks), they will provide appropriate reports of their activities, cost statements, audit certificates and if required by the Commission bank guarantee certificates.

6.8 Communications, dissemination and IPR

Tasks 6.1 and 6.2 are the all-important communication between the project and metrology stakeholders. Information will be made publicly available through the website. It is envisaged that the changes proposed in European metrology will attract significant interest from the user community, and task 6.1 makes provision for each partner country to hold a national dissemination event. The coordinator will periodically prepare brief articles suitable for publication in interest group newsletters. Translation, where necessary, will be the responsibility of the partners. Additionally a paper will be presented at an appropriate major conference in Europe (provisionally "Metrologie 2007") and to government funding agencies.

Current experience indicates that IPR is not likely to be a major problem, however that experience is based on the current modest levels of collaboration, and a task (T2.5) will monitor IPR issues as steps are taken to increase collaboration. Provision has been included to allow specialist external advice to be sought.

7 Technical content of the Coordination Activity

The ERA-NET consists of six work packages specifically:

- Systematic exchange of information and best practice (WP 1)
- Strategic Activities (WP 2)
- Implementation of joint activities (WP 3)
- Implementation of trans-national activities (WP4)
- Realisation of the ERA in metrology through Article 169 (WP 5)
- Dissemination, Governance and Project Management (WP 6)

The activities under WP 1 to WP 6 will be implemented according to the timetable under 7.2.

7.1 Technical Content Introduction – General Description and milestones

WP 1 – Systematic Exchange of Information and Best Practice

In this work package the information needed for joint actions will be collected by the partners and collated by the task group. The work will be divided up into seven tasks:

- National programme landscaping
- Overview of national foresight processes, where they exist
- Overview of national prioritisation processes
- Knowledge transfer
- Measuring the impact of the national metrology R&D programmes in Europe
- Understanding Information and Communication Technology (ICT) tools
- Training opportunities and exchange of personnel

In particular for the programme owners this will for the first time establish insights into planning, prioritisation and funding decisions of other countries.

Milestones to be reached at the end of WP 1:

- Adoption of identified best practice into national activities
- All information collected that is needed to start strategic activities

WP 2 – Strategic activities

This workpackage builds on WP 1 and prepares the ground for joint activities between the national programmes in WP 3. It consists of ten tasks:

- Assess existing foresight information
- Programme owners and programme managers forum
- Identify opportunities and quantify the benefits of collaborative R&D and shared facilities to aid national funding decisions
- Investigate the legal issues related to the Joint Activities
- Address intellectual property issues
- Address the special needs of emerging EUROMET members
- Beyond Europe – addressing wider collaboration
- Working group on ethical, gender, and societal issues
- Expansion of the ERA-NET
- Consultation and Go/No-Go decision

Crucial milestone be reached:

- Decision of the NSC to apply for Article 169 participation in FP7.

This decision has to be taken roughly at the mid-point of the project and will also be based on information available from WP 1 and WP 2, but in addition will depend to a large extent on the preliminary results obtained in WP 3 and particular WP 4.

WP 3 – Joint activities

The three tasks in this workpackage identify the strategic European metrology research activities based on the collected foresight information:

- Joint foresight studies
- Joint training and mobility
- Joint pilot research projects

Milestones to be reached for successful completion of this workpackage:

- Completion of the new foresight study: European Metrology Foresight 2007
- Launching of joint research projects with coordinated national funding

WP 4 – Transnational Activities

Following the joint activities relating to foresight, training and mobility in WP3, this workpackage establishes the structures and processes for joint research activities and launches joint European research projects. It consists of four tasks:

- Identification of strategic European metrology research activities to support innovation and quality of life
- Adaptation of the EUROMET structures to facilitate and optimise joint ERA-NET activities
- Opening of special facilities to other European metrologists
- Launch quick start collaborative research projects with central funding

Milestones to be reached for successful completion of this workpackage:

- Completion of adaptation of Terms of Reference (ToR) for EUROMET committees
- Strategic European metrology research activity identified
- Launch of first centrally funded collaborative research projects

With the achievement of the above milestones a new level of co-ordinated metrological research will be reached in Europe. A coherent level of European research in metrology will help to achieve the aim of establishing Europe as the most competitive and dynamic knowledge-based economy until 2010. To fully exploit the potential for coordinated strategic research in metrology, the next step will be to establish an agreed European Metrology Research Programme to be conducted on Article 169 based trans-national research.

WP 5 – Realisation of the ERA in Metrology Through Article 169

This workpackage will prepare a multi-year European Metrology Research Programme (EMRP) with the prospect of launching a joint programme between the Commission and the countries concerned utilising Article 169 of the Treaty. The technical and legal requirements within the countries wishing to participate in Article 169 based activities will be reviewed. Existing national obstacles will be identified and action plans developed to overcome them. The package consists of six tasks:

- Preparation of an EMRP to be executed as an Article 169 activity within the 7th Framework Programme of the Commission

- Identify (for each country) processes and milestones required for participation in trans-national research programmes based on Article 169
- Develop the European structures for joint metrological research on the basis of Article 169
- Ensure sustainability
- Develop appropriate funding mechanisms
- Action plan to realise an Article 169 based EMRP

The milestones to be achieved for this workpackage are:

- European Metrology Research Programme
- Legal and technical obstacles for national participation in Article 169 identified and removed
- Implementation plan for structures and procedures needed for Article 169 implementation
- Action plan for an Article 169 based European Metrology Research Programme

With the successful completion of the above milestones the European metrology community will be ready to apply for Article 169 based funding within the framework of FP 7.

WP 6 – Dissemination, Governance and Consortium Management

This workpackage has three linked but distinct aspects, and a total of seven tasks:

Dissemination

- Dissemination and PR
- iMERA web portal

Governance

- Network Steering Committee (NSC) meetings
- Independent High Level advisors
- Network Management Committee (NMC) meetings
- Partner Reporting

Consortium Management

- ERA-NET coordination

The following milestones have been identified for this workpackage:

- Launch of the web portal
- National Dissemination events
- Presentation at a major conference (probably Metrologie 2007)
- The meetings of the NSC
- The meetings of the NMC

7.2 Work Planning and Timetable

An overview of activities, timing and Task Groups are shown in the Gantt chart below. Completing all the tasks in 36 months is ambitious, however the consortium are determined to maintain the momentum, and are prepared to run related tasks with staggered but overlapping timing. This is made feasible by the use of common task leaders for those tasks.

7.3 Work Package List

WP	Workpackage title	Lead contractor No	Person-months	Start month	End month	Deliverable No
WP1	Systematic Exchange of Information and Best Practice	Lead by task group see 6.1 and Gantt chart	46.3	1	15	D1.1, D1.2, D1.3, D1.4, D1.5, D1.6, D1.7
WP2	Strategic Activities		46.1	1	36	D2.1, D2.2, D2.3, D2.4, D2.5, D2.6, D2.7, D2.8, D2.9, D2.10, D2.11, D2.12, D2.13
WP3	Joint Activities		22.0	1	33	D3.1, D3.2, D3.3, D3.4, D3.5
WP4	Trans-national Research Activities		50.3	1	36	D4.1, D4.2, D4.3, D4.4, D4.5, D4.6, D4.7, D4.8
WP 5	Article 169 Realisation of the ERA		77.4	1	36	D5.1, D5.2, D5.3, D5.4, D5.5, D5.6, D5.7
WP6	Dissemination, Governance and Consortium Management		67.5	1	36	D6.1, D6.2, D6.3, D6.4, D6.5, D6.6, D6.7, D6.8, D6.9, D6.10, D6.11
	TOTAL		309.6			

7.4 Deliverables List

Deliverable No	Delivered through task No.	Delivery title	Delivery date	Nature	Dissemination level
D1.1	1.1	Overview of the metrology landscape	6	R	PU
D1.2	1.2	National foresight activities workshop	6	O	PP
D1.3	1.3	National prioritisation activities workshop	6	O	PP
D1.4	1.4	National KT activities workshop	9	O	PP
D1.5	1.1, 1.3, 1.4, 1.5	A comparative study on national foresight, prioritisation, KT and impact assessment processes	12	R	PP
D1.6	1.6	Evaluation of national ITC tools	12	R	PP
D1.7	1.7	Overview of training and mobility	15	R	PP
D2.1	2.1	Synthesis of existing national foresight information	12	R	PP
D2.2	2.2	Owners and Managers Forum	9, 30	O	PP
D2.3	2.2	"Owners" position paper on enabling transnational research	12, 33	R	CO
D2.4	2.2	"Managers" position paper on enabling transnational research	12, 33	R	CO
D2.5	2.3	Guidance on assessing collaboration options when taking national funding decisions	18	R	PP
D2.6	2.4	Joint Activities legal issues action plan	24	R	PP
D2.7	2.5	IPR report	24	R	CO
D2.8	2.6	Emerging members action plan	18	R	PP
D2.9	2.7	Opportunities for collaboration beyond Europe identified	21, 33	R	CO
D2.10	2.8	Recommendations on ethical issues	24	R	PU
D2.11	2.8	Recommendations to improve the gender balance in European metrology	24	R	PU
D2.12	2.9	Evaluation of ERA-NET expansion opportunities	12	R	PP
D2.13	2.10	Recommendations on continuation of WP5 and changes to the work programme	18	R	PP
D3.1	3.1	3 Sector workshops and focus group meetings	12, 20, 28	O	PP
D3.2	3.1	Foresight studies and focus group reports	15, 23, 31	R	PP
D3.3	3.1	"European Metrology Foresight 2007"	33	R	PU
D3.4	3.2	European training programme for metrology	33	R	PP/PU
D3.5	3.3	Launch of joint research projects with coordinated national funding	12	O	PP

D4.1	4.1	Two workshops for TC Chairperson	7, 24	O	PP
D4.2	4.1	Briefing at 11 TC annual meetings	Various	O	PP
D4.3	4.1	Identified Strategic European Metrology Research Activities	9, 27, 35	R	PU
D4.4	4.2	New terms of reference for EUROMET bodies	18, 30	R	PU
D4.5	4.3	List of special facilities to be opened for access to foreign researchers	15	R	PU
D4.6	4.3	Creation of user support groups for special facilities	18	O	PU
D4.7	4.3	Joint facilities demonstrator(s)	18	O	
D4.8	4.4	'Quick start' centrally funded project launched	6	O	
D5.1	5.1	EMRP developed	30, 36	R	PU
D5.2	5.2	National analysis of legal and technical issues to be solved for participation in Article 169 activities	24	R	RE
D5.3	5.2	Action plans per country for national preparation for participation in an Article 169 based EMRP completed	30	R	RE
D5.4	5.3	Implementation plan for European Article 169 structures developed	36	R	PP
D5.5	5.4	Sustainability of intended structures and procedures investigated	18, 35	O	
D5.6	5.5	Consensus on funding issues by interested countries	36	R	RE
D5.7	5.6	Action plan to realise an Article 169 based EMRP	33, 36	R	RE
D6.1	6.1	Articles for publication	Various	O	PU
D6.2	6.1	Presentations for use by partners	Various	O	PU
D6.3	6.1	Conference paper(s)	TBD	O	PU
D6.4	6.2	IMERA website operational	6	O	PU/CO
D6.5	6.2	Network Steering Committee meetings	6, 18, 33	O	RE
D6.6	6.3	Minutes of NSC meetings	+1 month	R	PP
D6.7	6.4	Advisor reports	As appropriate	R	PP
D6.8	6.5	Network Management Committee meetings	1, 6, 12, 18, 24, 30, 35	O	PP
D6.9	6.5	Minutes of NMG meetings	+1 month	R	PP
D6.10	6.6	Partner reports	6, 12, 18, 24, 30, 36	R	CO
D6.11	6.7	Contract reports for EC	Interim*, 6, 12, 24, 30, Progress 18, Final 36	R	RE/PU

*Every 6 months the project coordinator will deliver a very brief interim activity report (3-4 pages) to the Commission."

Nature of the deliverable:

R = Report

P = Prototype

D = Demonstrator

O = Other

Dissemination level:

PU = Public

PP = Restricted to other programme participants

RE = Restricted to a group specified by the consortium

CO = Confidential, only for members of the consortium

Where more than one date is shown for a report the later dates indicate reviews and updates as appropriate.

Reports may either be stand alone or issued as sections within the formal 18-month or final report as appropriate.

7.5 Work Package Description

WP1 – Systematic Exchange of Information and Best Practice

Workpackage number:	1																			Start date or starting event (month):	1																		
Participant ID:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																			
Participant name:	NPL	DTI	BMWA	PTB	LNE	IMGC	SP	UNMS	SMU	EZ	NMI	DFM	METAS	JV	COSMT	CMI	GUM	MIRS	MIKES	IRMM																			
Person-months	2.9	1.7	2.0	1.5	3.6	3.8	3.6	1.2	1.3	1.3	2.7	2.7	2.3	3.5	1.3	1.3	2.3	3.5	2.3	1.5																			

Objectives

1. Provide opportunities for national programme owners and managers to review and adopt best practice in other countries
2. Provide the understanding to enable high-level policy input necessary for increased commitment to the ERA-NET objectives
3. Understand the different approaches to the metrics that underpin the rationale for and exploitation of metrological R&D, and the mechanisms to achieve them and as input to later workpackages
4. Develop the climate to achieve the very ambitious aims of this ERA-NET – specifically to foster a common approach towards Article 169 joint activity in metrology during the 7th Framework programme

Description of work

Workpackage 1 addresses the systematic understanding of the key processes of the participants' R&D programmes. It has 7 main tasks:

T1.1 National programme landscaping (LNE France, IMGC + input from all partners)

This task will expand the generic metrology R&D landscape described in the MERA study and will provide a systematic overview of the methodologies, known strengths and weaknesses of the various approaches. Opportunities for programme managers to share knowledge to improve national programmes will be identified. The output will be pivotal to a number of subsequent tasks.

T1.2 Overview of national foresight processes (IMGC Italy, Denmark + input from all partners except IRMM)

Foresight is pivotal in steering national programmes. Where partner countries conduct dedicated metrology foresight studies the scope and methodologies will be collated. Likewise the national approach to distilling metrology needs from industry or other foresight studies will be assessed. A workshop will identify opportunities for the practitioners of metrology foresight exercises (or those evaluating industry sector foresight studies) to share knowledge to improve steering of national programmes. The output of this task, and the actual content of the identified studies will also provide input to task 2.1.

T1.3 Overview of national prioritisation processes (NPL UK, BMWA + input from all partners except IRMM)

The wide variety of structures for delivering metrology in the participating countries is reflected in the wide variety of processes used for identifying metrology R&D priorities, ranging from defined protocols and using external advisors through to far less formal processes. This task will provide a systematic overview of the methodologies, known strengths and weaknesses of the various approaches will be highlighted. A workshop will identify opportunities for practitioners to share knowledge to improve national programmes.

T 1.4 Knowledge transfer (KT) activities (SP Sweden, NPL + input from all partners)

Recognising the importance of knowledge transfer activities, as described in 9.3 of the DoW a task group will advise on KT aspects relevant to the project. A wide variety of knowledge transfer mechanisms have evolved to different degrees in participating countries such as direct research collaboration with industry, collaborations with regulatory agencies, universities etc, "metrology clubs" - interest groups around specific topics, best practice guides, scientific publications and participation in documentary standards activities. The various national approaches to transferring the knowledge generated by the metrological R&D activities will be surveyed. A workshop will identify opportunities for the practitioners to improve national KT activities.

T1.5 Measuring the impact of the national metrology R&D programmes in Europe (NMI The Netherlands, DTI+ input from all countries)

The processes used in the participating countries to identify the impact of their national metrology programme R&D activities will be surveyed and opportunities for the practitioners to share knowledge and improve the national processes will be identified. An external economics consultant will aid the task team with the analysis of the approaches.

T1.6 Understanding ICT tools (JV Norway, DFM, NMI, METAS, CMi, GUM, MIRS, MIKES, NPL, DTI)

Key aspects related to information and communication technology as a tool in the ERA-NET will be surveyed identifying any obstacles to later workpackages. Areas to be addressed will include but not be limited to data exchange, databases, data quality criteria, video conferencing, data confidence and security.

Task 1.7 Training opportunities and exchange of personnel (MIRS Slovenia, IRMM + input from all countries)

A review of relevant existing national metrology training activities and national mobility sponsorship schemes will provide both information on best practice and identifiable opportunities (related to national mobility schemes) that will help underpin activities undertaken in task 3.2.

Deliverables

D1.1 Overview of the metrology landscape (Month 6)

D1.2 National foresight activities workshop (Month 6)

D1.3 National prioritisation activities workshop (Month 6)

D1.4 National KT activities workshop (Month 9)

D1.5 A comparative study on national foresight, prioritisation, KT and impact assessment processes (Month 12)

D1.6 Evaluation of national ITC tools (Month 12)

D1.7 Overview of training and mobility (Month 15)

Milestones and expected result

M1.1 "Portable" best practice in national programmes identified

M1.2 All information collated to enable the strategic activities to be meaningfully conducted

WP2 – Strategic Activities

Workpackage number: 2										Start date or starting event (month): 1										
Participant ID:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Participant name:	NPL	DTI	BMWA	PTB	LNE	IMGC	SP	UNMS	SMU	EZ	NMi	DFM	METAS	JV	COSMT	CMI	GUM	MIRS	MIKES	IRMM
Person-months	5.1	2.0	0.5	5.5	1.0	3.5	5.5	0.5	1.0	1.0	2.5	3.5	0.5	1.0	1.5	4.5	2.0	2.5	0.5	2.0

Objectives

- 1) To assess existing foresight information
- 2) To build the environment and processes, particularly amongst the “owners” to facilitate joint activities
- 3) To identify the activities best addressed collaboratively
- 4) To overcome any legal or IPR issues necessary for the joint activities
- 5) To identify options to overcome other barriers to joint activities
- 6) Enable European metrologists, in particular from countries with emerging metrology programmes, to participate successfully in joint research activities
- 7) To understand where it is appropriate to collaborate with researchers beyond Europe, and to evolve the mechanisms to do so
- 8) To ensure societal and gender issues are appropriately addressed
- 9) To expand the ERA-NET to new members
- 10) To come to a Go/No-Go decision to continue with Article 169 preparation

Description of work

Workpackage 2 builds on WP1 and prepares the ground for joint activities between the national programmes in WP3. It has 8 main tasks:

T2.1 Assessing existing foresight information (IMGC Italy, SP, NP, PTB, NMi, DFM)

A rich body of information exists at national level, identified under task 1.2, and also previously in the MERA project. The task team will carry out a quantitative and qualitative assessment of this existing foresight information and generate an integrated metrology foresight report. The report will include recommendations on the most appropriate mechanisms to maintain and update European-wide metrology foresight over time. The output of this task will then provide a basis for task 3.1.

T2.2 Programme owners and programme managers forum (NPL UK + input from all partners except IRMM)

Historically there has been little or no contact between the programme owners in the partner countries. Whilst those responsible for programme management may have had some contact it has not been in the context of managing their R&D portfolios. This key task will create a community for those responsible for identifying and funding metrology R&D priorities and for those responsible for managing programmes. Workshops will be held twice during the life of the project.

T2.3 Identifying opportunities and quantifying the benefits of collaborative R&D and shared facilities to aid national funding decisions (NPL UK, DTI, SP, NMi, DFM, GUM, IRMM)

Currently collaborative opportunities are identified *after* national decisions on priorities and budget allocations have been taken, and the opportunities are identified by the R&D delivery teams as best they can. This places a major constraint on the level of collaboration that is possible. In this task a core set of principles will be developed that will be suitable for adaptation into the various national processes to enable the identification and exploration of suitable opportunities before programmes are finalised. The possibility of quantifying the potential benefits of collaboration *a priori* to aid national prioritisation and decision making will be explored with the aid of an external economics consultant.

Tools or checklists related to common facilities arising from task 4.3 will be integrated when they

become available.

T2.4 Investigating the legal issues related to the Joint Activities (PTB Germany, DTI, IMGC, DFM)

The task team will examine whether the current informal “club” status of EUROMET is suitable for the Joint Activities being implemented in this ERA-NET. Options such as the establishment of a European Economic Interest Group (EEIG) and other legal structures will be explored. Additionally the task team will examine broad issues related to the joint establishment and operation of major facilities. Professional external legal advice will be sought to aid the task team with the analysis of the various options.

The task team will make appropriate recommendations to the Government funding agencies, NSC and EUROMET General Assembly.

T2.5 Addressing intellectual property issues (SP Sweden, SMU)

Few IPR problems have been encountered in existing experience between the NMI partners within the current and previous Framework Programme projects. However this may be because of the limited nature of the current collaborations. The task team will have a monitoring role as the various scenarios for closer collaboration are developed, and report on potential IPR issues with appropriate recommendations to address them. Provision has been made in the budget for external advice from IP experts.

T2.6 Addressing the special needs of emerging EUROMET members (CMI Czech Republic, MIRS, GUM, NPL, COSMT, IRMM)

Not all EUROMET countries have well-established programmes for metrological R&D. Some countries with limited research capabilities, the new Member States and future accession countries often face particular difficulties. The task team will develop a strategy to increase participation in R&D from this community. Additionally the task team will explore the potential from the recent changes in European Union policy offering the possibility of linking European structural funding in support of the European Research Area.

T2.7 Beyond Europe – addressing wider collaboration (DFM Denmark, CMI, NPL, PTB)

European metrology does not operate in isolation, and as described in 9.4 of the DoW coordination worldwide is embodied in the Metre Convention, an intergovernmental treaty of some 50 countries encompassing all the major developed economies worldwide. Already there is an example of a worldwide R&D collaborative metrology project (the “Avogadro” project – to replace the mass artefact) in which the resources and capabilities required are beyond those available in any single country and any single trade bloc. The task team will determine whether collaboration beyond the boundaries of Europe is appropriate for other major metrological challenges.

T2.8 Working group on ethical, gender and societal issues (SP Sweden, CMI)

Overseeing the ethical, gender and societal issues raised in 9.2 of the DoW this task team will work across the other project tasks to alleviate the risk of creating technical barriers to trade between Europe and its trading partners (linking with T2.7). They will promote understanding within and external to the project related interoperability – both in measurement standards and measurement aspects of documentary standards and address certain aspects related to metrology access by developing countries. Anecdotal evidence suggests whilst women are reasonably represented at the postdoctoral level there is serious under representation in more senior metrology posts. The task team will examine the issue and make appropriate recommendations to improve this situation.

T2.9 Expanding the ERA-NET (CMI Czech Republic, NMI, NPL)

The task team will engage with countries that have expressed an interest in joining the ERA-NET but required more time to resolve their participation. Some budget has been included within the relevant tasks to ensure that prospective new members can participate in specific meetings or events. However there is no budget included to fund additional partners in the network and participation as such would be subject to EC rules and additional funding being made available.

T2.10 Consultation and Go/No-Go decision (Project coordinator and NSC)

Progress, including the future prospects, will be summarised and presented to the EUROMET General Assembly and government funding agencies around the mid point of the project. If there is no realistic prospect of launching a European metrology research programme under Article 169 the NSC will recommend termination of WP5. Following a "Go" the NSC, taking note of the progress and the consultation with the GA, may recommend changes to the future WPs. Termination or changes to the work programme will be subject to the agreement of the Commission. This first Go/No Go effectively releases the go ahead for WP 5. The decision will be revisited as the issues become better understood and is addressed again in task 5.4

Deliverables

- D2.1 Synthesis of existing national foresight information (month 12)
- D2.2 Owners and Managers Forum (month 9 & 30)
- D2.3 "Owners" position paper on enabling transnational research (month 12, 33)
- D2.4 "Managers" position paper on enabling transnational research (month 12, 33)
- D2.5 Guidance on assessing collaboration options when taking national funding decisions (month 18)
- D2.6 Joint Activities legal issues action plan (month 24)
- D2.7 IPR report (month 24)
- D2.8 Emerging members' action plan (month 18)
- D2.9 Opportunities for collaboration beyond Europe identified (month 21, 33)
- D2.10 Recommendations on ethical issues (month 24)
- D2.11 Recommendations to improve the gender balance in European metrology (month 24)
- D2.12 Evaluation of ERA-NET expansion opportunities (month 12)
- D2.13 Recommendations on continuation of WP5 and changes to the work programme (month 18)

Milestones and expected result

- M2.1 Owners and managers developing a common community
- M2.2 Recommendations to enable the next phase of collaboration
- M2.3 Go/No-Go decision

WP3 – Joint Activities

Workpackage number: 3	Start date or starting event (month): 1																			
Participant ID:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Participant name:	NPL	DTI	BMWA	PTB	LNE	IMGC	SP	UNMS	SMU	EZ	NMi	DFM	METAS	JV	COSMT	CMI	GUM	MIRS	MIKES	IRMM
Person-months	2.0	2.0	2.0	2.5	2.5	3.5	1.5	0.0	0.0	0.0	1.5	2.0	0.5	0.0	0.0	0.0	0.0	1.5	0.5	0.0

Objectives

1. Interact with European stakeholders to develop and execute a systematic and on-going dedicated European metrology foresight activity
2. Enable European metrologists - in particular from countries with emerging research programmes - to successfully participate in joint research activities through access to facilities and mobility of researchers
3. Undertake nationally-funded joint research projects

Description of work

Workpackage 3 identifies the strategic European metrology research activities based on the collected foresight information. It also addresses training and mobility issues from a European perspective. It consists of three tasks:

3.1 Joint foresight studies (IMGC Italy, NPL, DTI, BMWA, PTB, LNE, SP, DFM)

Within this task the partners will interact with EUROMET and European metrology stakeholders to identify those areas in metrology with the highest potential impact for industry and society. The task team will build on the historical findings from task 1.2 and task 2.1. Stakeholder consultation will include in particular industry, trade associations, the scientific community, regulators, standardisers, accreditors and other research funding agencies. Foresight development will include high-level thematic workshops (one per year) and the establishment of focus groups with stakeholder participation for areas of particular importance. The task team will prepare on the basis of the available information a report "European Metrology Foresight 2007" which will be updated periodically.

3.2 Joint training and mobility (MIRS Slovenia, PTB, LNE, NMi, METAS, MIKES)

Based on the findings of task 1.7 common elements for the qualification of metrological personnel will be identified and common training material will be developed. Joint training courses will be offered in the fields of identified needs. The mobility programme of the EU and other suitable programmes will be analysed for the potential to help improve the mobility of European metrologists, in particular for countries with emerging research programmes.

3.3 Launching joint research projects (LNE France, NPL, DTI, BMWA, PTB, IMGC, SP, NMi, DFM)

The emphasis of these projects will be to provide experience and case studies in managing collaborative R&D. The projects will be funded by coordinating resources from the national programmes. A common protocol will be prepared on project requirements like:

- Work programme with stated objectives
- Defined responsibilities
- Time scales
- Resources

Emphasis will be placed on starting projects in different sectors of research. A subset of these

projects will be monitored in detail to quantify benefit/cost of conducting the R&D on a collaborative basis so as to improve on the decision making process regarding the EMRP.

Deliverables

- D3.1 Sector workshops and focus group meetings (12, 20, 28)
- D3.2 Foresight studies and focus group reports (month 15, 23, 31)
- D3.3 "European Metrology Foresight 2007" (month 33)
- D3.4 European training programme for metrology (month 33)
- D3.5 Launch of joint research projects with coordinated national funding (month 12)

Milestones and expected result

- M3.1 European Metrology Foresight 2007. First time a European foresight study for needs in metrology has been formulated.
- M3.2 First metrology training material in Europe with joint ownership
- M3.3 Launching of joint research projects with coordinated national funding

WP4 – Transnational Activities

Workpackage number: 4	Start date or starting event (month): 1																			
Participant ID:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Participant name:	NPL	DTI	BMWA	PTB	LNE	IMGC	SP	UNMS	SMU	EZ	NMI	DFM	METAS	JV	COSMT	CMI	GUM	MIRS	MIKES	IRMM
Person-months	5.7	2.8	3.5	7.0	7.4	3.5	2.1	0.5	1.1	0.5	2.1	3.3	2.2	1.9	0.5	1.4	0.6	1.4	1.4	1.4

Objectives

1. Identify strategic European metrology research activities
2. Adapt the existing organisational structures of EUROMET according to the needs of joint research
3. Open state-of-the-art national metrology facilities for scientists from other European countries
4. Undertake a centrally-funded research project

Description of work

Workpackage 4 establishes the structures and processes for joint research activities and conducts joint European research projects. It consists of four main tasks:

4.1 Identification of strategic European metrology research activities to support innovation and quality of life (LNE France, NPL, DTI, BMWA, PTB, IMGC, SP, DFM, METAS + input from all countries)

On the basis of the results of task 3.1 the strategic research activities will be identified with participation of the EUROMET Technical Committees (TCs), - including two dedicated workshops for the TC Chairs and attendance by an iMERA representative at individual annual TC Committee meetings for each of the 11 EUROMET TCs - which cover the following disciplines:

- Acoustics, ultrasound and vibration
- Electricity and magnetism
- Flow
- Interdisciplinary metrology (new technologies such as nano, bio)
- Ionising radiation
- Length
- Mass and related quantities
- Metrology in chemistry
- Photometry and radiometry
- Thermometry
- Time and frequency

The recommendations from the TCs will be reviewed by the EUROMET Executive Committee and government funding agents, and proposed to the General Assembly of EUROMET. Technical roadmaps will then be developed in consultation with the TCs. As in task 3.1 this is an ongoing task that will require updating on a periodic basis. Specific technical proposals to achieve the milestones of the technical roadmaps will then be formulated.

4.2 Adapting the EUROMET structures to facilitate joint ERA-NET activities (PTB Germany, EUROMET Executive Committee, EUROMET delegates)

- Development of processes to consider advice from stakeholders
- Provision of competence and development of sustainable procedures for the formulation and review of technical roadmaps in the technical committees
- Adaptation of composition and size of the involved committees to enable the identification of strategic European metrology research activities

4.3 Opening of special facilities to other European metrologists (PTB Germany, NPL, LNE, IMGC, DFM + input from all countries)

Update and review list of facilities. A number of special facilities for metrological R&D have been set up far beyond the routinely available capabilities. Such facilities will be opened to users from other countries and user support groups will be established. The list of special facility will be cross-referenced with task 2.3 on order to avoid unnecessary double investments. Different mechanisms for sharing operating costs will be developed.

4.4 Launch of 'Quick Start' centrally funded research project (LNE France, NPL, DTI, BMWA, PTB, + input from all countries)

In contrast to the joint research projects in task 3.3, this will test the practical aspects of managing centrally funded projects. A subset of the partners have agreed to contribute a small proportion of their national funding allocation to a common fund, which will then be used to fund a suitable technical research project. This will provide the basis for informed decisions on how to manage common funding. The intention is to launch the quick start project as soon as possible with the aim of completing the project by about the end of the first year, reporting on the lessons learnt by month 15. In this way the maximum benefit to later tasks and decisions will be gained.

Deliverables

- D4.1 Two workshops for TC Chairperson (month 7, 24)
- D4.2 Briefing at 11 TC annual meetings (months – various to fit TC schedules)
- D4.3 Identified strategic European metrology research activities (month 9, 27,35)
- D4.4 New terms of reference for EUROMET bodies (month 18, 30)
- D4.5 List of special facilities to be opened for access to foreign researchers (month 15)
- D4.6 Creation of user support groups for special facilities (month 18)
- D4.7 Joint facilities demonstrator(s) (month 18)
- D4.8 'Quick start' centrally funded project launched (month 6)

Milestones and expected result

- M4.1 Completion of adaptation of ToR for EUROMET committees. EUROMET ready to develop strategic research programme
- M4.2 Strategic European Metrology Research identified. For the first time the strategic European metrology research activities have been identified which will help to use the available resources much more efficiently through joint research in the identified areas.
- M4.3 First centrally funded collaborative research projects launched. Provision of practical experience allowing problems related to common funding to be addressed

WP5 – Realisation of the ERA in Metrology Through Article 169

Workpackage number: 5										Start date or starting event (month): 1										
Participant ID:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Participant name:	NPL	DTI	BMWA	PTB	LNE	IMGC	SP	UNMS	SMU	EZ	NMI	DFM	METAS	JV	COSMT	CMI	GUM	MIRS	MIKES	IRMM
Person-months	6.5	8.1	8.1	10.5	6.1	3.3	2.5	2.5	2.4	3.5	2.4	3.3	3.3	2.5	2.5	2.4	2.5	2.5	2.5	0.0

Objectives

1. Develop a European Metrology Research Programme (EMRP)
2. Identify and overcome legal and technical obstacles for national participation in Article 169 funded research
3. Develop the organisational structures and their terms of reference in preparation for an Article 169 based EMRP
4. Ensure sustainability of solution beyond the time of financial support of the Commission
5. Prepare for the national funding aspects in preparation for an Article 169 based EMRP.
6. Develop an action plan to realise an Article 169 EMRP

Description of work

Workpackage 5 will prepare an EMRP with the prospect of executing the programme as a joint research and development programme between the Commission and the participant countries concerned utilising Article 169 of the Treaty. Furthermore the technical and legal requirements in the countries to participate in Article 169 based activities will be reviewed. Existing national obstacles will be identified and national roadmaps for removal prepared and executed. The package consists of six main tasks.

5.1 Preparation of the European metrology research programme to be executed as an Article 169 activity within the 7th framework programme of the Commission (LNE France, NPL, DTI, BMWA, PTB, IMGC, DFM, METAS + input from all partners except IRMM)

Using the output of task 4.1 as the basis the task team will prepare the EMRP with the intention of executing the programme through an Article 169 based activity

5.2 Identify (for each country) processes & milestones required for participation in trans-national research programmes based on Article 169 (All partners except IRMM, BMWZ & DTI Germany & UK to collate summary from each country for summary report)

National funding structures will be analysed by the national partners on the basis of a joint protocol, obstacles will be identified, solutions for removal formulated and a national action plan (with milestones) developed. These activities will be performed in dialogue with the Commission to take into account any developing requirement for Article 169 implementation.

5.3 Developing the European Structures for joint metrological research on the basis of Article 169 (PTB Germany, NPL, DTI, BMWA, EZ + input from all partners except IRMM)

Developing the organisational structure and its terms of reference for the EMRP. The structures will be elaborated by the task team and are likely to include such competencies as:

- Safeguarding the interests of the “owners” and steering the programme
- Developing the programme
- Project selection processes
- European metrology programme secretariat
- Evaluation of completed projects and their impact and feedback on the programme

5.4 Ensuring sustainability (BMWZ & DTI Germany, UK, NPL, LNE)

When creating suitable legal and organisational structures for the implementation of Article 169 (or other solutions) care must be taken that these structures and the defined procedures remain suitable for continuation of trans-national activities in the time when the financial support of the Commission has ended. The task team will monitor proposals and prepare preliminary comments shortly before the mid term and a finalised report towards the end of the project on the sustainability and submit it to the NSC for discussion and approval. This report will form the basis of discussion between the Ministries and EUROMET and will represent the second Go/No-Go decision point.

5.5 Funding aspects (BMWZ & DTI Germany, UK, + input from all partners except IRMM)

A successful implementation of Article 169 requires consensus on financial contribution by the participating countries. The basis for the relative contributions of the participating countries will be established. After consensus is reached on the EMRP the funding can be finalised and agreed on by the participating programme owners. This task will be performed in close interaction with the task team of task 5.3 as it will influence the Terms of Reference in particular of the fledgling programme owner council. Proposals will be endorsed by the NSC.

5.6 Action plan to realise an Article 169-based EMRP (PTB Germany, NPL, DTI, BMWA + interaction with all partners)

Based on the results of tasks 5.1 through 5.4 a combined and coherent action plan to realise Article 169 will be established.

Deliverables

D5.1 EMRP (month 30, 36)

D5.2 National Analysis of legal and technical issues to be solved for participation in Article 169 activities (month 24)

D5.3 Action plans per country for national preparation for participation in an Article 169 based EMRP (month 30)

D5.4 Implementation plan for European Article 169 structures (month 36)

D5.5 Sustainability of intended structures and procedures investigated (month 18, 35)

D5.6 Consensus on funding issues by interested countries (month 36)

D5.7 Action plan to realise an Article 169 based EMRP (month 36)

Milestones and expected result

M5.1 Climate established to facilitate Article 169 for metrology

M5.2 Implementation plan for structures and procedures needed for Article 169 implementation. Readiness to install organisational structures for Article. 169 achieved.

M5.3 Action plan for an Article 169 based EMRP.

WP6 – Dissemination, Governance and Consortium Management

Workpackage number: 6	Start date or starting event (month): 1																			
Participant ID:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Participant name:	NPL	DTI	BMWA	PTB	LNE	IMGC	SP	UNMS	SMU	EZ	NMI	DFM	METAS	JV	COSMT	CMI	GUM	MIRS	MIKES	IRMM
Person-months	27.5	2.7	1.8	2.6	2.6	2.6	2.1	1.4	1.7	1.9	2.1	2.1	2.1	2.6	1.9	2.1	1.7	2.6	1.7	1.7

Objectives

1. Ensure that stakeholders are appropriately informed as the project progresses so that they can input with a full understanding of the issues
2. Provide appropriate governance for the project
3. Establish appropriate management for the ERA-NET ensuring the deliverables are achieved within the timescales and budgets and contract requirements

Description of work

Workpackage 6 has three linked but distinct aspects, and a total of seven main tasks.

Dissemination

T6.1 Dissemination and PR (NPL UK + all partners)

This task will encompass the communication between the project and metrology stakeholders, including preparation of articles for interest group newsletters and standard material for use by the partners and presentation at a major European conference (probably Metrologie 2007) and to the Commission and funding agencies. Each partner country will hold a national event to explain the changes to their stakeholder community.

T6.2 iMERA web portal (NPL UK, DTI)

A dedicated web site will be established for the ERA-NET with a private area for the partners, an area for EUROMET members who are not partners and an open area for public dissemination. The website will include a work area so that reports etc can be centrally stored, and will be used for some of the project management activities. The UK Department of Trade and Industry have indicated that an existing suite of web-based software enabling "voice over IP" communications, virtual meetings, document control and archiving may be available for the project. Alternatively the portal will be developed as a dedicated area on the EUROMET website. External expertise may be necessary for the more advanced aspects of the portal.

Governance and project management

T6.3 The Network Steering Committee (NSC) meetings (NPL UK + NSC members)

The Network Steering Committee (NSC) will compose of 8 senior Ministry or Ministry/NMI representatives (typically Director level), and, as defined by the EC, is chaired by the project coordinator. The NSC will meet on at least 3 occasions on a planned basis (early in the project, around the mid point and towards the end of the project), but may be called together on an ad-hoc basis should the need arise. The NSC will monitor the work performed, review progress towards objectives and take particular interest in the sustainability of the proposed increased cooperation. They will discuss and propose any corrective actions necessary. The NSC takes responsibility for reviewing the various reports and recommending/endorsing implementing actions and for the Go/No-Go decision under tasks 2.10 and 5.4

T6.4 Independent High level advisors (NPL UK, DTI, PTB, NMI, SP)

With the complexity of establishing long-term sustainable international collaboration we expect to require specialist legal expertise (e.g arising in task 2.4 and WP5) and advisors will be engaged to aid the NSC and the project. Additionally specialist expertise may be required for modelling impact (task 1.5) and the quantification of the benefits of collaboration in task 2.3 and to assist in

addressing IPR issues under task 2.5 associated with a more highly integrated approach.

T6.5 Network Management Committee (NMC) meetings (NPL UK + NMC members)

The NMC will consist of the task leaders for all current tasks and will have day-to-day responsibility for ensuring the programme of work is completed to time and budget. The NMC, chaired by the Project Coordinator, will meet at least twice per year. Those partners who are not task leaders will be invited to the NMC meetings at the beginning of the project, the mid point and the final meeting.

T6.6 Partner Reporting (NPL UK + input from all partners)

The various task leaders will provide reports on their activities. These reports will be in a format that is suitable as the input to the periodic reports required by the European Commission (and prepared by the Coordinator).

Consortium Management

T6.7 ERA-NET coordination (NPL UK)

Network coordination and monitoring will be carried out by an experienced senior international project manager within NPL "the Project Coordinator", with appropriate support from a network administrator. The Project Coordinator will have overall responsibility for the project, and will be the point of contact between the partners and the European Commission. The Project Coordinator shall be responsible for issuing the periodic reports to the Commission

Deliverables

- D6.1 Articles for publication (months various)
- D6.2 Presentations for use by partners (months various)
- D6.3 Conference paper (s) (TBD – provisionally month 30)
- D6.4 IMERA website operational (month 6)
- D6.5 Network Steering Committee meetings (months 6, 18, 33)
- D6.6 Minutes of NSC meetings (1 month after meetings)
- D6.7 Advisor reports (as appropriate for the various work packages)
- D6.8 Network Management Committee meetings (months 1, 6, 12, 18, 24, 30, 35)
- D6.9 Minutes of NMG meetings (1 month after meetings)
- D6.10 Partner reports (months 6,12, 18, 24, 30, 36)
- D6.11 Contract reports (Interim months 6, 12, 24, 30 Progress/Final 18, 36)

Milestones and expected result

- M6.1 Launch of the web portal
- M6.2 National dissemination events
- M6.3 Presentation at a major conference (provisionally Metrologie 2007)
- M6.4 Periodic meetings of the NSC
- M6.5 Periodic meetings of the NMC
- M6.6 Successful completion of annual contract obligations

8 Project resources and Budget Overviews

8.1 Efforts for the project

Governance and management

- Seven meetings of the Network Management Committee (At the start up and every 6 months through the three years) - Task 6.2. For partners who are not task leaders, resource has been included to enable them to attend the kick-off, mid-term and final NMC meetings.
- Three meetings of the Network Steering Committee are scheduled – Task 6.3
- A number of the management meetings can be arranged coincident with other meetings and a reduction has been applied to take into account the savings.
- In various tasks members of the task team may need to meet. On the occasions face-to-face meetings prove necessary the additional costs can be absorbed within the present budgeting.

Web costs

- A provision has been made to develop the web portal for the project application and to provide technical support during the project. Although it is envisaged that the web portal will be developed within the consortium it is possible that external expertise may be necessary if more advanced functionality (such as web forums, voice over IP) is required. If this does become the case the appropriate provision (currently €20k) would be switched from other costs to subcontracting.

Subcontracting

- A provision of €118k in total has been made to provide external expertise - on a subcontract basis - related to legal issues – Task 2.4 and WP5, to provide analysis of the techniques used to measure impact – Task 1.5, and developing a model to predict impact of collaboration - Task 2.3 and to help develop a model to allow participants to quantify, in economic terms, the benefits of collaboration versus single participant activity. This amount is split between the relevant task leaders and appears as subcontract costs. Additional resource has been allocated under subcontracting (consortium management) to meet the contractual obligations related to external financial auditing. As mentioned above, provision may be necessary for external expertise to be engaged to assist with the web portal development (Task 6.2). To avoid double counting there is no current provision within the subcontracting.

Provision for non partner participation

- It is estimated that the total number of invites to non partner experts across the various workshops, including industrial experts from outside the metrology community, is approximately 200 workshop days, budgeted at €0.8k for T&S per day. This appears as “other costs” for the various workshop hosts. In reality the number of attendee days may be somewhat higher, but experience has shown that not all attendees reclaim their full costs.

The following tables 1-5 are indicative the table 6 (A.3.1) is the contractual reference for the budget.

9 Other issues

9.1 Taking ethical or gender issues into account

The ethical, gender and societal issues related to reliable measurements as covered by the ERA-NET iMERA are to be considered in a specific task (T2.8) with the establishment of a working group on societal issues⁴.

A⁵

Does your proposed research raise sensitive ethical questions related to:	<u>YES</u>	<u>NO</u>
• Human beings		X
• Human biological samples		X
• Personal data (whether identified by name or not)		X
• Genetic information		X
• Animals		X

B. Applicants are requested to confirm that the proposed research does not involve:

- Research activity aimed at human cloning for reproductive purposes,
- Research activity intended to modify the genetic heritage of human beings which could make such changes heritable;
- Research activity intended to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer;
- Research involving the use of human embryos or embryonic stem cells with the exception of banked or isolated human embryonic stem cells in culture.

The partners confirm that work does not involve any of the above.

⁴ iMERA §2.8

⁵ "2003 – 2004 Work programme. Support for Co-ordination of activities", Commission Decision C(2003)4609, 12/12/2003, n_wp_200207_en.doc

9.2 Potential ethical and gender aspects

Reliable measurement results are important in almost every aspect of our daily life, ranging from fundamental science, through health and safety to global trade. Metrological traceability provides measurement results that are comparable and form an objective base - with quoted references and estimated uncertainties - for decision-making in conformity assessment.

Therefore, whilst the proposed research in itself has little direct ethical or gender consequences, metrology does play an essential role by providing for objectivity and transparency in support of decision-making and confidence-building in many sectors of society where potential ethical and gender aspects are likely, as exemplified below.

<i>Example of social, ethical and gender aspects</i>	<i>Potential problems associated with lack of comparability of measurement results</i>	<i>Example</i>	<i>Measurement-related solutions provided by proposed research</i>
Global trade between producers and consumers	Creates unnecessary Technical Barriers to Trade (TBT) ⁶ . This is a severe handicap, especially for developing countries.	Use of different measurement procedures to detect antibiotics in shrimps exported from China to EU ⁷ .	Pre-normative measurement research. Interlaboratory comparisons. Agreed metrological (traceability, uncertainty) procedures for decision-making
Complex industrial products	Consumers in complex technological societies have difficulties making independent judgements about product merits and safety.	New nanotechnological products ⁸ are both promising but also source of fear.	Metrology standards provide for interoperability and exchangeability of parts and systems – act as mediator between specialist technical world of products and processes, and social world of people
Information in communication systems	Insecure data and information transfer in essential systems such as e-Government, tele-medicine etc.	Lack of time synchronisation leading to confusion in information from different signals.	Provision of common time for instance through synchronisation over the Internet.
Health & safety, pharmaceutical and other chemical sectors	Can be hazardous in leading to incorrect diagnosis and treatment.	Contaminants in medicines. Cholesterol in human blood.	Development of certified reference materials.

⁶ “Transatlantic Economic Partnership”, EU/US, created May 1998, http://www.europa.eu.int/comm/trade/issues/bilateral/countries/usa/index_en.htm

⁷ “Metrological support to international trade”, <http://www.metrotrade.dk>

⁸ “Science & innovation investment framework 2004 – 2014”, §7.14 Science and Society, DTI (UK) July, ISBN: 1-84532-031-X, <http://www.hm-treasury.gov.uk>

<i>Example of social, ethical and gender aspects</i>	<i>Potential problems associated with lack of comparability of measurement results</i>	<i>Example</i>	<i>Measurement-related solutions provided by proposed research</i>
The environment	Can lead to incorrect and unfair decisions in environmental monitoring aimed at guaranteeing long-term durable sustainability.	Trading in greenhouse gases ⁹ : "Achieve stabilisation of greenhouse gas concentrations ...to prevent dangerous anthropogenic interference with climate ..." "Preserve integrity of internal market" "Avoid distortions of competition."	"Reporting of emissions which are measured shall include: — Total emissions; — Information on the reliability of measurement methods; and — Uncertainty."

9.3 Knowledge transfer

The ERA-NET iMERA has several tasks¹⁰ addressing stakeholder interaction and knowledge transfer, thus giving ample opportunity of spreading awareness and obtaining feedback from, and encouraging active participation from, various societal groups not immediately in the measurement research sphere. In addition, the project management plans a specific task¹¹ about dissemination and PR and advice as a means of promoting iMERA to external stakeholders.

Despite its importance, metrology is often omitted in considerations at many levels of policy-making and opinion-forming in science and innovation. This ranges from an under-representation of metrology and measurement-related issues both nationally and at the European level in technological road-mapping and foresight; R&D plans; few university courses in metrology, to a lack of measurement lessons in schools and popular science activities. Reasons for this include the 'horizontal' nature of metrology in that it impacts almost every technological and societal sector and thus 'belongs nowhere in particular', as well as an inherent 'invisibility', where correct measurement often leads to no high-profile event.

Metrology is a subject that the general public can readily relate to; because measurement is something everyone performs and is subject to in everyday life. There is thus great potential, by increasing and improving metrology education at all levels, to contribute to wider programmes aimed at promoting equality and counteracting trends of young people of both genders and ethnic minorities away from technical and scientific training and careers¹². A more 'measurement informed' public will also be better prepared to appreciate the significance of any measurement result and to make independent judgements about product merits and safety in an increasingly complex technological world. Thirdly, if innovation is "the

⁹ "Establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC", EU Directive 2003/87/EC Annex IV, Official Journal 2003, L275/32, 2003-10-25

¹⁰ iMERA §§1.1, 1.4, 2.1, 2.8, 3.1, 4.4

¹¹ iMERA §T6.1, T6.4

¹² "Science & innovation investment framework 2004 – 2014", §6 Science, Engineering and Technology Skills, DTI (UK) July, ISBN: 1-84532-031-X, <http://www.hm-treasury.gov.uk>

successful exploitation of new ideas"¹³, then metrology provides a necessary support to innovation at every step in the value chain from idea to finished product. Knowledge transfer in metrology with industries – in particular, small and medium-sized enterprises – is thus a key activity in the context of promoting growth through innovation.

Initial studies of European and international metrology knowledge transfer¹⁴ will be followed up in the proposed work.

9.4 Third country participation

Metrology has long been on the international collaborative agenda – the world's first global treaty was the Metre Convention from 1875, which is administered by the International Bureau of Weights & Measures (BIPM)¹⁵. In addition to continued bilateral contacts between each national metrology system and the BIPM, the various national metrology systems have in the last decade or so formed regional organisations allowing for increased co-ordination of metrological activities, reflecting increased globalisation of trade and industry as well as more extensive demands for traceable measurement. The European collaboration between the NMIs in the EU and EFTA states called EUROMET¹⁶ was established in 1987 and has indeed provided the initial forum for formulating the present iMERA proposal. EUROMET covers co-operation in the development of national measurement standards and measuring methods; optimisation of the use of resources and services; improvement of measurement facilities and making them accessible to all members; and the performance of comparisons to ensure a better coherence of measurements. Similar regional metrology organisations have been formed in most of the world's major trade regions¹⁷. These in turn have links, either individually or jointly through the BIPM, to many of the key international organisations with measurement interests¹⁸.

There are of course lessons to be learned from the experience of non-EU national and regional metrology programmes and interested organisations, and a specific task to this effect is envisaged in the present proposal (task 2.7)¹⁹. The task will also identify whether there are areas of research where interregional collaboration would be beneficial – as is the case for the Avogadro project - and feasible, and if so identifying potential collaborators beyond Europe.

¹³ "Competing in the global economy: the innovative challenge", DTI Innovation Report (UK) December 2003
http://www.npl.co.uk/met/dti_steer/innovation-report-full.pdf

¹⁴ "NMS KT International Best Practice Study", Optimat/DTI (UK) July 2003

¹⁵ "Metre Convention and the MRA", <http://www.bipm.org/en/convention/>

¹⁶ <http://www.euromet.org>

¹⁷ APMP (Asia-Pacific); COOMET (Euro-Asia); SADC MET (Southern Africa); SIM (The Americas)

¹⁸ Codex Alimentarius Commission; IAEA; ILAC; ISO; OIML; UNESCO; UNIDO; WHO

¹⁹ §2.7 iMERA

Annex A

Annex A.1 Consortium Description

Partner 1 and coordinator – United Kingdom (National Physical Laboratory - NPL)

The National Physical Laboratory is the national metrology institute for the UK. NPL is government owned - contractor operated and is the key formulator and manager of the NMS programmes, responsible for 17 of the 20 NMS programmes. Additionally NPL formulated and led the European Commission supported planning project “MERA”: “Planning the European research area in metrology”. NPL holds the current chairmanship of EUROMET, ensuring continuity between the project and existing structures.

Partner 2 – United Kingdom (Department of Trade and Industry - National Measurement System Directorate - DTI)

The Department of Trade and Industry (DTI) is the UK Government ministry that is concerned with industry and trade in goods and services. DTI provides both policy guidance and direct support for innovation – and acts as a proxy for other Government departments responsible for quality of life issues – through the National Measurement System. Additionally the NMS specifically supports the Standards and Technical Regulations Directorate (also within DTI), which oversees the programmes of activity related to documentary standards and regulations

The main thematic support related to metrology are the 18 research programmes which address research and dissemination of both primary and derived units of measurement, plus two associated horizontal programmes related to International Metrology and Knowledge Transfer.

The annual budget of the programmes is €90M of which about 50% is classified as R&D project based spend. Each programme comprises a number of projects, typically about 30, subject to selection through a formal process.

Partner 3 – Germany (Bundesministerium für Wirtschaft und Arbeit - BMWA)

The Bundesministerium für Wirtschaft und Arbeit (BMWA) is the German Federal Ministry of economics and labour. BMWA is responsible to provide policy guidance and funding for the German metrology system.

The BMWA concludes target agreements describing the metrological three-years goals with the Physikalisch-Technische Bundesanstalt (PTB, Partner 4), which is by law responsible for the realisation and dissemination of the legal units in Germany. Concerning the field of research in metrology BMWA and PTB are supported by a high level scientific advisory board – the Kuratorium.

The BMWA allocates an annual budget to PTB in the order of €125M of which about 60% is dedicated to metrological research and development.

Partner 4 – Germany (Physikalisch-Technische Bundesanstalt - PTB)

The Physikalisch-Technische Bundesanstalt (PTB) is the national metrology institute of Germany. It is a higher federal authority under the auspices of the BMWA (Partner 3). In close consultation with the BMWA and a high level scientific advisory board – the Kuratorium – it develops and conducts the German metrological research programme.

PTB's task spectrum comprises essentially all units in physics and engineering, a number of quantities in analytical chemistry and medical physics, metrological IT, and technical cooperation with developing and threshold countries.

PTB operates two sites (Braunschweig and Berlin) with a total number of staff of around 1500 including about 400 scientists. PTB represents Germany in European and international metrological organisations.

Partner 5 – France (Laboratoire National de Métrologie et d'Essais – LNE)

The Laboratoire National de Métrologie et d'Essais is a public organisation with industrial and commercial activities. LNE has a total of 750 employees carrying out research and operating associated calibration and tests, certification of products, certification of quality systems, training and metrology. The turnover is about €70M of which 15 % is dedicated to research.

LNE is the national metrology institute of France coordinating the activities of three national metrology laboratories (CNAM-INM, CEA-LNHB and OP-SYRTE) and six associated laboratories. LNE cooperates with other national metrology institutes on a bilateral basis, within EUROMET and within the framework of the Convention du mètre. LNE also provides consultancy services and training to private companies and foreign national metrology institutes.

LNE maintains and improves primary measurement standards, and is in charge of ensuring the traceability of measurements in the fields of: length, mass, force, pressure, acoustics, temperature, thermophysical properties, viscometry, optical radiation, chemical and electrical metrology. LNE has a large experience of cooperation with other European and international laboratories in the framework of eg. EC FP V & VI programmes, COST, EUREKA, EURACHEM and EUROLAB.

LNE's expertise is connected with past chairmanship of EUROMET and its experience with previous SMT and BCR projects. On behalf of the DG Trade, LNE also co-ordinated a project aimed at providing a picture of the metrological activities at the European level.

Partner 6 - Italy (Istituto di Metrologia "G. Colonnetti" - IMGC)

The Istituto di Metrologia "G. Colonnetti" (IMGC) is the Italian national metrology institute for mechanical, thermal and some chemical quantities. It is an institute of the Consiglio Nazionale della Ricerca (CNR) under the authority of the Ministero per l'Istruzione, l'Università e la Ricerca (MIUR), the Italian ministry responsible for funding metrology research.

During 2005, IMGC will be merged with the Istituto Elettrotecnico Nazionale (IEN) to create the Istituto Nazionale di Ricerca Metrologica (INRIM, established by D.Lgs.n.38/2004), a new NMI covering all metrological fields except ionising radiation, directly under the authority of the MIUR who have authorised IMGC (and INRIM when it is constituted) to act on their behalf in the iMERA project.

Specific competences of IMGC (and then of INRIM) are in: metrological research, national measurement standards, calibration, accreditation, consultancy services and support to standardisation and to legal metrology.

The staff at IMGC and the other Italian NMIs total about 330 persons (about 150 scientists). The annual total budget (from MIUR and from the market) of Italian NMIs is of the order of €25M. IMGC (and then INRIM) develops and conducts the metrological research programmes funded by MIUR on the basis of annual and triennial programmes approved by high level advisory boards.

Partner 7 – Sweden (National Testing & Research Institute - SP)

SP Swedish National Testing & Research Institute AB appointed under contract²⁰ by the Ministry of Industry, Employment and Communication to act as the national metrology institute, except for ionising radiation which is dealt with by the Swedish Radiation Protection Institute, SSI, in the framework of the national metrology research programme. A Metrology Council, with seven delegates representing industry, authorities and universities and appointed by the Government, takes an active role in the planning of metrological activities in Sweden and reports directly to the Ministry on these activities according to the contract. For the iMERA project, SP has been mandated by the Ministry of Industry, Employment and Communication to act on its behalf.

The main thematic support related to metrology consists of 4 active programmes which address research and dissemination of both primary and derived units of measurement, together with support to standards maintenance, equipment investment and associated horizontal support activities such as the international metrology activities.

The annual budget of the programmes is €5.3M of which about 30% is classified as R&D spend. Each research programme comprises a number of projects containing in total typically about 20 that are subject to selection through a formal process.

Partner 8 – Slovakia (Slovak Office of Standards, Metrology and Testing - UNMS)

The Slovak Office of Standards, Metrology and Testing (UNMS) is responsible for state policy in the field of technical standardisation, metrology and testing in the Slovak Republic. The basic conceptual design of this state policy is technical harmonisation in accordance with the National Programme for Adoption the Acquis Communautaire and to form the needed infrastructure. UNMS co-operates closely with other bodies of the state administration and in company with them shares in realisation of the Chapter No. 1- Free Movement of Goods, gestation of affairs is in charge of the UNMS. The UNMS participates in operating the working group for policy of the technical harmonisation and standardisation of the Committee for Trade, Industry and Business Development EEC UN, as well as operating in the Senior Official Group for Standardisation and Conformity Assessment (SOGSCA) working group. The Office is the Slovak Republic representative on the International Standing Committee for Hand-carried Firearms Tests C.I.P and currently undertakes the presidential function.

Partner 9 – Slovakia (Slovak Institute of Metrology - SMU)

The Slovak Institute of Metrology (SMU) is a non-profit organisation funded by the government that develops and maintains the Slovak primary measurement standards and carries out research in the field of high-precision measurement techniques. It provides type approval, verification, calibration of measuring instruments and training for specialists involved in metrology and measurements. SMU is certified according to ISO 9001: 2000 and its laboratories are accredited according to ISO/IEC 17025.

SMU elaborates and realises state policy in metrology. Approximately 70% of the annual budget is spent on the R&D programme (about €2.1M). The programme comprises 40 long-running R&D tasks.

SMU permanently develops international co-operation and participates in activities of international metrological bodies and organisations. SMU participates or has participated in the co-ordination and running of projects within PHARE Twinning, EUROMET, DUNAMET, COOMET, TEMPUS, UNDP.

²⁰ Contract between Swedish State and SP Swedish National Testing & Research Institute AB (org. no. 556464-6874), concerning activities as national metrology laboratory [June 2003].

Partner 10 The Netherlands (Ministry of Economic Affairs – Competition Directorate – EZ)

The Ministry of Economic Affairs (EZ) is the Dutch Government ministry that has as its aim the creation of sustainable economic growth. The key policy areas of EZ are “Knowledge Economy and Innovation”, “Competition and Dynamic” and “Room to do Business”.

The Competition Directorate of EZ is responsible for the Dutch input to the Metre Convention and is the owner of the metrology programme, which consists of three sub-programmes for:

- Maintenance and Development of Measurement Standards
- Key Comparisons in relation to the CIPM MRA
- Metrology Research

The annual budget for the three programmes is approximately €8M (excl. VAT) of which about €3M is for research and development.

All programmes are described in project format and an independent Advisory Board to the Minister evaluates the projects.

Partner 11 The Netherlands (NMI Van Swinden Laboratorium)

The NMI Van Swinden Laboratorium (VSL) is a division of NMI, a private metrology-orientated organisation, and is owned by TNO, the Dutch national applied research organisation. NMI-VSL is designated by law as the Dutch national metrology institute and is responsible for the development and the realisation of the Governmental metrology programme.

NMI-VSL is a signatory of the CIPM MRA and approximately 700 CMCs have been approved and are published in the BIPM KCDB. NMI-VSL was a partner in the European Commission supported planning project MERA.

Partner 12 – Denmark (Danish Fundamental Metrology)

DFM is the national metrology institute of Denmark, maintaining a range of national measurement standards. DFM is a private, non-profit institute with its primary objective to support Danish industry by offering metrological know-how and calibrations at the highest international level. In addition the Institute provides consultancy services to both private companies and public authorities in Denmark and abroad in matters relating to metrology and to laboratory accreditation. Denmark has a decentralised system with other institutes maintaining special standards. DFM plays a co-ordinating role, and by being an active member in international metrological organisation, it serves as a Danish link to the international community.

DFM is accredited by DANAK (Danish Accreditation) to calibrate at the highest level in Denmark within the following subject fields: Mass, length, DC electricity and resistance, optical power, measurement of electrolytic conductivity in pure water.

DFM is ISO 9001 certified by Danish Standard. DFM is member and the coordinator of DANIAmet - Danish primary and national reference laboratories - which was the first organisation in the world to demonstrate full compliance with the requirements of the MRA (Mutual Recognition Arrangement), when the quality system of DANIAmet was presented and accepted by the EUROMET QS-Forum in March 2001.

DFM has three sources of funding: 1) Government funding to develop and maintain primary and reference standards, research in fundamental metrology, co-operation in national and international metrology networks, education of Ph.D. students and other research students/fellows, 2) Income from participation in national and international projects, 3) Income from sales of services on a normal commercial basis.

Partner 13 – Switzerland (METAS Swiss Federal Office of Metrology and Accreditation)

The Swiss Federal Office of Metrology and Accreditation (METAS) is the national metrology institute of Switzerland. As a Federal office of the Swiss Federal Department (ministry) of Justice and Police, it is the Federal government's technical authority for metrology and accreditation, regulated by public law. METAS is primarily responsible for:

- Provision and dissemination of metrological and conformity assessment infrastructure and know-how necessary to the Swiss economy and the public,
- Guarantee of correct and lawful measurements for the protection of citizens and the environment,
- Establishment of the legal basis for the enforcement of the Federal Law on Metrology
- Operation of the Swiss Accreditation Service (SAS).

In the field of fundamental metrology, METAS has the mandate to realise the physical units and ensure their dissemination, to maintain the national measurement standards and measurement capabilities, to conduct research projects in fundamental metrology and to contribute to the work of international metrological organisations. The annual budget for these activities is in the order of €14M, of which about 25% is classified as R&D.

Partner 14 – Norway (Justervesenet - JV)

JV is the national metrology institute in Norway. It is a governmental authority under the Department of Industry and Trade. JV has an annual budget of €8.5M, of which €3.5M is for the national laboratory, the rest is for the area of legal metrology. An estimated 15% of the budget is classified as R&D. The activity of the National Metrology Laboratory covers the base SI units except the mole, and it has a staff of 21 where 17 have an M.Sc. or a Ph.D. JV has the authority to appoint national reference laboratories in fields that it does not cover itself. JV represents Norway in the Metre Convention and other international metrological bodies and has been a participant in many EUROMET activities including the MERA project. In the iMERA project JV has been mandated by the Department of Industry and Trade to represent Norway.

Partner 15 – Czech Republic (Czech Office for Standards, Metrology and Testing – COSMT)

The Czech Office for Standards, Metrology and Testing (COSMT) plays the role of policy maker/national authority in the area of fundamental metrology. The development of the national measurement system (NMS) is based, among others, on a system of projects aimed at maintenance and development of national standards and at research in metrology. The financing is provided and administered by the Ministry of Industry and Trade (MIT) with a prior approval of COSMT (at the Ministry there is no special unit to administer the whole programme). This arrangement is supported by an official letter designating COSMT as the policy maker/national authority issued by MIT so that the programme owner is COSMT with MIT standing closely behind. The Metrology Council, an advisory board of President of COSMT, representing industry, authorities and universities takes an active role in the planning of metrological activities in the Czech Republic.

The public support related to metrology consists of the national standardisation programme for metrology which address research and dissemination of both primary and derived units of measurement, together with support to standards maintenance, equipment investment and associated horizontal support activities such as the international metrology activities.

The annual budget of the programme is €1.2M of which about €0.48M can be classified as R&D spending. The national programme comprises a number of projects in total typically over 40 that are subject to selection through a formal process.

Partner 16 – Czech Republic (Czech Metrology Institute-CMI)

The Czech Metrology Institute (CMI) is according to the “Law on Metrology no. 505/1990 Coll. as amended” authorised to act as national metrology institute in all the fields of measurement, except for time and frequency which is dealt with by the Academy of Sciences of the Czech Republic, Institute of Radio Engineering and Electronics, IREE, in the framework of the national metrology system. CMI is the key formulator and manager of the national standardisation programme and receives additional €0.15M as a direct subsidy from MIT purely for R&D. CMI has been successful in the past in formal bids for R&D projects called by the Grant Agency, MIT in industrial research etc. CMI is a signatory of the CIPM MRA and over 400 CMCs have been approved and are published in the BIPM KCDB. Additionally CMI took part in the European Commission supported planning project “MERA”: “Planning the European research area in metrology”.

Partner 17 – Poland (The Central Office of Measures – GUM)

The Central Office of Measures (GUM) is the sole national metrology institute in Poland. GUM is a government owned entity manned by the Civil Services Corps members. As a member of EUROMET, GUM from 1996 has participated in a large number of EUROMET projects and determines the goals of activities in the field of metrology in Poland.

Partner 18 – Republic of Slovenia (Metrology Institute of the Republic of Slovenia – MIRS)

The Slovenian national metrology institute is part of the Ministry of Education, Science and Sports, officially responsible for the maintenance of national measurement standards. MIRS is a signatory of the CIPM MRA and carries out all the activities linked with the Metre Convention. MIRS covers the area of national standards, legal metrology and provides traceability to certain industrial areas. The Slovenian metrology system is distributed among several designated institutes, which are in principal either governmental or semi-governmental bodies. For metrology management and coordination activities, MIRS is certified according to ISO 9001-2000, while accreditation against ISO 17025 is a precondition for all laboratories. The annual budget of MIRS (all areas) is €2.5M, where all national measurement standards are allocated approximately €1M (maintenance, traceability, dissemination etc), while research only activities are estimated to cover 30% of the sum (€0.3M).

Partner 19 – Finland (Centre for Metrology and Accreditation - MIKES)

MIKES is the national metrology institute in Finland. It is a governmental authority under the Ministry of Trade and Industry. MIKES has an annual budget of €6.4M, of which €3.7M is for the national laboratories. Legal metrology does not fall within MIKES' scope. An estimated 50% of the budget is classified as R&D. MIKES has designated two national standards laboratories in universities and nominated three contract laboratories. Ionising radiation and geodetic length are under another ministry, but EUROMET activities are coordinated through MIKES. MIKES has a staff of 36 in the metrology area. In Finland commission for metrology is an important stakeholder giving statements and guidance to annual activities.

Partner 20 – Institute for Reference Materials and Measurements (IRMM) – Joint research Centre of the European Commission

IRMM does not manage a national programme nor a ministry funding metrology R&D. The Institute for Reference Materials and Measurements is part of the European Commission's Joint Research Centre. Its mission is to promote a common and reliable European measurement system in support of EU policies. The policy areas where IRMM contributes include food and feed safety and quality, biotechnology, sustainable agriculture, environment, health and nuclear safety and security. It produces and disseminates internationally accepted quality assurance tools, including validated methods, reference materials, reference measurements, inter-laboratory comparisons and training, particularly for chemical, bio-analytical, radionuclide and neutron cross-section measurements. As a EUROMET member, it contributes to European metrology collaborative research, including fundamental metrology research (e.g. the International Avogadro Project). The annual IRMM budget is approximately €30M, and about 60 % of it is directly linked to R&D costs.

Summary of partners

National Physical Laboratory

Department of Trade and Industry	UK
Bundesministerium für Wirtschaft und Arbeit	UK
Physikalisch-Technische Bundesanstalt	Germany
Laboratoire National d'Essais	Germany
Istituto di Metrologia "G. Colonnetti"	France
National Testing & Research Institute	Italy
Slovak Office of Standards, Metrology and Testing	Sweden
Slovak Institute of Metrology	Slovakia
Ministry of Economic Affairs – Competition Directorate	Slovakia
Van Swinden Laboratorium	The Netherlands
Danish Institute for Fundamental Metrology	The Netherlands
Swiss Federal Office of Metrology and Accreditation	Denmark
Justervesenet	Switzerland
Czech Office for Standards, Metrology and Testing	Norway
Czech Metrology Institute	Czech Republic
The Central Office of Measures	Czech Republic
Metrology Institute of the Republic of Slovenia	Poland
Centre for Metrology and Accreditation	Republic of Slovenia
	Finland

Institute for Reference Materials and Measurement - Joint Research Centre of the European Commission

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Annex A.2 Subcontracting

Subcontracting costs are expected to arise from two distinct activities, firstly external auditing required by the EC contract, secondly expert advice associated with certain tasks and work packages.

- A) costs associated with mandatory auditing totalling €44600 for the project

