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MINISTERIO DE INDUSTRIA, ENERGÍA Y TURISMO



CENTRO ESPAÑOL DE METROLOGÍA

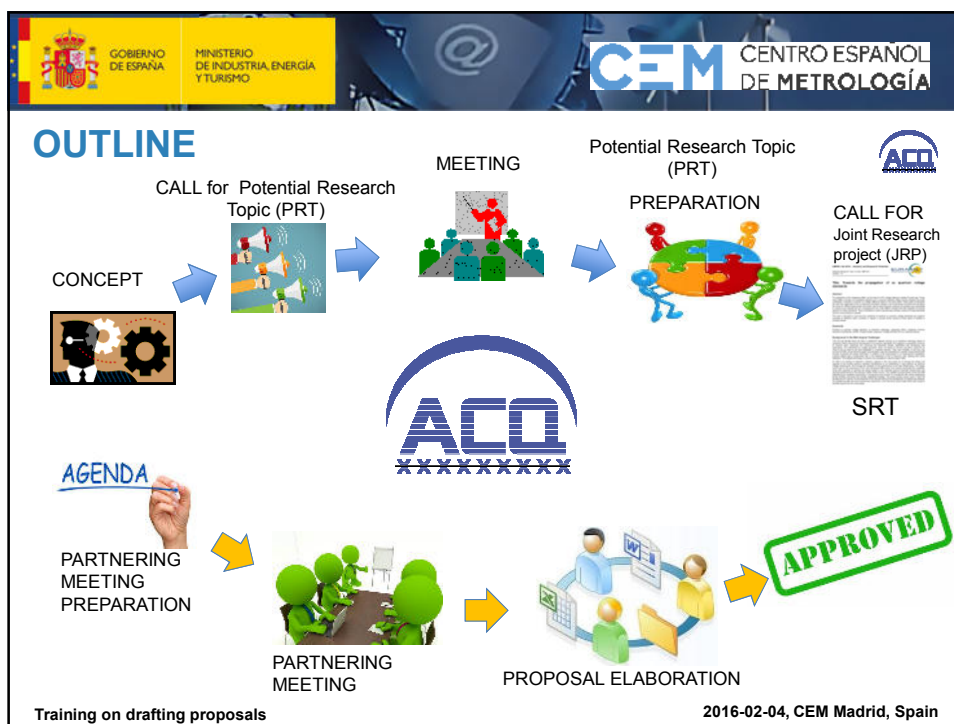


**FROM THE CONCEPT TO THE PROJECT:
CEM EXPERIENCE ON A CAPACITY BUILDING SUCCESSFUL PROPOSAL**

ACQ-PRO

Training on drafting proposals

2016-02-04, CEM Madrid, Spain



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CONCEPT

• AC Quantum voltage Background

- QUANTUM EFFECTS PLAY A FUNDAMENTAL ROLE IN THE FUTURE SI REDEFINITION
- DC quantum voltage started 30 years ago and is used for most of the NMIs and many industrial laboratories.
- There is not a reference for AC voltage that meets all the requirements
- Research on ACQ has been done in the last decades and is expected to continue for several years
- AC quantum voltage standards are very complex system to develop and operate. Only available to a few NMIs.

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CALL

EMPIR Work Programme

Call Scope - TP Research Potential (2014)

Document: P-PRG-GUI-017 Version: 1.0

Approved: EMRP Programme Manager 2014-01-20

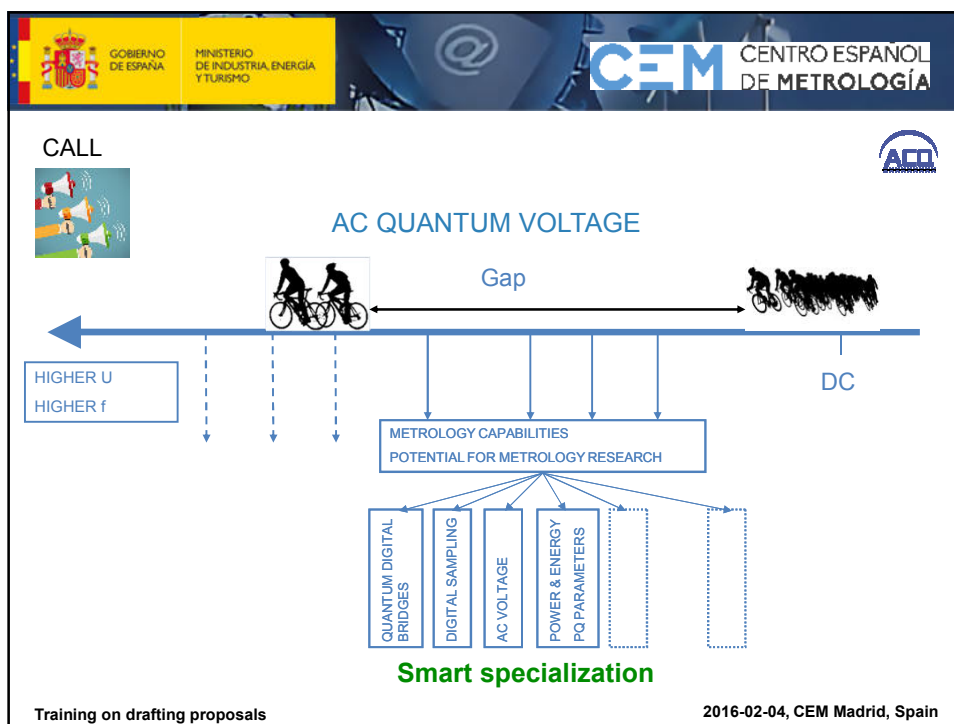
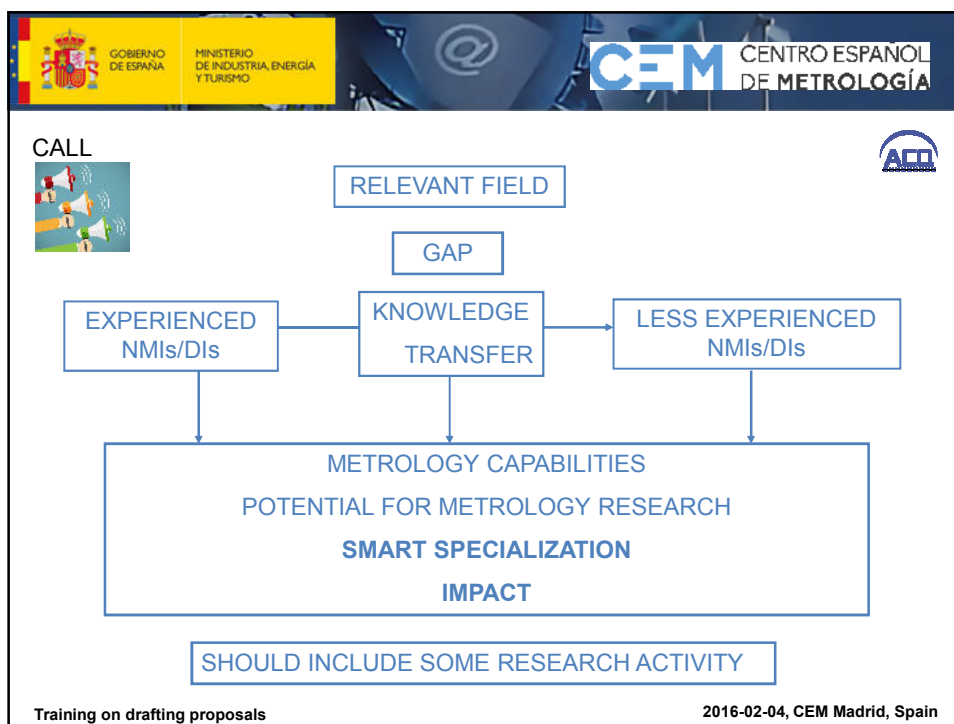
In order to respond to an existing capability gap in emerging EURAMET member countries and regions, Capacity Building instruments have been included within EMPIR. The overall strategic aim of the metrology capacity-building activities on different technological levels is to achieve a balanced and integrated metrology system in the participating states, enabling them to develop their scientific and technical capabilities in metrology. Competitive metrology capabilities affect all other aspects of the technical quality infrastructure of the participating NMIs and DIs, therefore directly contributing to increased European economic welfare.

Research Potential Projects (RPOTs) are a Capacity Building instrument for the development of the potential for metrology research of the participating organisations which will subsequently provide input to other aspects of technology transfer, innovation and all other aspects of research.

The needs identified within the Potential Research Topics (PRTs) should recognise that RPOTs will be demand oriented, will have a European dimension and critical mass, will focus on EURAMET's internal infrastructure and expertise to provide appropriate internal knowledge transfer to emerging members, will be based on horizontal collaboration for the development of new metrological infrastructures in a coordinated way ("smart specialisation") and will need to demonstrate significant impact to the entire quality infrastructure. RPOTs should include some research and development activities and in this respect they differ from the technical assistance nature of cooperation, however they do not need to address fundamental scientific challenges. An important element of RPOTs is the collaboration between NMIs/DIs that are less experienced in a relevant field with NMIs/DIs with greater experience, with the aim of establishing and developing metrology capabilities and the potential for metrology research.

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MEETINGS



FIND PARTNERS EXPERIENCED AND LESS EXPERIENCED



CAPACITY BUILDING MEETINGS


(LESS EXPERIENCED) NEEDS AND TOPICS

EURAMET TECHNICAL COMMITTEES

MORE EXPERIENCED INVOLVEMENT


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MEETING



EURAMET TECHNICAL COMMITTEES

ELECTRICITY AND MAGNETISM

THERE IS A MEETING FOR EACH CALL

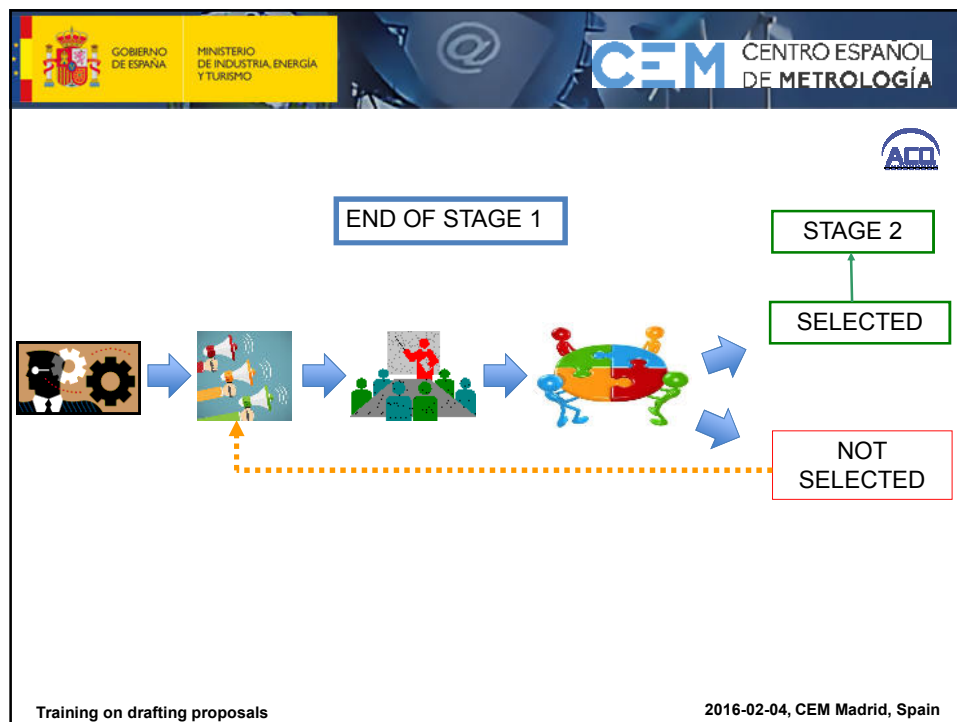
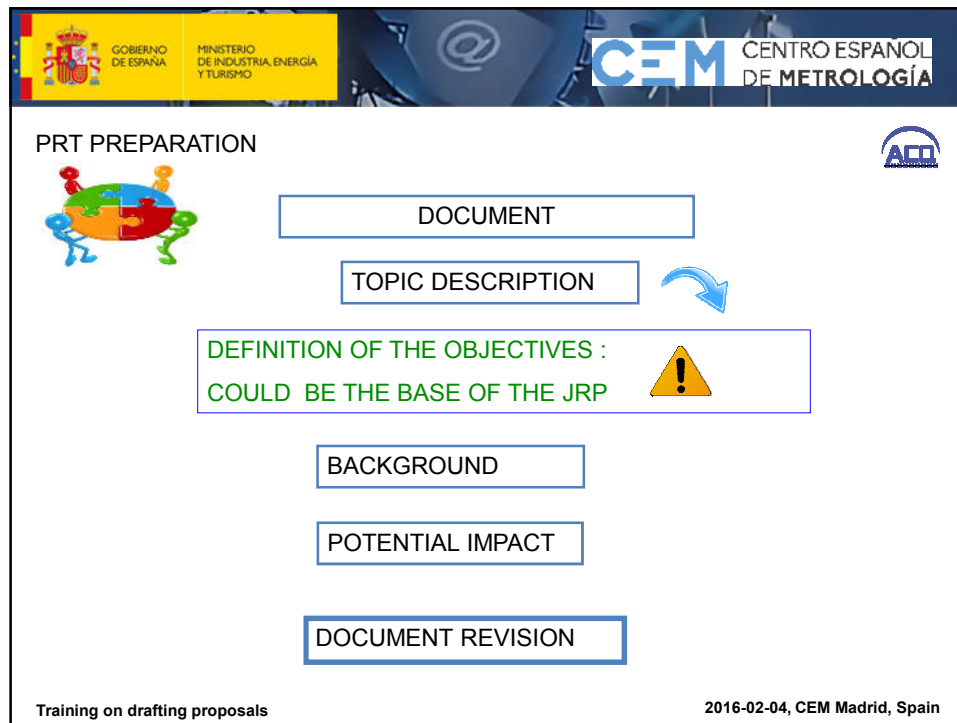


NEED TO COMPETE WITH MANY OTHER IDEAS

EXPERIENCED NMIs, IN GENERAL, ARE MORE INTERESTED ON FUNDAMENTAL RESEARCH PROJECTS

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SRT



STAGE 2



EMPR Call 2014 – Industry and Research Potential

Detected Research Topic number: SRT-v01

Version: 1.2

Title: Towards the propagation of ac quantum voltage standards

Abstract

The application of the Josephson effect, as the basis of a DC voltage reference, started 30 years ago. Today many NMIs in Europe and worldwide possess such a quantum standard. More recently research has been undertaken to develop a quantum ac voltage reference based on the same effect. These types of standards will offer the magnitude of the ac electrical parameters directly to the fundamental constants that will define the future SI. Different approaches have been used to reach this goal, however the systems are complicated to construct and operate and as a consequence only a few NMIs in Europe have the capacity to conduct research on these standards. There is therefore a need to develop less complex versions of these standards that are more practical to operate.

This topic is focused on improving the availability of practical ac quantum voltage standards and research capability at NMIs/OIs within countries or regions in Europe where access to these types of facilities is currently limited.

Keywords

Practical ac quantum voltage standard, ac waveform metrology, Josephson effect, Josephson Arbitrary Waveform Synthesizer (JAWS), Programmable Josephson Voltage Standard (PJVS), capacity building

Background to the Metrological Challenges

Over the last decade there has been a substantial research activity on ac waveform metrology based on Josephson effect, aimed at the development of ac quantum standards. This research is expected to continue for several years, extending and improving the standards already established and developing new applications. The established ac voltage standards, which are based on thermal converters, relate the ac value to the dc value by the heat dissipated in a resistive element. Their main limitation is that they only provide the RMS value whereas digital communication requires traceability for sampled measurements with complex amplitude and phase information. In addition to the improvement in ac measurement capabilities, quantum effects play a fundamental role in the redefinition of the SI electrical units, allowing their direct realisation. The related technology is currently only available for a few European NMIs.


An NMIs or OI wishing to establish a research capacity in this area would do so through the design and upgrade of the existing quantum standard infrastructure or by establishing a new practical ac quantum voltage infrastructure, and through the validation of the performance of the new infrastructure. The design would build on the experience of the more developed NMIs which have already developed this capability, using their expertise to optimise the design based on the available quantum standard infrastructure and required performance for the particular needs of that country. The validation process would involve the NMI establishing the capability participating in comparisons and analyses of uncertainties with others establishing similar facilities and those with already established facilities. The whole process would result in both the development of a facility, the development of the relevant staff and the development of relationships between the establishing NMI and more experienced researchers in the field which would foster further joint research activities beyond the life of the project.



CHECK THE CHANGES FROM THE PRESENTED PRT


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PARTNERING MEETING PREPARATION

AGENDA



THE MEETING IS A UNIQUE OPPORTUNITY TO MEET THE KEY PARTNERS

↓


PREPARATION IS VERY IMPORTANT

AGENDA

A DRAFT OF DELIVERABLES ACCORDING TO THE PROJECT OBJECTIVES


A DRAFT OF THE WPs ACCORDING TO THE DELIVERABLES

A TEMPLATE TO PREPARE THE BUDGET DURING THE MEETING




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PARTNERING MEETING



TAKE THE OPPORTUNITY : DO AS MOST AS POSSIBLE


INTRODUCTION TO THE PROJECT

INITIAL PROPOSAL OF THE DELIVERABLES

FIRST DRAFT OF THE WPs

SELECTION OF THE COORDINATOR

SELECTION OF THE WPs LEADERS




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PARTNERING MEETING



REVISION OF THE DELIVERABLES AND WPs


COORDINATED FOR THE WPs LEADERS. PARTNERS ACTIVITIES

FIRST DRAFT OF THE BUDGET ↔ ACTIVITIES




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PARTNERING MEETING






PROPOSAL PREPARATION ORGANIZATION

TASKS DISTRIBUTION AND DEAD LINES

SENT THE MINUTES TO ALL INTERESTED PARTNERS


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PROPOSAL ELABORATION





FACILITATOR HELP


JRP PROTOCOL : GUIDE 4

PROJECT ADMINISTRATIVE DATA : GUIDE 5

LETTERS OF SUPPORT


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PROPOSAL ELABORATION





JRP PROTOCOL FIRST DRAFT

JRP PROTOCOL SECOND DRAFT

JRP PROTOCOL WPs LEADERS REVISION

JRP PROTOCOL PARTNERS REVISION

JRP PROTOCOL FINAL REVISION

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