EMPIR Reporting Guidelines

Part 6 – Preparing for Mid-Term Reviews - JRPs

EURAMET MSU
Phone: +44 20 8943 6666 Email: EMPIR.msu@euramet.org
msu.euramet.org

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Contents

If you require further help or guidance after reading this document, please contact the helpline

Email: EMPIR.msu@euramet.org

Telephone: +44 20 8943 6666

1 Background

All JRPs are subject to a mid-term review[1] process. For each TP, all the JRPs will be reviewed at a high level by a group of external experts who will be selected by the TP Guardians and by members of the EMPIR Committee.

The reviewers will evaluate the potential outcomes of the projects and their uptake by stakeholders by addressing the following questions:

- Have the stakeholders' needs changed in the 3 years since the PRTs were submitted, and if so, how?
- Is the project going to meet the needs of the stakeholders?
- Should changes be made to the project to ensure impact is maximised?

The reviews can then be aggregated at TP level to make a judgement on how well the portfolio of projects will meet the intentions in the scope for the call. The mid-term TP reviews will not be about individual project progress against the plan as this is already assessed by the EURAMET MSU during the reporting process.

To facilitate the mid-term TP review process, the consortia shall deliver the documents detailed below according to the relevant TP:

Projects from TP IND and TP FUN

- Publishable Summary
- Reporting Template 05 - JRP Self-Assessment for the Mid-Term Review
- a PowerPoint presentation

Projects from TP NRM

- Publishable Summary
- Reporting Template 05 - JRP Self-Assessment for the Mid-Term Review
- Letter from the chief stakeholder (e.g. main standardisation body, technical committee or working group) describing the contribution of the project thus far
- a PowerPoint presentation

These documents will be requested by the EURAMET MSU and will then be provided to the reviewers. **Note that it is particularly important that the JRP website is updated prior to the mid-term review as the reviewers will use this as evidence of publications and other dissemination activities.**

A face to face mid-term review meeting will be held for every TP to supplement the mid-term review documents.

Attendees will include the reviewers (~5), the JRP representatives (one per project), the EURAMET MSU and may include the TP Guardian and/or EMPIR Chair or EMPIR Deputy Chair. The mid-term review meeting will include a Q&A session which should be attended by one representative of the consortium. In addition, the consortium is required to prepare a PowerPoint presentation, which will be provided to the reviewers in advance of the meeting. A structure for the presentation is given in Section 3. JRP representatives should prepare slides following this structure as closely as possible.

The reviewers will express their opinion about the achievements of each project and will make recommendations in their final written report on the improvements that should be made by the project.

Following on from the outcomes of the mid-term review, the EMPIR Committee will decide whether the recommendations that the consortia need to implement should be followed-up by the EURAMET MSU through the standard reporting process or whether an improvement plan needs to be prepared by a consortium in cooperation with the national EMPIR Committee member/TP Guardian. When a suitable solution is agreed (e.g. discontinuation of a task, redefinition or refocusing of activities/deliverables, removal/addition of a

[1] Note that JRPs of shorter duration, e.g. 24 months, will be reviewed at the same time as the other JRPs in the TP, so the review will be near the end of the shorter projects rather than at their mid-term. Similarly, JRPs with later start dates will be reviewed at the same time as the other JRPs in the TP, so the review might be before the mid-term reporting for the project.

partner), the JRP coordinator may need to liaise with the EURAMET MSU to implement an amendment of the project's EMPIR Grant Agreement. The EMPIR Committee may also raise other general issues about the TP to be addressed by the TP Guardians (who are detailed in the table below).

	TP Guardian	TP Facilitator
20FUN	Filippo Levi (INRIM)	Olga Kazakova (NPL)
20IND	Jiri Tesar (CMI)	Dolores Del Campo (CEM)
20NRM	Maguelonne Chambon (LNE)	Eveline Domini (LNE)

2 The self-assessment

The EURAMET MSU provides a template – Reporting Template 05 - JRP Self-Assessment for the Mid-Term Review, which shall be completed according to your consortium's assessment of the project and sent to the EURAMET MSU to be provided to the external experts before the review meeting.

Please note that the reviewers do not have the Annex 1 of your project, so the self-assessment should be a standalone document.

2.1 Introduction

This section should be summarised in 0.5 – 1 page, depending on the size of the consortium. In doing so, please address the following points:

- What are the key existing capabilities and knowledge of your consortium?
- How will these key existing capabilities and knowledge be enhanced by this project?
- What will the enhancements resulting from the project enable your partners to do in the future in terms of new products or services to their customers?
- What will your project's tangible contribution be to the work of standardisation committees?

Please complete the 'Introduction' section as shown in the example below:

Example

1 Introduction

The partners bring together some of the best national measurement capabilities in the world in the area of high-frequency electronic/electromagnetic measurement, and two commercial organisations. Some of these capabilities (partner A and partner B) cover very broad areas of the technology that have been built up over decades. Partner C and partner D have also been involved in this area for many years but provide a narrower scope to the capability. The capabilities of partner E and partner F are relatively new but have been improved considerably in a relatively short period due to good engagement and knowledge transfer from established partners. The knowledge and expertise of the consortium is at a very high level, particularly amongst the NMI partners that have worked in this area for a long period. However, the emerging organisations, partner E and partner F, are progressing considerably to establish traceability for multi-port measurements and electronic calibration units and by the end of the project will participate in a BIPM Key Comparison.

All partners are increasing their appreciation of the issues affecting this area of metrology and are developing a deeper insight into each other's knowledge and capabilities. All organisations are getting a stronger feel for how difficult it is to apply leading edge metrology research in an industrial environment and how the different research strengths of the consortium can be combined to deliver solutions.

The enhancements to these capabilities, brought about by the work undertaken in this project, are enabling the NMI partners to establish and provide traceability in new areas of measurement (i.e. for new measurands and existing measurands being provided over extended frequency ranges). In addition, new forms of traceability are being made

available using the very latest technologies. These enhancements are also opening up new opportunities for further collaboration with the wider scientific community through research programmes such as Horizon 2020.

2.2 Strengths and weaknesses

2.2.1 Objective indicators

The objective indicators are already detailed in your publishable summary or output and impact report, and in your project's Annex 1 (targets). Insert the targets for each indicator and actual numbers achieved to date in the table.

2.2.2 Excellence

With a view towards the end of your project, what do you consider are the strengths and weaknesses regarding the scientific or technological excellence of your project's work?

Focus on 3 strengths and 2 weaknesses and compare your consortium's contribution with that from other regions (SIM, APMP, etc.).

Please rate your project using the following scale and explain your self-assessment.

(9) Dominant: The consortium is recognised internationally - setting the pace and direction of metrology in this area worldwide.

(8) Strong/dominant

(7) Strong: The consortium is recognised internationally - not the leading entity, but able to set new directions on its own.

(6) Favourable/strong

(5) Favourable: The consortium operates mostly as its individual national identities - leading at national level and able to sustain technological competitiveness.

(4) Tenable/favourable

(3) Tenable: The consortium operates only as its individual national identities - not leading and unable to set an independent course.

(2) Weak/tenable

(1) Weak: The consortium is unknown beyond Europe and its scientific contributions lag behind other regions.

Note: Do not rate every strength/weakness. Instead, use this scale to rate your project as a whole (i.e. only one single mark should be listed for the scientific or technological excellence of the project).

2.2.3 Impact

Elaborate on which, and how, partners and stakeholders will profit from the project outputs.

Describe how your project is engaging with stakeholders to facilitate the transfer of project's outputs to those organisations and how this will maximise the early impact of your project.

Indicate the impacts that you expect to be achieved by the project. Take a perspective of 5 years after the end of the project and focus on a maximum of 5 impacts.

Please rate your project using the following scale and explain your self-assessment.

(4) High: Evidence for economic and societal impact, showing important influence on economic growth, environmental issues, public health, healthcare, or health policy.

(3) Substantial: Evidence for economic and societal impact, as a pronounced result of the research.

(2) Moderate: Evidence for economic and societal impact, but this is not a pronounced result of the research.

(1) Weak: No or unclear evidence of economic or societal impact.

Note: Do not rate every impact. Instead, use this scale to rate your project as a whole (i.e. only one single mark should be listed for the impact of the project).

Using the standards table from section B2.c of your Annex 1 as a starting point, describe the progress and the status of your main contribution to the work within standardisation bodies e.g. working draft in preparation, technical recommendation submitted, standard in revision, new guides, new work item accepted. In addition, summarise the work that has been done to promote the uptake of the outputs by these bodies e.g. presentations at committee meetings.

2.2.4 Implementation

Strengths and weaknesses

Outline the strengths and weaknesses of your consortium in implementing the project's tasks and in achieving the envisaged outputs.

Specify strengths or weaknesses of the partners (e.g. in terms of scientific/technological capabilities, motivation and ambition, project management experience, or leveraging the potential impact, etc.).

Issues and deviations

Summarise (in one or two paragraphs) the deviations from your initial project plan and elaborate on the issues and corrective actions which you consider will be necessary for the remaining project duration. If there is an actual risk of your project not achieving part of its initial objectives, please comment on that.

Cooperation and joint research

Describe whether the cooperation between the partners is effective and up to the standards required for a successful project. Highlight any partners whose contribution is not as required.

Describe whether the joint research is leading to results that individual NMIs could not achieve by themselves. Also describe how this is leading to added value for the metrology and wider communities.

Please complete the 'Strengths and weaknesses' section as shown in the example below.

Example

2 Strengths and Weaknesses

2.1 Objective indicators

Indicator		Total	Target[1]
Engagement outside the metrology community	Number of external partners	4	n/a
	Number of unfunded partners	2	n/a
	Number of collaborators[2]	13	n/a
Presentations & other dissemination	Conference presentations / posters	26	12
	Other dissemination activities	4	3
Open access peer-reviewed publications[3] and datasets	Open access peer-reviewed publications	3	10
	Co-authored joint open access peer-reviewed publications[4] (of the above)	0	10
	Open access datasets linked to publications	3	n/a
Standards	Inputs to standardisation committees[5]	9	6
	No. of unique standardisation committees engaged with (of the above)	7	5

Training	Training activities (internal)	4	5
	Training activities (external)	1	3
IP	Patent applications	0	n/a
Uptake	Uptake / use of project outputs by the end-users	2	n/a

[1] -Target number of specific indicators for the lifetime of the project e.g. open access peer-reviewed papers or conference presentations etc, as described in your Annex 1.
[2] - Collaborators are those organisations that have signed a Letter of Agreement with the consortium. Do not include stakeholders i.e. organisations which have not signed a Letter of Agreement.
[3] - Only published open access peer-reviewed publications with a suitable persistent identifier should be listed i.e. papers in preparation or submitted should not be included in the table, but can be mentioned as a footnote below the table.
[4] - More than 1 partner from organisations in different countries.
[5] - Committees whose main task is to draft documentary standards (not metrology committees).

2.2 Excellence

The main strengths regarding the scientific and technological excellence of this project are the skills, experience and expertise of the scientists at the NMIs and unfunded partners. The combined resources of the consortium provide a best-in-the-world knowledge base and this is being exploited in the project to deliver work of a very high standard. In addition, the consortium is working towards the early uptake of the project outputs by end-users.

Weaknesses within the consortium are the lack of expertise of the smaller NMIs and a few technical delays encountered by these partners, which resulted from equipment and personnel issues.

Strength 1: Knowledge and expertise among the consortium scientists in the topic area of this project

It is considered that the knowledge and expertise within this consortium as a whole exceeds that of any related consortium/activity in other regions.

Strength 2: Combined facilities and resources available at the consortium sites

It is considered that the combined facilities and resources available at the consortium facilities are only rivalled, in one or two areas, by facilities available at NIST, USA. For all other areas of the project, the combined consortium facilities exceed facilities found in other regions.

Strength 3: Science deliverables which work for the customer, not just the NMIs

Some of the project's scientific activities are designed for immediate non-NMI use and are being demonstrated outside the NMI community. A measurement method and a residual error model are already in use by one stakeholder.

Weakness 1: Lack of experience within some consortium NMIs

Although two of the partners lack the experience of other partners, such a situation is very common in other regions (e.g. APMP). This apparent 'weakness' is therefore considered not to be any greater than that found in other regions.

Weakness 2: Overcoming delays

Some deliverables have encountered delays due to technical and/or personnel problems, but these have been or are being solved. A key member of the staff has left partner E and the organisation had to appoint a replacement, which led to a delay in the layout design for reference PCBs. Technical issues with the 4-port VNA led to a delay in the multi-port measurements. The issue has been discussed at the project meeting and partner C invited partner E to receive training and carry out the measurements using partner C's equipment at their facilities.

Excellence rating:

Based on the above indicators, the overall self-assessment rating for this JRP is given as **(8) Strong/dominant**. The consortium is dominated by two larger NMIs (partner A and partner B); if the consortium was more evenly matched it could be ranked higher, however the relative lack of experience of some partners make this difficult to achieve.

2.3 Impact

All partners are benefiting from the project's outputs. The participating NMIs are increasing both their measurement service capability (for third-party customer calibration services) and their ability to contribute as collaborators in other EMPIR projects and European research programmes (such as Horizon 2020). In addition, the industrial unfunded partners are benefiting through quick and easy access to the knowledge generated by this project's outputs. The external stakeholder community (European industry and research organisations, such as universities) are also

benefiting from the outputs of this project – easily accessible traceability mechanisms enable efficient and reliable testing of new products (in industry) and research into new areas of science and technology (in academia).

The project has established a Stakeholder Advisory Group which progressively gives feedback on the relevance of the different methods developed during the lifetime of the project to create the highest possible impact. The outputs of the project have been disseminated to European manufacturers of VNAs, calibration kits, precision connectors and waveguide components via presentations given at relevant conferences and meetings arranged at the stakeholders' facilities. Two of the project's outputs (a measurement method and a residual error model) are already in use by one European stakeholder.

Some expected impacts from this project during the coming 5 years are as follows:

- Availability of primary national standard traceability across the entire millimetre-wave region (30 GHz to 300 GHz)
- Routine calibration services for Vector Network Analyser (VNA) Electronic Calibration Units
- Routine calibration services for multi-port devices, including devices on high-speed Printed Circuit Boards (PCBs)
- Accessible traceability, via verification artefacts, for nonlinear and extreme impedances
- Up-to-date 'quality-related' documentation – (i) the EURAMET VNA Guide; (ii) IEEE standards for waveguide and coaxial lines

Impact rating:

Based on the above 'Impact' indicators and expected impacts, the overall self-assessment rating for this project is given as: "**(3) Substantial**: Evidence for economic and societal impact, as a pronounced result of the research".

Information on standardisation

Standards Committee / Technical Committee / WG	**Partners involved**	**Likely area of impact / activities undertaken by partners related to standard/committee**
IEEE P1785 Standardisation - Working Group	Partner A (chair), Partner D	Partner A and Partner D presented the work on geometric features and electrical behaviour at the annual meetings of this WG. Feedback was sought which was taken into account in the selection of the geometrical dimensions of the coaxial connectors. A new IEEE documentary standard (Pxxx) is being written for rectangular metallic waveguides operating at high frequencies, which includes data obtained and validated in this project. Partner A provided a report to this WG and participated in the preparation of this new standard.
IEEE P287 Standardisation-Working Group	Partner A (chair), Partner D	An existing documentary IEEE standard (Pyyy) is currently being revised with the contribution of Partner A and Partner B. This revised standard incorporates new data for precision coaxial connectors that has been obtained in this project. Partner D has also presented the project at the meetings of this WG.
IEEE Working Group on microwave theory and techniques	Partner B, Partner D	Partner D, with support from Partner B, has prepared and delivered a proposal for the creation of a new IEEE WG to the IEEE Standards Association. This proposal suggested the new group to include experts from different countries and fields. Partner D will chair the new WG.
BIPM JCGM – WG1 "Measurement Uncertainty"	Partner C	Partner C has provided input to Supplement 3 of the GUM, which is at an early stage of preparation. Partner C has also presented the project at the meetings of this WG.
EURAMET - TCEM, SC-RF&MW	Partner A	An existing EURAMET Guide on the evaluation of Vector Network Analysers (VNA) is being revised and will include developments in VNA metrology achieved in this project. Partner A is a member of this committee and has presented the project at the annual meetings. Partner A is also working on the revision of the guide.

2.4 Implementation

Strengths and Weaknesses

The partners have shown a high level of engagement which has ensured that the project's tasks have been delivered to a very high standard of quality and efficiency. All participants work well together and there have been no management issues to solve. Partner C has offered (unplanned) training and access to their equipment to partner E so that the multi-port measurements were not delayed for longer. Partner B is very experienced in dissemination and outreach activities and has been very active in the engagement of stakeholders.

The cooperation between participants still requires improvement. The scheduling of the activities for the second half of the project is envisaged to promote the joint research and collaboration. The improved collaboration will be reflected in the planned co-authored peer-reviewed publications. The capabilities of partner E and partner F have improved considerably in a relatively short period of time but are still relatively new.

Issues and deviations

There was a technical issue with the 4-port VNA at the facilities of partner E which led to a significant delay in the multi-port measurements and the establishment of uncertainty budgets. Partner C has offered their assistance and training and we believe that we will still be able to undertake an intercomparison of full and quick calibration schemes during the lifetime of the project, which was one of our key scientific and technical objectives.

The industrial partners and the stakeholder committee often find it difficult to attend the face-to-face project meetings. This is often due to internal restrictions of the companies. For this reason, it has been decided to hold the stakeholder committee meetings via teleconference, even if this is not ideal.

Cooperation and joint research

The cooperation between partners will increase in the second half of the project when sharing of equipment and data will be central to many activities. In the first 18 months, partner C has offered partner E unplanned training and access to their facilities.

The activities planned for the first half of the project did not involve much joint research. However, the partners have exchanged knowledge about characterisation measurements and PCB components. Such exchange of knowledge has led to results that could not have been achieved by a single NMI. For example, the advice from partner D has been very helpful in overall improvements to designs for PCB components being realised by partner E. Also, during the first 18 months, partners A, C and D have started to revise a EURAMET Guide for VNAs.

2.3 Opportunities and threats

Elaborate on the main opportunities and threats you see for the successful exploitation of the project outputs. Indicate how to avoid/limit/minimise the threats and leverage/enhance/maximise the opportunities.

State how your project depends on the actions of the partners and/or external stakeholders beyond the contract to achieve the results.

Which decisions need to be taken and by whom to ensure that results are taken up?

Please complete the 'Opportunities and threats' section as shown in the example below:

Example

3 Opportunities and Threats

The main opportunities and threats for the successful exploitation of the project outputs are summarised below:

Opportunities

- Interactions with professional societies (such as IEEE, EuMA, etc) – this includes participation in the organisation of international scientific conferences in this area of technology, as well as workshops, seminars, training courses, etc. Active representation on appropriate technical committees with such societies is enhancing these opportunities;
- Links to regional metrology organisations (EURAMET, AMPM, etc) – this ensures the established new and improved traceability mechanisms are receiving public exposure to the relevant user communities (in Europe and elsewhere).

Active representation on appropriate EURAMET, BIPM, etc, technical committees is helping leverage these opportunities;

- Continuation of the European ANAMET Technology Forum meetings – this will enable knowledge exchange within the European region (including those from outside the consortium) to be continued. This should be achieved through self-funding mechanisms (modest meeting registration fees, etc);

Threats

- Lack of interest from stakeholders in the longer term could mean that best intentions for future exploitation of the project outputs could become dissipated and/or deployed elsewhere. This threat could be minimised by early and on-going engagement with stakeholders including identifying any changes in requirements, by maintaining the exploitation plan up-to-date and relevant during the lifetime of the project, ensuring that actions and responsibilities are clearly defined including beyond the project lifetime for the take up of results by industry and to maximise impact;
- A novel disruptive technology could supersede existing technologies developed in the project and limit the longer-term exploitation of the project outputs. The consortium could minimise this threat by following the progress of the state of the art and beyond in the area including horizon scanning, and by striving to ensure, where possible, that their work will remain relevant to stakeholders' needs. Partnerships with external stakeholders established prior to and during the project will be utilised with the aim of ensuring the continued relevance and applicability of the outputs of the project.

2.4 Summary

To summarise, please detail the headlines of what you want to have achieved at the end of the project and how you expect your partners and stakeholders to make use of that achievement in the 5 years following the end of the project.

What will make your project a success?

What will remain from your work?

Please complete the 'Summary' section as shown in the example below:

Example

4 Summary

The key targets to be reached by the end of this project (and to be exploited in the 5 years that follow the end of the project) are as follows:

- New SI traceability for measurement quantities used in high-frequency electronics applications. This new traceability will enable end-users to exploit frequency regions with the confidence that comes from having the availability of traceable measurements.
- New customer calibration services for new types of measurement and new types of device. These new calibration services will allow users of 'new' measurands (such as X-parameters) and new devices (ECUs) to quantify quality attributes such as traceability, measurement equivalence and reproducibility, etc.
- A knowledge resource (i.e. source of European expertise) for those using and requiring state-of-the-art measurements for applications in production, manufacturing, testing, research and development. This knowledge base will be accessible and deployable in future research and development projects and initiatives supported by funding mechanisms such as Horizon 2020.
- Incorporation of work and results e.g. rectangular metallic waveguides and VNA metrology, into new and revised documentary standards. This will ensure inter-comparison of data and reduce the existing gap between NMIs and manufacturers of new devices, therefore supporting European innovation.

This project will be considered a success if these targets are met and the long-term aspirations (for continued traceability and measurement services) are sustained. It will be these services and capabilities that will remain beyond the lifetime of this JRP (for a period of at least 10 years or more).

3 The presentation slides

For the 2023 mid-term reviews, consortia will be required to prepare a PowerPoint presentation. The EURAMET MSU provides a structure for the slides that should be followed. The presentation shall be sent to the EURAMET MSU together with other requested documents by a given deadline. These documents will be provided to the reviewers in advance of the meeting.

The slides are aimed at supporting the claims made in your self-assessment, more specifically the excellence and impact rating. It shall include one or two brief overview slides and then briefly focus on the project's objectives. Rather than addressing background or future work, the presentation should primarily **highlight achievements and provide justification for the excellence and impact rating.**

The presentation should be of a size that can be emailed to the EURAMET MSU and should follow the suggested outline below:

- Title: 1 slide
- Introduction: 1 or 2 slides
- Objectives: 1 or 2 slides
- Achievements: 2 to 4 slides
- Excellence rating: 1 or 2 slides
- Impact rating: 1 or 2 slides
- Summary: 1 slide.

To facilitate the review process, this structure should be followed as closely as possible. Additionally, in order to apply/secure a fair approach to each project, the maximum number of slides should not exceed 15.