

Proposals for the BIPM Work Programme for 2020-23

Presentation to the 26th meeting of the
CGPM

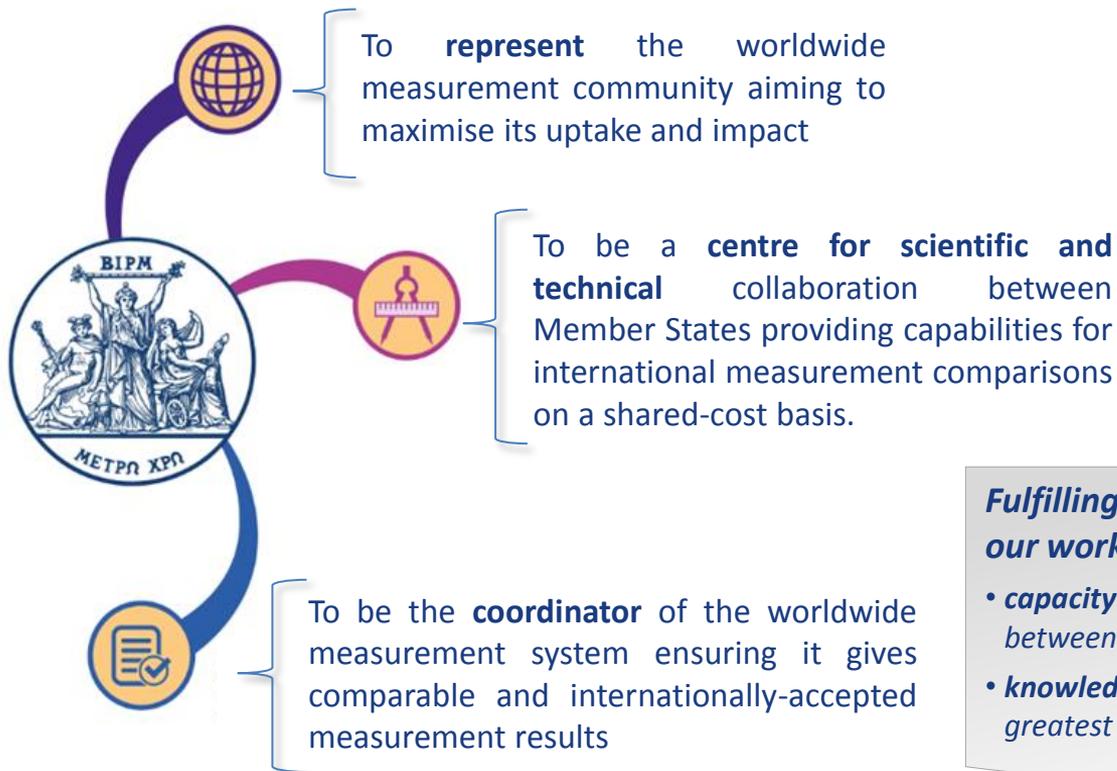
by the BIPM Director

Wed 14th Nov 2018

Bureau
| **International des**
| **Poids et**
| **Mesures**



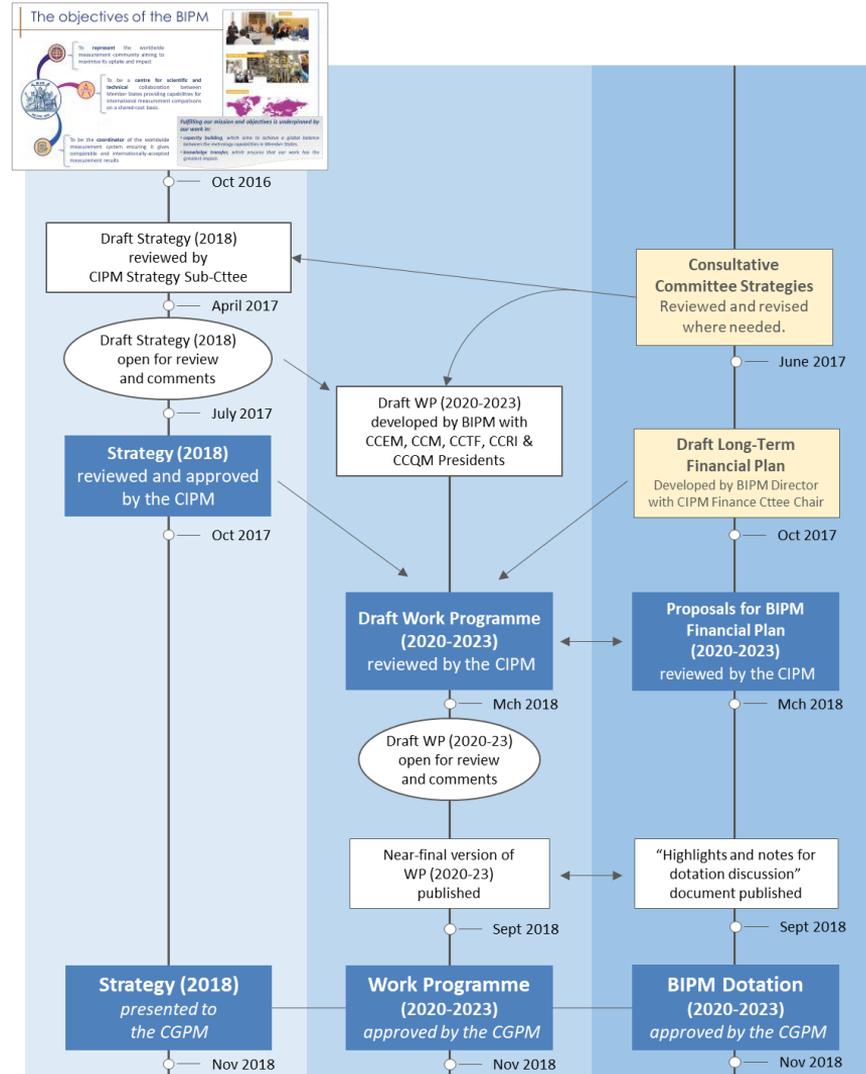
The objectives of the BIPM



Fulfilling our mission and objectives is underpinned by our work in:

- **capacity building**, which aims to achieve a global balance between the metrology capabilities in Member States.
- **knowledge transfer**, which ensures that our work has the greatest impact.

Development and agreement of the BIPM Strategy and Work Programme



Timeline for the development and agreement of the BIPM Strategy and Work Programme

A strategy has been developed for BIPM's work in each area and also for the support services.

These were all steered by input from the CC Strategies and are built on the BIPM Mission, Role and Objectives.

Strategy for coordination and international liaison

Physical Metrology	Planned strategy	Long Term (2020-2025)
To provide a long-term primary realization of the kilogram	To complete development of the BIPM Kibble balance with a relative uncertainty of 10 ppb or better by end of 2020.	To implement the most accurate and efficient means of realizing and disseminating the kilogram.
To coordinate components of primary realizations held by NMI to support the mise en pratique for the kilogram	To organize and coordinate a key comparison of primary realizations of the kilogram according to the proposed mise en pratique following the CCM pilot study conducted before the realizations.	To organize and coordinate an ongoing comparison of primary realizations of the kilogram according to the mise en pratique.
To support the dissemination of mass metrology by providing calibrations of mass standards on request to NMIs.	To organize an ensemble of reference mass standards as a means of providing traceability for BIPM, by collaboration with the highest possible accuracy.	To maintain a robust ensemble of reference mass standards as a means of providing traceability for BIPM, by collaboration and reference for an ongoing comparison of primary realizations.
To develop and provide on-site comparison using travelling quantum electrical standards.	To continue the programme of on-site comparison of electrical quantum standards and to increase support for the CCM comparison programme.	To develop and implement a new generation of efficient and more versatile quantum standards for use in comparison on-site and based at the BIPM.
To support the mise en pratique of the electrical unit.	To determine K_e with uncertainty below 1 part in 10^8 using the calculable capacitor and the quantum Hall effect.	To ensure long-term sustainability of a portfolio of calibration services for voltage, resistance and capacitance.
To exploit facilities at the BIPM by providing the highest priority calibrations for electrical quantities requested by NMIs.	To maintain a portfolio of calibration services that equal past investments in BIPM capabilities for the benefit of all NMIs.	To ensure long-term sustainability of a portfolio of calibration services for voltage, resistance and capacitance.





14

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11

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12

Strategy for chemistry and ionizing radiation

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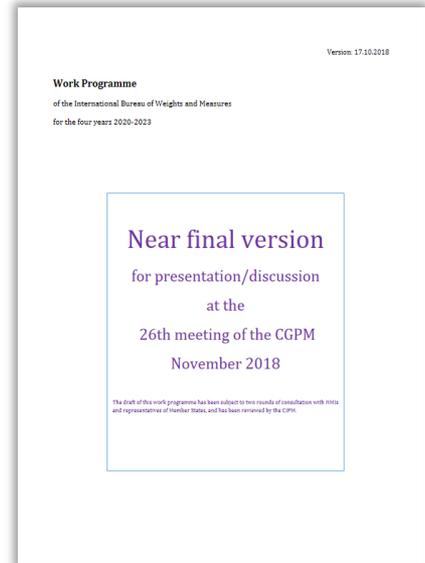





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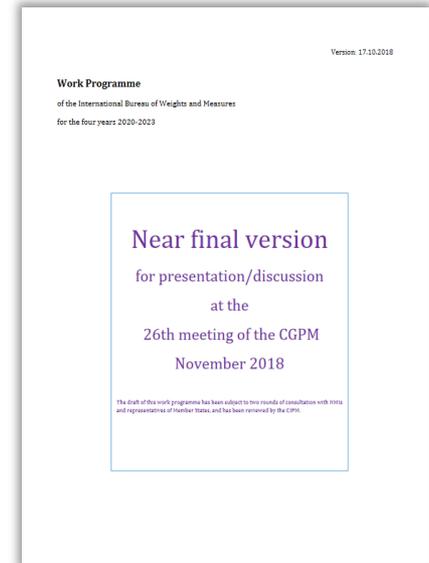
Setting priorities for the work programme

- ◆ Identified the **highest-value activities** required by the Member States.
- ◆ Reviewed the **technical work needed at the BIPM in physical metrology** following the expected decision to redefine the base units of the SI at the 26th CGPM (2018),
- ◆ **Balanced the resources committed to the three strategic objectives** (liaison, technical collaboration and coordination) with the capacity building and knowledge transfer activities,
- ◆ **Developed a sustainable long-term financial plan** for the operation of the BIPM enabling it to fulfil its mission to 2025.



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The foundation of BIPM's activities will continue to be the work of staff in all parts of the organization carrying out liaison, coordination and technical collaboration, with technical activities limited to those where the BIPM has a distinctive role and that provide direct support to many, or all, Member States.

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Estimates of the staff resources and expenditure needed are given for 66 tasks.

We plan to be able to deliver all of the tasks that we have presented in the consultation – (except two longer-term investments).

I will only talk about 2 tasks for each area!

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Key points from the proposed programme

Physical metrology

- ◆ To disseminate from the BIPM Kibble balance and to coordinate the comparison of primary realizations of the kilogram.
- ◆ To organize a new comparison of AC voltage standards based on the Josephson effect.



Key points from the proposed programme

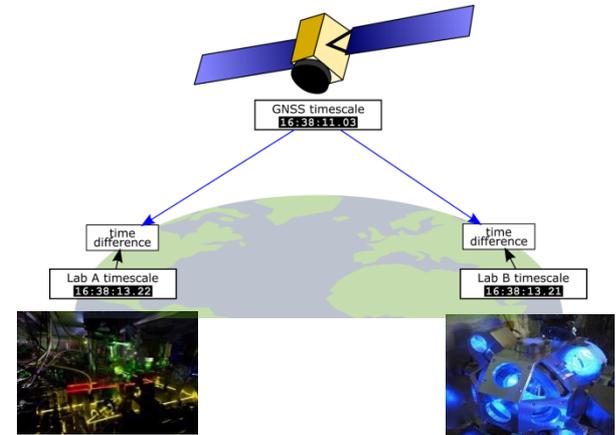
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Time metrology

- ◆ to introduce high-accuracy frequency data from optical clocks into the UTC calculation.
- ◆ to automate data handling in order to optimize the calculation of UTC and increase the number of laboratories participating in Rapid-UTC by 10 %.



Key points from the proposed programme

Chemical metrology

- ♦ to coordinate the implementation of new values for ultra-violet absorption cross-sections for ozone amongst 25 NMIs world-wide that are centrally involved in providing the basis for world surface ozone measurements.
- ♦ to triple the number of nuclei covered by the BIPM's qNMR Internal Standard Reference Data, allowing wider application of qNMR techniques at NMIs for chemical standard characterization.



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Ionising radiation metrology

- ♦ to double the number of NMIs taking part in key comparisons and calibrations of the primary standards that underpin radiotherapy dosimetry for 11 000 clinical accelerators world-wide by making greater use of the off-site DOSEO facility.
- ♦ to launch the next-generation International Reference System (SIR) for comparing standards of gamma-emitting radionuclides, for applications in nuclear medicine and environmental monitoring. Exploit new low-current measurement technologies that may have spin-off advantages for their use at NMIs and DIs.

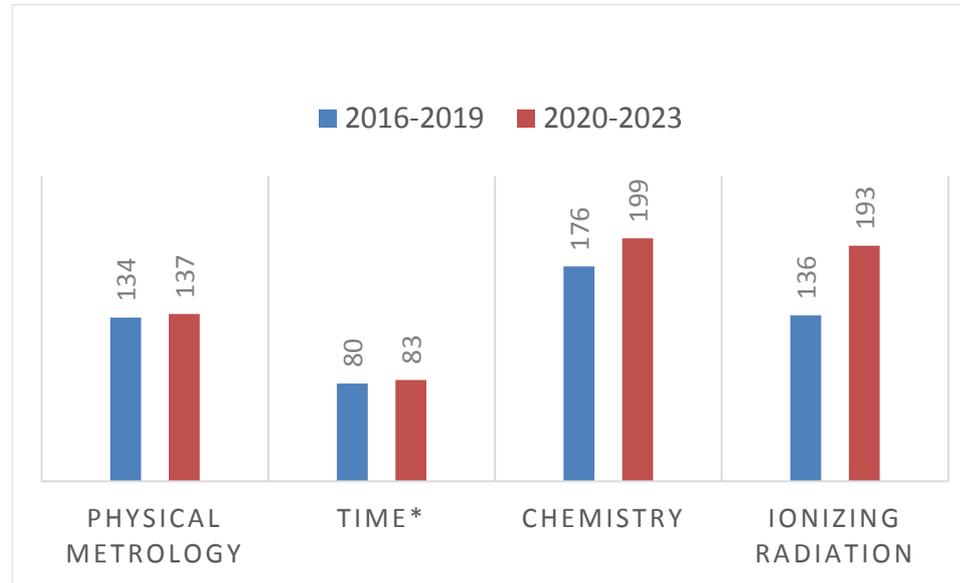


Participation in BIPM activities

Comparisons
coordinated by the
BIPM

and

Calibrations delivered
by the BIPM



**Planning for a 16%
increase in participation**

**the participations indicated for the Time Department correspond to the monthly determination of UTC.*

Key points from the proposed programme

Liaison, we will continue:

- ◆ to present a coherent and cohesive single voice for metrology by working closely with OIML.
- ◆ to advocate on behalf of the NMI community such that the members of other International Organisations can gain the best benefit at national level from the available national metrology resource for their missions.

Institutional liaison

- ISO, ILAC, UNIDO, WTO-TBT etc.

Technical liaison through Consultative Committees

- IAEA, ITU, ICRU and others

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Coordination

- ♦ to promote the mutual recognition of national measurement standards and of calibration and measurement certificates issued by NMIs, particularly by operation of the KCDB.
- ♦ to support *in vitro* diagnostic measurements world-wide by providing and operating of the JCTLM database.
- ♦ to expand the IMRR database which is the gateway to data and data-related services held by the international metrology community

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- ISO, ILAC, UNIDO, WTO-TBT etc.

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Accurate results
for patient care

Key points from the proposed programme

“Core” capacity building

- ◆ to increase the pool of NMIs that are able to contribute to activities and take leadership responsibility within the CIPM MRA.
- ◆ To promote ‘right first time’ engagement in the CIPM MRA and thus reduce the review burden on the leading NMIs.

“Core” CBKT

- at least **420 NMI/DI** staff are expected to attend courses and workshops

Key points from the proposed programme

Technical capacity building (all sponsor funded)

- ◆ to support NMIs developing capability in “Metrology for accurate patient care”.



- ◆ to provide new capacity-building opportunities to:
 - improve the quality of data submitted to UTC
 - support new NMIs coordinating comparisons of electrical quantum standards and for the dissemination of mass standards.
 - engage with NMIs and DIs working in radiation dosimetry and radionuclide metrology, through joint projects and workshops.

Placements

- **40 laboratory placements** at the BIPM totaling around 170 person month will be offered

Workshops

- **100 participations** in laboratory-based workshops organized at the BIPM

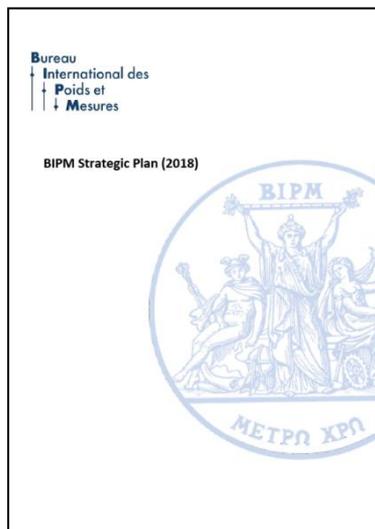
Summary

- ◆ The proposed activities are ambitious and depend on the work of visiting scientists and specialists working alongside BIPM staff for their delivery.
 - *The increasing participation of visiting scientists reduces costs, brings in specific expertise when it is needed, injects new ideas, and provides flexibility in staffing.*
- ◆ The proposals also include capacity building and knowledge transfer activities, some of which depend on the BIPM securing sponsorship from NMIs, Member States and RMOs, or other bodies.
- ◆ We will continue to enable scientific and technical collaboration between Member States providing capabilities for international measurement comparisons on a shared-cost basis.

Thank you



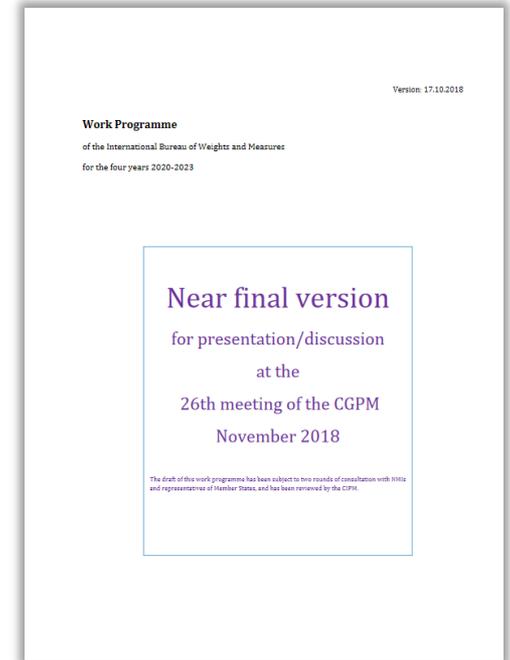
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Liaison - to foster cooperation with international organizations and to promote the world-wide comparability of measurement.		
Detailed strategy	Plans (2018-2019)	Long Term (2020-2025)
To increase participation by International Organizations in technical coordination activities at the BIPM, including CCs and their working groups, and to achieve greater recognition by IOs of the value of SI traceable measurements.	<p><i>To implement a “portfolio” approach to liaison activities:</i></p> <ul style="list-style-type: none"> - <i>Maintaining a balanced evaluation and prioritization process for existing liaison and coordination activities (recognizing resource limitations and that institutional and “door opening” roles differ).</i> - <i>Evaluating and responding to opportunities for new liaison and coordination initiatives.</i> <p><i>To establish staff exchange opportunities to and from key International Organizations.</i></p> <p><i>To develop sustained links with inter alia the World Bank and the OECD.</i></p>	
To promote the importance of the global comparability of measurements with international organizations of strategic importance to the BIPM mission (including the OIML, ILAC, ISO, WTO-TBT) and to work with them and others through Joint Committees.	<p><i>To work towards better coordination and recognition of “Quality Infrastructure” (QI) and the central role of metrology within it amongst IOs and their stakeholders.</i></p> <p><i>To review the relevance and impact of all MoUs and joint documents with International Organizations.</i></p> <p><i>To develop a portfolio of papers representing the position of the CIPM on issues of shared interest (for example the review of ISO/IEC 17025/34, the VIM, DCMAS etc).</i></p> <p><i>To participate with the OIML in the review of document OIML-D-01.</i></p>	<p><i>To commission an independent study to benchmark the impact arising from metrology in QI.</i></p> <p><i>To implement a strategy of shared representation with partner organizations.</i></p>
To increase opportunities for Member States with emerging measurement systems, encouraging “prospective Member States” to make the transition from Associate to Member State.	<i>To develop a consensus (for discussion at the 26th CGPM) on how to address the needs of Countries and Economies with Emerging Measurement Systems (CEEMS). Exploiting synergy with the OIML where possible.</i>	<i>To implement a new approach (reflecting the views of Member States at the 26th CGPM (2018)).</i>

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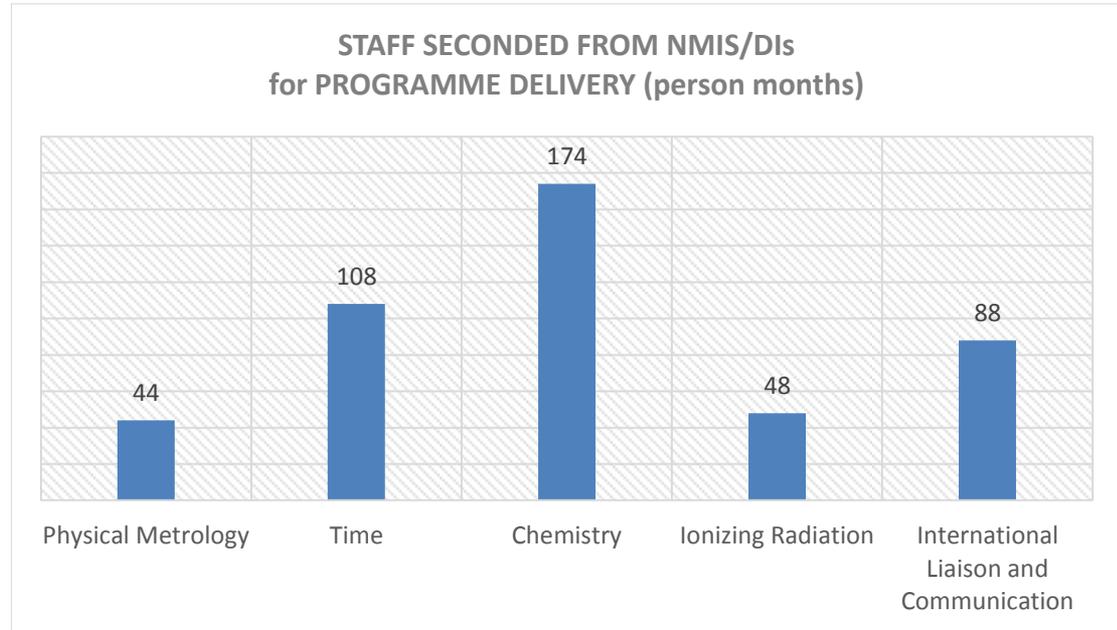
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Capacity Building and Knowledge Transfer (CBKT)

Knowledge transfer activities from visiting scientists/specialists seconded to the BIPM

- ◆ 462 *pm* secondments projected



Basis for costings – staff and secondments

- ◆ BIPM staff:
 - 2112 pm for programme delivery
 - 75 pm for Dep. Management
- ◆ Staff seconded from NMIs/DIs:
 - 462 pm secondment

