

# IADB SIM Research Engagement Opportunity

## 2017 Guidance and Application

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### **Activity and Application Guidance**

In support of the Sistema Interamericano de Metrología (SIM) Project with the Inter-America Development Bank (IADB) on “Strengthening National Metrology Institutes in the Hemisphere, in support of emerging technologies”, SIM member National Metrology Institutes (NMIs) and Designated Institutes (DIs) are invited to submit joint research proposals to advance development of technical research capabilities in metrology related to emerging technologies such as advanced manufacturing, nanotechnology and biotechnology.

The SIM Technical Committee Chair will accept joint research proposals from any SIM Member NMI or DI that includes at least two SIM partner institutions. All proposals will require management approval, and details on the objectives and benefits of each activity. The application may be found on Page 2 of this document.

Project requests may not exceed u\$s 45.000. The requested funds can be used to support exchange of scientists, organize meetings, workshops, intercomparisons and pilot studies.

Proposals shall be send to SIM Technical Committee Chair ([csanto@latu.org.uy](mailto:csanto@latu.org.uy)) with copy to SIM Secretariat ([Simkin@inti.gob.ar](mailto:Simkin@inti.gob.ar)).

### **Application and Administrative Review Timeline**

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The table below includes both deadlines for applicants and other important dates that should be kept in mind when preparing associated activity arrangements.

<b>Application Processing</b>	<b>Important dates &amp; Deadlines (see explanation below)<sup>1</sup></b>
Application Announcement	26 <sup>th</sup> December 2016
Application Deadline ( <i>all applications</i> )	3 <sup>th</sup> March 2017
Applicant(s) Notified of Final Decision	10 <sup>th</sup> April 2017

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Selection Criteria:

Applications will be evaluated based on need and potential impact.

Contribution to IADB project goals (see project goals at the end of this document)

Contribution to addressing measurement challenges associated with emerging technology

New collaboration or continuation or expansion of existing collaboration.

Benefit to partners and to region

Number of countries (minimum 2)

## Application

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Please do not exceed two pages.

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**Partner Institutions**  
(include PI, email and  
address for each  
NMI)

**Centro Nacional de Metrología**

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**Instituto Nacional de Metrologia, Qualidade e Tecnologia (INMETRO)**

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**INACAL Instituto Nacional de Calidad**

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**Dictuc S.A., Laboratorio Custodio de Patrones Nacionales de Longitud de Chile  
(Laboratorio Designado)**

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<p><b>Project Description</b> <i>Briefly describe the research project, highlighting key objectives and expected contributions of each of the partners</i></p>	<p><b>Large-scale dimensional metrology.</b></p> <p>The accurate measurement of large-scale structures is one of the main problems in present day technologies such as wind turbines, oilrig structure construction, vessels, airplanes as well as infrastructure construction of bridges or hydropower utilities require precision engineering that has to be verified with accurate measurements.</p> <p>Large structures may be measured with either total stations, laser trackers or other emerging technologies. These are complex measurement instruments and their use, characterization and calibration or verification are a challenge to be addressed. This is the purpose of this project. It would comprise the following <b>objectives</b>:</p> <ul style="list-style-type: none"> <li>• Instrument verification and assessment according to existing written standards.</li> <li>• Development of calibration standards (artifacts).</li> <li>• Calibration and verification methods’ development.</li> <li>• Measurement uncertainty assessment.</li> <li>• Characterizations of variables of influence such as the refractive index of air.</li> <li>• Evaluation and comparison of the different instruments and technologies (total stations, laser trackers, photogrammetry, etc.)</li> </ul> <p>The personnel of the five participating NMIs, in collaboration, would perform the testing required, including artifact design and construction. At least a calibration site will be set at one of the five NMI facilities, but the other four may replicate it at their facilities.</p> <p>Once this measurement assurance infrastructure is in place, there will be adequate capability for large-scale measurements in the SIM region supporting energy generation by wind power; as well as the oil drilling industry, the ship construction industry, the aerospace industry and the precision manufacturing industry.</p>
<p><b>Potential impact/project goals:</b> <i>briefly describe the measurement challenge this research project is expected to address</i></p>	<p>We foresee an important growth of power production by wind turbine farms in the near future in the region. The mechanical alignment of the different parts of these systems along with the precision manufacturing of the blades are a metrological challenge. In other fields, such as civil engineering structures, oil offshore drilling platforms, air and space industry and ship building there are similar requirements. To address this challenge it is required to set-up the infrastructure to calibrate, verify and characterize the measurement equipment used. We foresee to generate at least a couple of new CMCs in the field for the participating laboratories.</p>
<p><b>Project relevance:</b> <i>briefly describe the relevance of the project to IADB/SIM Project Goals</i></p>	<p>This project will provide measurement infrastructure and capabilities to support industries in the region requiring large-scale precision measurements. This will be in support of the power industry, oil industry, vessel construction and aerospace industry.</p> <p>Nowadays advanced manufacturing is requiring high accuracies on large volumes. For example 3D accuracy in large scale production and assembly with length less or equal to 100 m is required. High value manufacturing and large civil engineering projects are critical users of large volume dimensional metrology. For example hydropower industry manufactures large turbines that require a precision levelling of 20 um/m which is the capability limit of laser trackers, the efficiency of wind power energy depends of how well the blades are dimensioned, aerospace industries needs to align during the manufacturing and assembly of the fuselage.</p>

<b>New or Existing Collaboration</b> <i>briefly explain is this is a new collaboration? or an extension or expansion of existing collaboration?</i>	It is not really a new collaboration. The personnel of the five institutes have been in contact and exchanged information in the past and a few research visits have taken place already, for example in the topographic field and most important, a couple of NMI in the area of laser trackers. These acquaintances allow each part to know about the capabilities of the others and state the present proposal solidly.
<b>Tentative Dates</b> <i>Expected start and end dates</i>	1 January 2018-30 December 2019
<b>Project cost</b> <i>Please provide an estimated cost (NTE 40K)</i>	25 000 USD.

**Please describe:**

**Benefit to SIM:**

This project will mainly influence three areas, advance manufacturing, large-scale structure measurement and energy production. A lot of metrological knowledge will be generated and will be diffused to all of the SIM members through technical training and courses by the five participating NMIs

**Benefit to Participating Metrology Institute(s):**

**In the case of CENAM the main benefits will be:**

- Determine the measurement capabilities with our laser tracker Leica AT901 and our total station Leica.
- To have a photogrammetry system to relate the measurements of large parts of this system against the measurements with laser tracker and CMM.
- To establish procedures and measurement techniques for the verification of laser trackers, total stations and photogrammetry systems.
- To get experience in the measurement challenges described previously. It is intended that these challenges help to identify how to improve the measurement accuracy of instruments such as laser tracker, total stations and photogrammetric systems in order to propose improvements or develop new methodologies and techniques of measurement.

**Anticipated results/impact:**

- Design and construction of measurement standards for performance evaluation of laser trackers based on ISO 10360:10:2016.
- Proved measurement techniques and procedures to be used in our applications.
- Comparison between national laboratories in the measurement of large volume pieces using laser tracker, total stations and a photogrammetry system.
- Report of practical exercises of how refractive index of the air affects measurements with laser tracker and total stations.

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**Objectives of SIM-IADB Project.** *The General Objective is: Development and implementation of new measurement expertise available in member countries to address emerging technology needs. The three specific objectives: (i) Promote a climate of innovation, competitiveness and productivity by enhancing the delivery of advanced measurement services needed by firms for the development and adoption of emerging technologies; (ii) Facilitate public-private sector dialogue between the national measurement institutes and stakeholders in government and industry to improve the regulatory framework in the hemisphere needed to develop innovative companies bringing new products and technologies to the marketplace; and (iii) Promote the mutual acceptance of measurement results necessary not only for trade, but also to facilitate cooperative R&D projects between different member countries, and between LAC and other regions.*