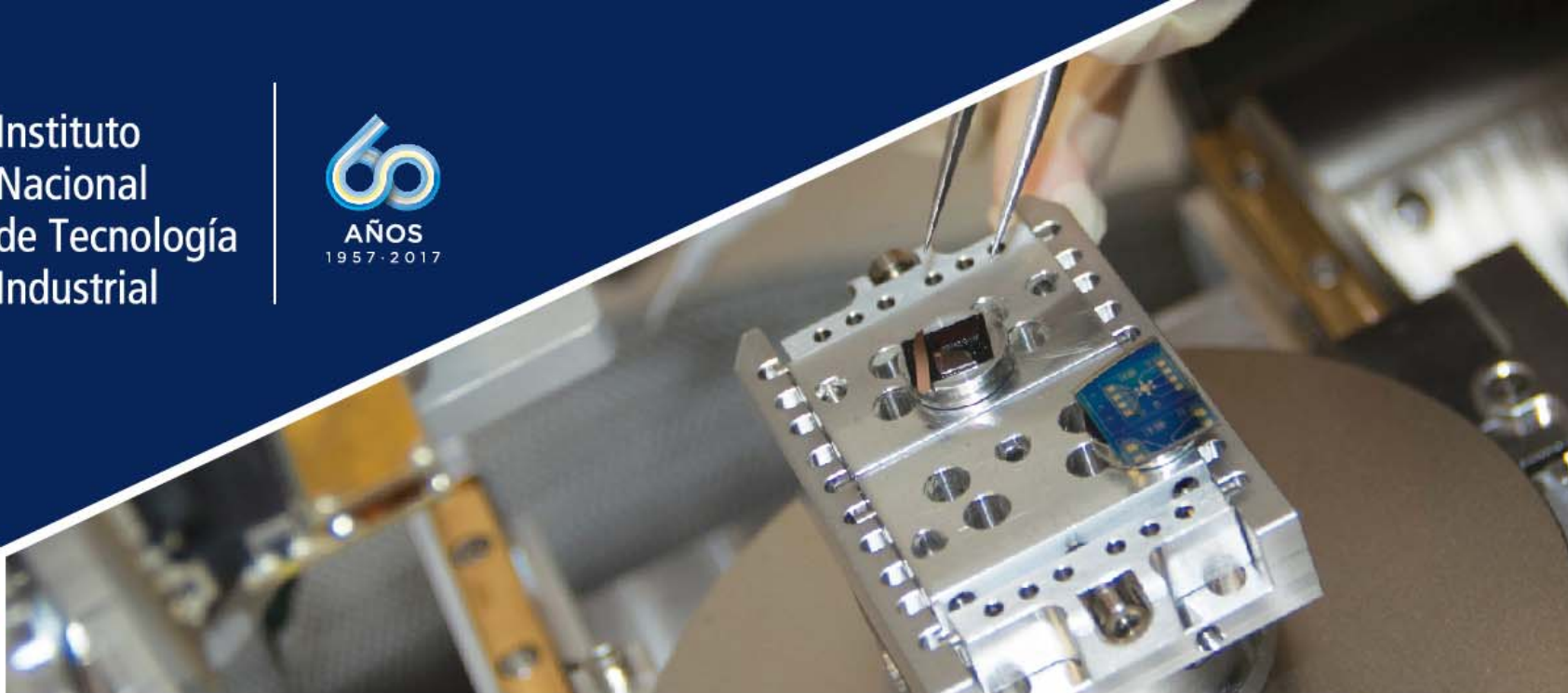




Instituto  
Nacional  
de Tecnología  
Industrial



# Advanced manufacturing, Digitization and IoT

Héctor Laiz

BIPM, Oct 2017



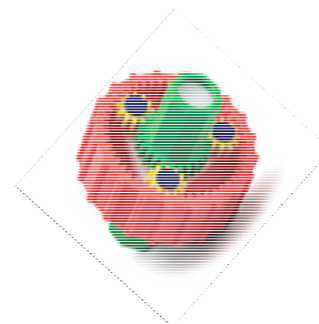
Ministerio de Producción  
Presidencia de la Nación

## Outline:

### Activities at INTI:

- 1. 3-d Printers Calibration**
- 2. Computed Tomography System verification**
- 3. Cybersecurity and IoT**
- 4. Legal Metrology Cloud**

## Development of verification methods for additive manufacturing



- **By Materials:** look for common characteristics in the materials or additives used by the 3D printer with the aim of standardizing the requirements to be verified in each case.
- **By manufacturing process:** study the repeatability, the accuracy in positioning.
- **By production process:** analyzing the requirements of the piece according to the field of application
- **Modeling and simulation**

## Development of a calibration procedure of Computed Tomography System



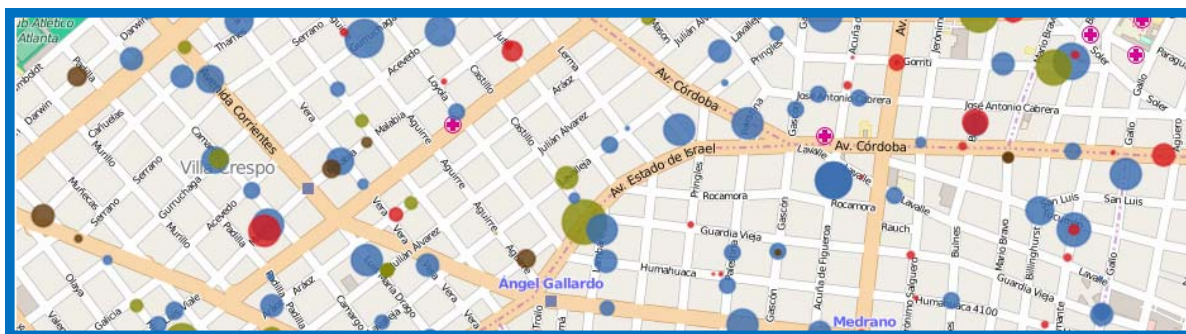
- Developing a verification procedure
- Developing complex metal artifact with complex internal characteristics and surface roughness to calibrate the system

**3D Computed Tomography System**

**General Electrics, V/TOME/XS**



## Legal Metrology Cloud



Instruments with legal verification	Repairs being made
on-line legal documentation for all instruments	Surveillance of the activities of technical services
Alarms to the proper office	Open access to indicators and statistics
GIS of all instruments	Digital certificates

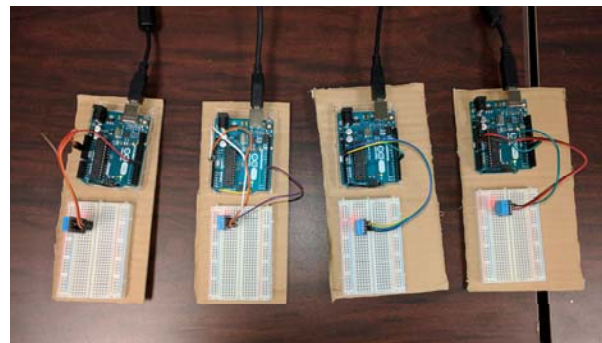
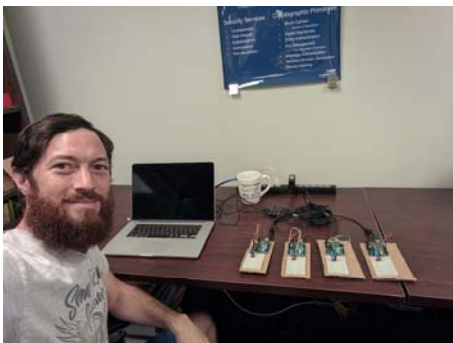
## Cybersecurity and IoT

*Requirements: Integrity, confidentiality and availability*

**Stablished services:**

1. Testing of the software requirements of regulated instruments (pattern approval)
2. Testing of embedded software in fiscal memories

**New Project: IoT Cybersecurity Laboratory (cooperation with NIST)**



**Role of NMIs!**



**INTI**



**Thank you!**



Ministerio de Producción  
Presidencia de la Nación