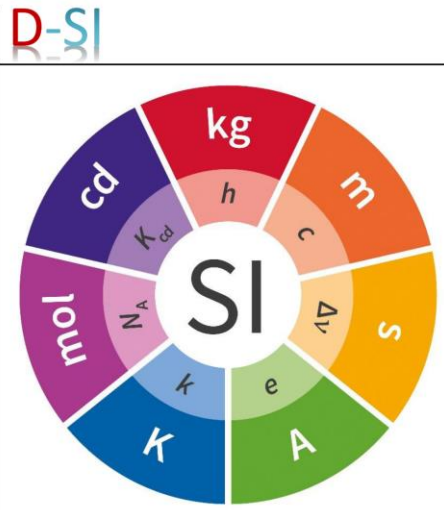


DCC Summer School 2022 experience

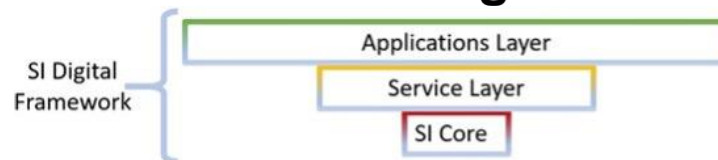
Eduin Culma (INM, Colombia)

Rubén Gil (INACAL, Perú)

SI Digital Framework



Grand vision of the SI Digital Framework



- Lab Automation
- Artificial Inteligent
- Machine Learning
- Metrology cloud
- **Digital Calibrate Certificate DCC**
- Others


Bureau International des Poids et Mesures

The International System of Units (SI) in **FAIR** digital data.

FINDABLE ACCESSIBLE INTEROPERABLE REUSABLE

<https://www.bipm.org/en/bipm-workshops/digital-si>

Perception about DCC in the region



Customer service application

Administrative data

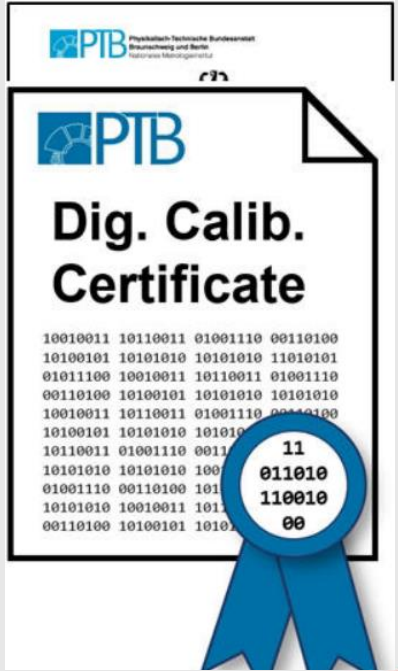


Digitalization and automation of calibration processes

Measurement Result



SPREADSHEET



PTB Physikalisch-Technische Bundesanstalt
 Braunschweig und Berlin
 Federal Metrology Institute

PTB

Dig. Calib. Certificate

10010011 10110011 01001110 00110100
 10100101 10101010 10101010 11010101
 01011100 10010011 10110011 01001110
 00110100 10100101 10101010 10101010
 10010011 10110011 01001110 00110100
 10100101 10101010 10101010
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 10101010 10010011 101
 00110100 10100101 1010

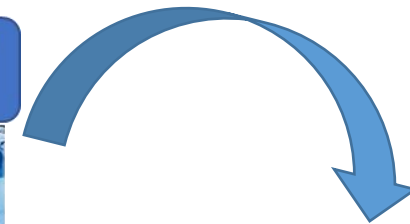
11
 011010
 110010
 00

<https://dcc-conference-2020.ptb.de/uploads/0h9O9M5aDyiy6xsZEbcyr.pdf>

Current status of the DCC approach INACAL, Peru

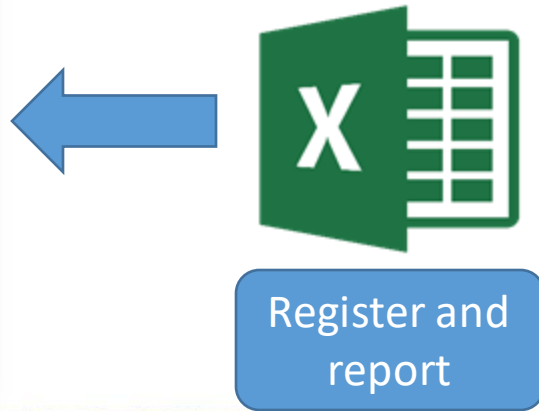


Sistema de Citas
Metrológicas
para servicios de calibración



Measurement
(Automated system /
Manual Process)

Calibration
Certificate
PDF
Electronic
Signature



Register and
report

Current status of the DCC approach INM, Colombia

Input
XLS-File

1. Administrative shell (mainly mandatory)
2. Calibration results (partly regulated)
3. Individual information (not regulated)
4. Optional Attachment

<XML>
XML-DCC

Hash function

HASH

```
18DA AA89 ED45 048B Fd54
ADF4 165E 5490 DE43 FF34
34AD 66DE AAD4 345A 45DE
4376 DDAE 879F 11DA 12ED
```



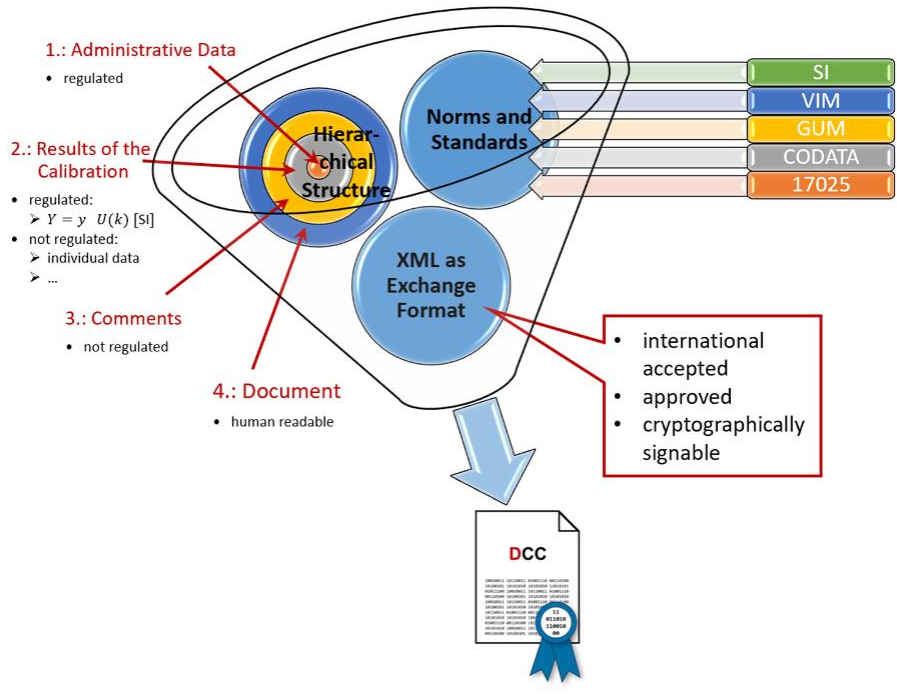
Signing key

Signature function

Digital signature

```
DF34 ED32 AA43 34CA 4DEA
34AD 4BCB 01BD 001D D4E1
990D 7DFE EFE4 67A7 112F
54EA 6689 87FE 44AE 09ED
```

<XML>
Digitally signed DCC



Why is DCC necessary in the metrology?

- Today's challenges are more complex and time critical
- Huge increase in the use of sensors and systems generating vast amounts of data
- The digitalisation of the measurement infrastructure allowing machine-readable measurement reporting

Groups and activities that support the DCC



Metrology for Digital Transformation

<p>M4DT Day 10th - Cloud Technologies</p> <p>The M4DT Follow Up&Support Group have decided to organize each last Thursday</p> <p>Published: 6 months ago</p>	<p>Thu 24 Feb 2022</p> <p>M4DT-Day</p> <p>"One day to learn and transform our world"</p>	<p>M4DT Day 9th - Digital Calibration Certificate</p> <p>The M4DT Follow-Up & Support Group have decided to organize each last T</p> <p>Published: 10 months ago</p>	<p>Thu 28 Oct 2021</p> <p>M4DT-Day</p> <p>"One day to learn and transform our world"</p>
<p>M4DT Day 8th - Metrology for Industry 4.0</p> <p>The M4DT Follow Up&Support Group have decided to organize each last</p> <p>Published: one year ago</p>	<p>Thu 30 Sep 2021</p> <p>M4DT-Day</p> <p>"One day to learn and transform our world"</p>	<p>M4DT-SIM Conference 2021</p> <p>SIM-MWG-14 invites you to participate in the Annual Conference 2021 "Metrology fo</p> <p>Published: one year ago</p>	<p>Wed 1 Sep 2021</p> <p>M4DT-Day</p> <p>"One day to learn and transform our world"</p>
<p>M4DT Day 7th - Automation of Laboratory</p> <p>The M4DT Follow Up&Support Group have decided to organize each last Thursday of th</p> <p>Published:</p>	<p>Thu 29 Jul 2021</p> <p>M4DT-Day</p> <p>"One day to learn and transform our world"</p>	<p>M4DT Day 6th - Agile Project</p> <p>Dear colleagues, The M4DT Follow Up&Support Group have decided to organize each last Thurs</p> <p>Published:</p>	<p>Thu 24 Jun 2021</p> <p>M4DT-Day</p> <p>"One day to learn and transform our world"</p>



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NEXT EVENTS

<p>M4DT-SIM</p> <p>1-2 SEPTEMBER 10:00 am - 4:00 pm</p> <p>M4DT Annual Conference 2022</p> <p>Metrology for Digital Transformation SIM Conference 2022 September 1st and 2nd</p> <p>VIEW DETAIL</p>	<p>Metrology for Digital Transformation</p> <p>29 SEPTEMBER 3:00 pm - 5:00 pm</p> <p>11th M4DT-DAY - Save the day</p> <p>Date: September 29th 2022 Time (UTC): 15:00 & 17:00 UTC</p> <p>VIEW DETAIL</p>	<p>Metrology for Digital Transformation</p> <p>10-13 OCTOBER 8:00 am - 4:00 pm</p> <p>MWG 14 (Metrology for Digital Transformation SIM Group) - FIRST FACE TO FACE MEETING- Panama- Save the date</p> <p>VIEW DETAIL</p>
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Programme of the DCC Summer School

Siegfried Hackel



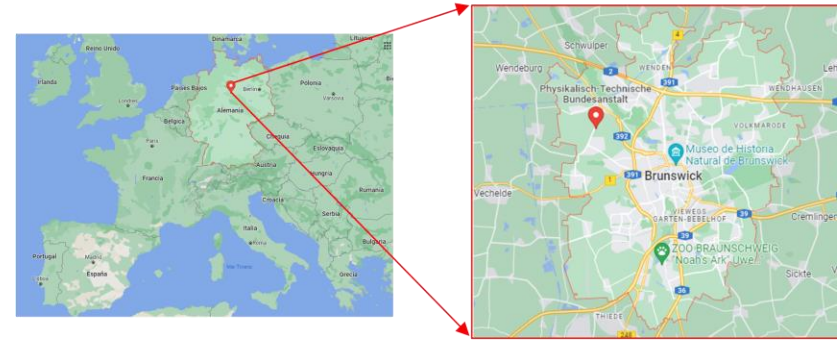
How do these projects and activities help and will help INM of Colombia?



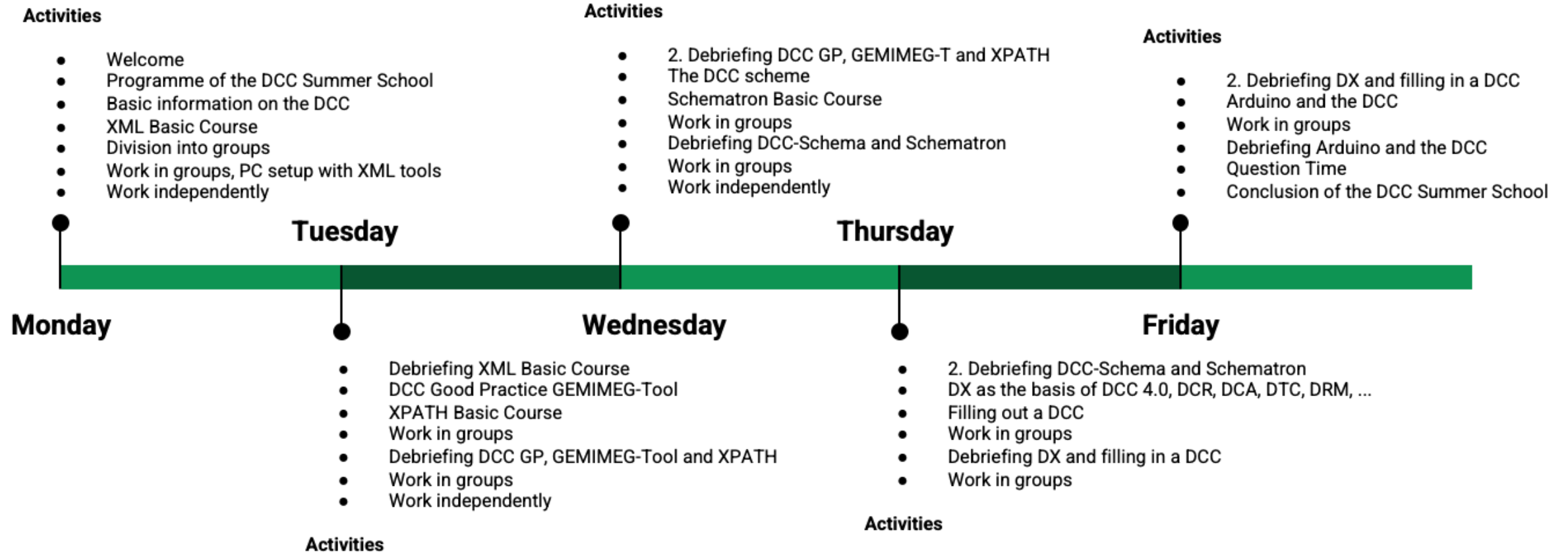
How do these projects and activities help and will help INACAL?



What is the Summer School?



Summer School Topics



Source: DCC Summer School Programme
Dr. Siegfried Hackel
Head of the DCC Summer School

Importance of the Summer School to participants



consolidating knowledge
work in groups
share information
good practice
dcc scheme **xml**
summer school
different applications **dcc** to learn
valuable technical info
discussion with colleagues
different applications

What's next for INACAL after SUMMER SCHOOL 2022?

DCC in the
mass
laboratory

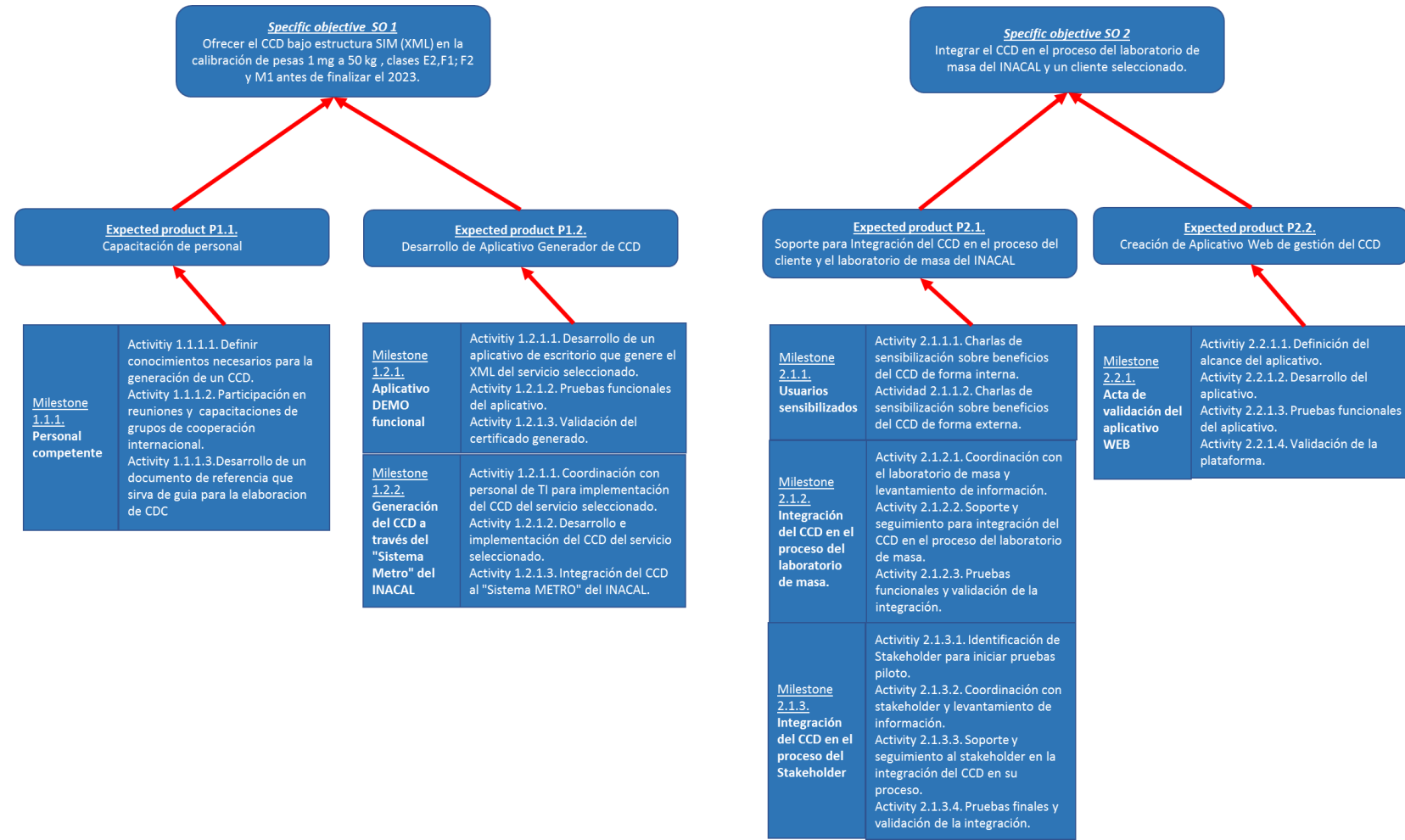
Awareness
talks



What's next for INACAL after SUMMER SCHOOL 2022?

DCC for calibration service of weights from 1 mg to 50 kg, accuracy classes E2, F1, F2 and M1.

- It is known that the summer school will be followed up, which motivates INACAL to work continuously on the subject.
- INACAL, thanks to the information obtained from the summer school, plans to start dissemination talks.



What's next for INM of Colombia after SUMMER SCHOOL 2022?

DCC in
the time and
frequency
laboratory

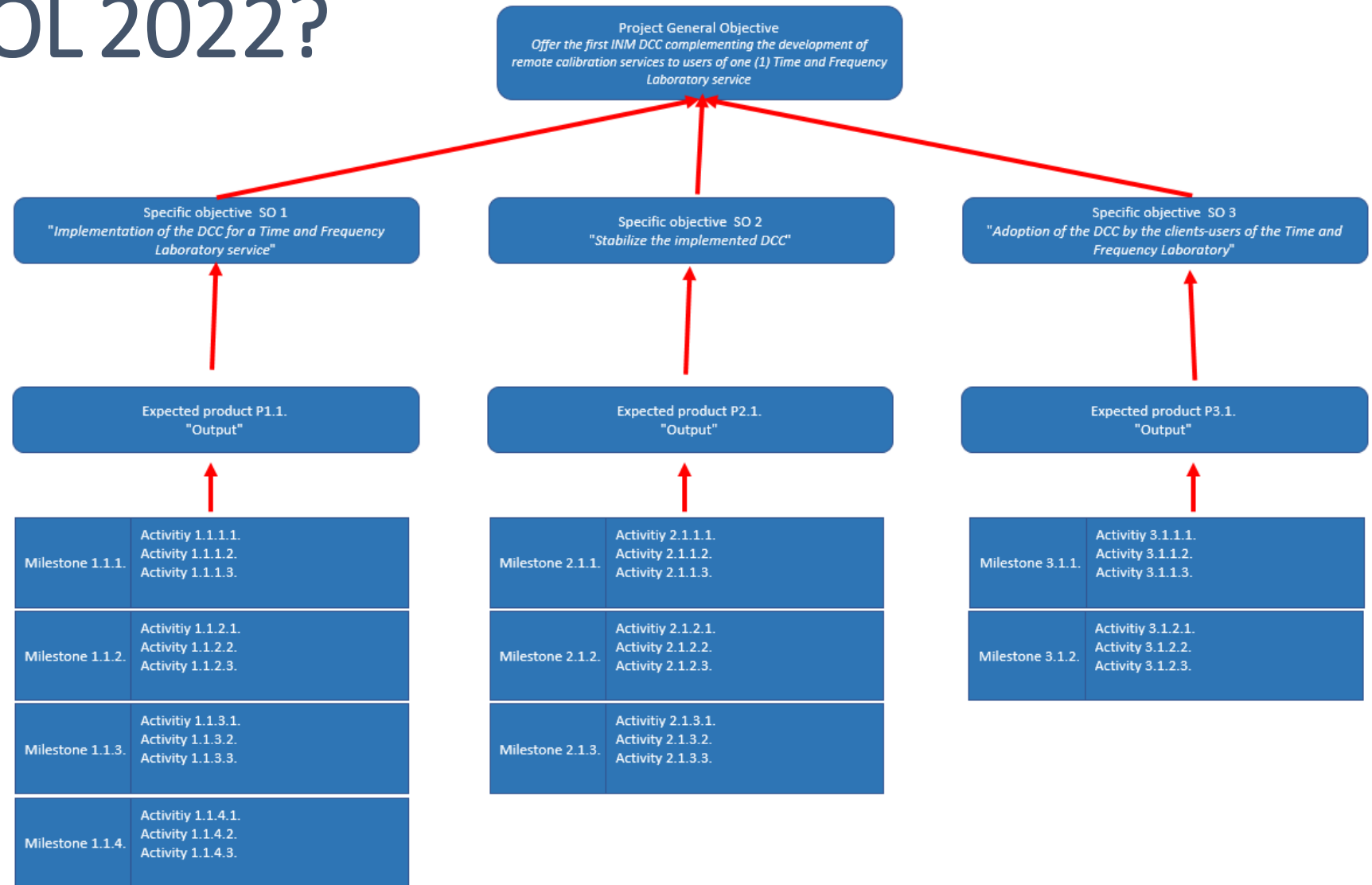
Legal time
service



What's next for INM of Colombia after SUMMER SCHOOL 2022?

18 months

- A great milestone that contributes to the awareness of reality in the implementation and use of DCC.
- INM, thanks to the information obtained from the summer school, plans to start dissemination talks.



Perception of DCC impact in the SIM region

- DCC development helps understand and use for one of the first D-SI enabling technologies
- Collaborative efforts among NMI to take on the challenges of M4DT
- Machine-readable certificate for our industries

Some conclusions and final comments

- The summer school provided an opportunity to learn about DCC technical issues and the perspective of the participants.
- In a subsequent summer school, the progress achieved should be shown, as well as more technical training.
- It is recommended that the development of the DCC be a collaborative effort between the IT area of the NMI and the metrologist in charge.

Thanks!