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Organisation

Goals

- To create a **<u>COLLABORATIVE</u> space** where attendees exchange:
    - return of experience
    - best practices
    - methods and tools employed

  when engineering PLC based control systems.

- Identifying **expertise** among institutes which can foster **collaborations**

- **Participation** is the key!

Basics

- It is not a tutorial
  - But all questions are welcome
- Virtual: a new format
- Feedback: questions & answers
  - Zoom
    - Advised to raise your hand "virtually" to intervene (the convener will moderate)
    - Chat: Write your question or comment (the convener will gather them)
  - *Do not use Whova* for your questions

- Participation
  - Keep your microphones off while you're not talking
 - Keep your cameras on (better to see people than avatars!)
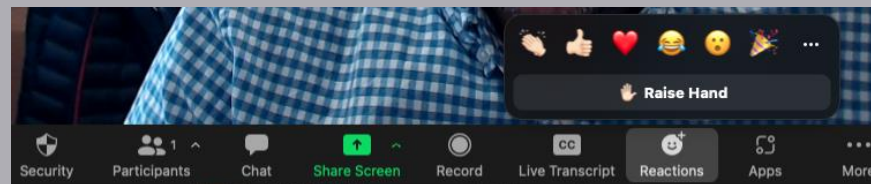
Feedback of the previous editions

- Overall excellent feedback from participants
  - Identified partners and collaboration in some projects
  - Improved the overall knowledge of the field (e.g. testing, versioning, specs…)

Place	Attendees
Barcelona 17	45
New York 19	34
Shanghai 21 (virtual)	57

Attendees

- 57 attendees from 28 Institutes
  (4 from the organization)

Attendees by Country

Attendees by Institute
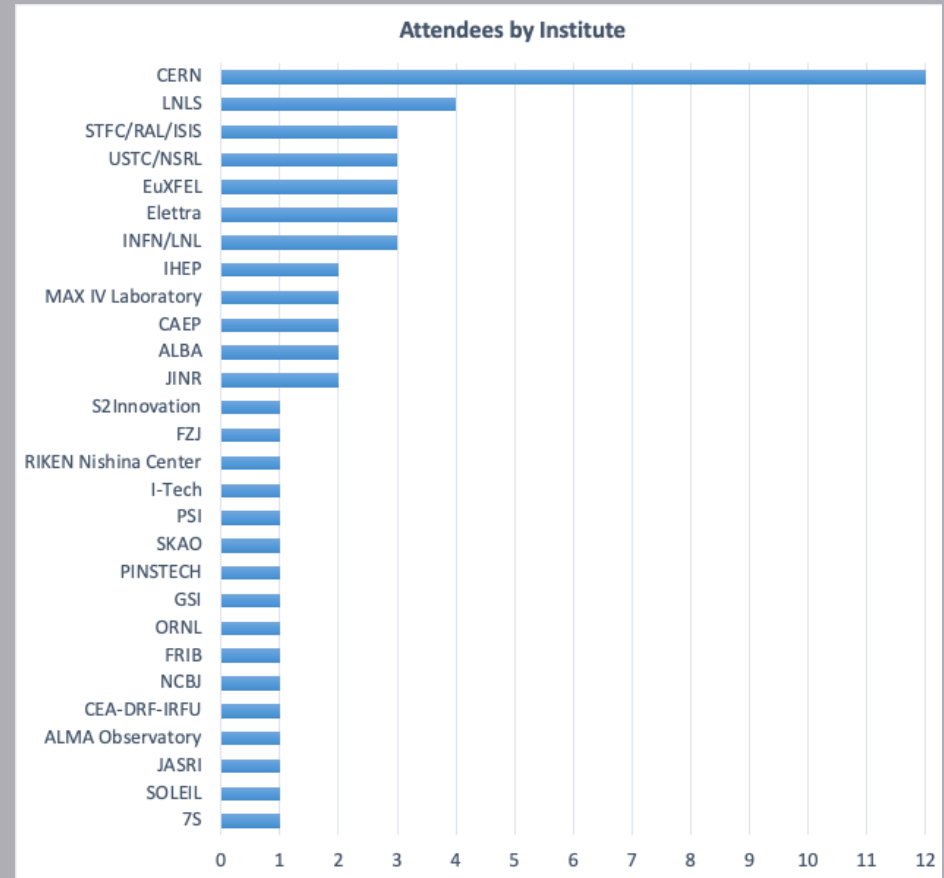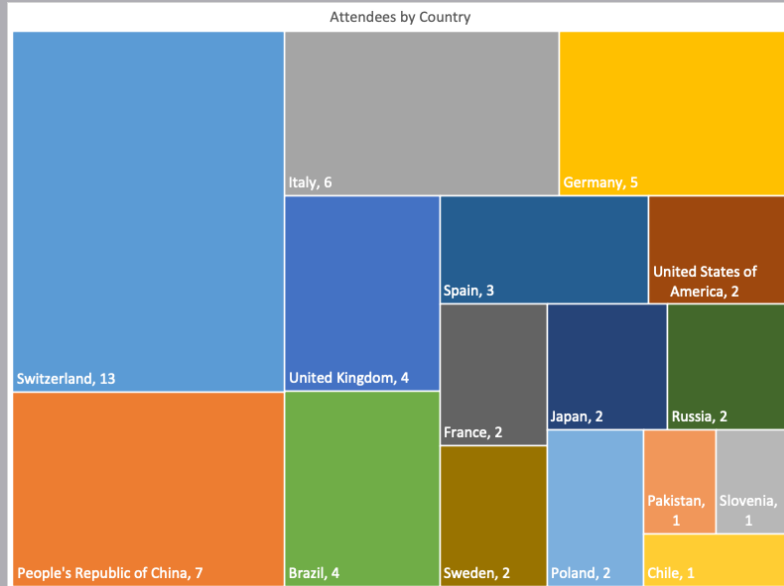
Main workshop topics

- Engineering Lifecycle of a PLC based application

Specifications ▸ Development ▸ Testing ▸ Management

- Hardware upgrades

Some challenges

- PLC based control systems life spans for **more than 15 years** in most of the cases. **Development and maintenance** of the PLC applications is a complex task, as usually the applications do not follow any structure but the automation engineer own implementation. Is **standardization** a real need? Do the **control frameworks** give any help on this?

- In the same context **hardware upgrades** constitute a challenge *per se*. The systems engineered with PLCs typically require high availability. Are there general **guidelines** of when an installation must be upgraded and how?

- **Testing** industrial applications is a time consuming task and usually an imperfect exercise. Compromises must be found to the test coverage (e.g. difficult offline tests). What is the **best method to test an application**?

- Deploying applications must be tracked and the **software components deployed** must be easily **traceable**. In case of an issue in a delivered component in a project, an efficient identification of the affected PLCs should be straight forward. Are you in measure to identify this effectively?

Agenda

Workshop introduction	*Dr Enrique Blanco Vinuela*
Virtual workshop, Shanghai (China) [Virtual]	14:00 - 14:10

IEC61499 standard and an industry implementation: 4DIAC	*Dr Alois Zoitl*
Virtual workshop, Shanghai (China) [Virtual]	14:10 - 15:00

ELETTRA, Trieste, Italy	*Massimo Trevi*
Virtual workshop, Shanghai (China) [Virtual]	15:00 - 15:05
CAS - Beijing, China	*Yongcheng He*
Virtual workshop, Shanghai (China) [Virtual]	15:05 - 15:10
NCBJ - Poland	*Jaroslaw Szewinski*
Virtual workshop, Shanghai (China) [Virtual]	15:10 - 15:15
ALBA - Barcelona, Spain	*Jorge Villanueva*
Virtual workshop, Shanghai (China) [Virtual]	15:15 - 15:20
SNS (ORNL), Tennessee, USA	*Karen White*
Virtual workshop, Shanghai (China) [Virtual]	15:20 - 15:25

Coffe break: Coffee break	
Virtual workshop, Shanghai (China) [Virtual]	15:30 - 15:50

- Agenda

IEC 61499 standard and an industry implementation: 4DIAC
Dr Alois Zoitl

An overview of the main elements of the language, how to apply it and the current industrial adoption

Technology trends

Agenda

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PLC hardware upgrades: basics concepts	*Jeronimo Ortola Vidal*
Virtual workshop, Shanghai (China) [Virtual]	15:50 - 16:10
CI/CD techniques for quality assurance	*Brad Schofield*
Virtual workshop, Shanghai (China) [Virtual]	16:10 - 16:30
Formal verification of PLC programs with PLCVerif	*Borja Fernandez Adiego*
Virtual workshop, Shanghai (China) [Virtual]	16:30 - 16:50
Closing session: Q&A	*Dr Enrique Blanco Vinuela*
Virtual workshop, Shanghai (China) [Virtual]	16:50 - 17:20
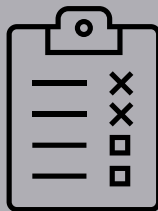
Testing / verification

Continuous Integration for PLC-based Control System

PLCVerif: **A formal verification tool**
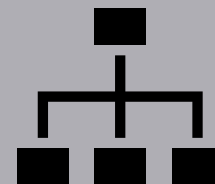
Management

PLC hardware obsolescence

Support

Workshop

https://indico.cern.ch/e/PBCS-21

Register if you have not done it!!

PBCS: PLC based control systems Workshop

15 October 2021
Shanghai (China) [Virtual]
Europe/Zurich timezone

Overview
Scientific Programme
Timetable
Contribution List
My Conference
 My Contributions
Registration
Participant List

Support
✉ ICALEPCS21-PBCS-W...
☎ +41754112804

This ICALEPCS 2021 conference workshop intends to create a collaborative space where attendees will show and exchange their best practices, tools employed and return of experience when engineering PLC based control systems. Specific topics we would like to address are:

- Specifications
- Software development under Standards and/or Frameworks.
- PLC Suppliers IDEs: Advanced software engineering features availability
- Novel paradigms: e.g. Automatic code generation, object orientation...|
- New technology trends: e.g. embedded OPC-UA, MQTT
- Programming language choice and coding conventions: Best practices
- Application management: source version control & deployment service
- Testing and verification: Methodologies and tests (FAT, SAT), virtual commissioning, formal methods...
- Upgrade and/or reengineering of applications
- Documentation

Registration remarks

- **Testing & Verification** is the most *ticked* session (interest)
- Upgrades:
  - [INFN] In INFN-LNL PLCs are used by different groups, for the control of different applications as Cryogenics, vacuum, machine and person safety, air conditioning, target handling and Automatic Guided Vehicle. Mainly 2 brand are used: Schneider and Siemens, while PILZ has been chosen for safety application. Up to know there PLC **lifecycle** is no managed in a common way, but we have to approach a strategy to start the process.
  - [ALBA] We are at the very initial stages of Alba II, let's say 10 years long project. It implies a major Accelerator update including the PLC-based interlock systems: Equipment Protection System (EPS) and Personnel Protection System (PSS). I would like to survey similar **upgrades** in other facilities and future technological options (experiences in the implementation of the Safety Life Cycle according to IEC 61508 and IEC 61511, development and code testing/verification tools, use of Ethernet networks for safe communication...)

- [SOLEIL] Looking for experience in use of large PLC fleet (100s) **administration software** (for deployment, firmware updates, status reporting, industrial network management, ...)
- [SOLEIL] Looking for experience in use of software-based **simulators**. Either embedded in PLC code or external (PC-based, writing and reading into the image memory of the PLC to simulate I/O signals). Brands, products, selection criteria, etc...
- [SOLEIL] Use of **OPC UA** as communication layer between SIEMENS PLC and TANGO (or other middleware / supervision software). What are the interesting features and performance of this protocol? Which implementation has already been chosen in other facilities?

Follow up

- **Survey**: have an idea about how institutes use:

  - Hardware
  - Software
  - Methods
  - Tools

  Results will be available for everyone

- Collaboration online space (e.g. Slack, mattermost…)
  - Share experience
  - Questions
  - Contacts