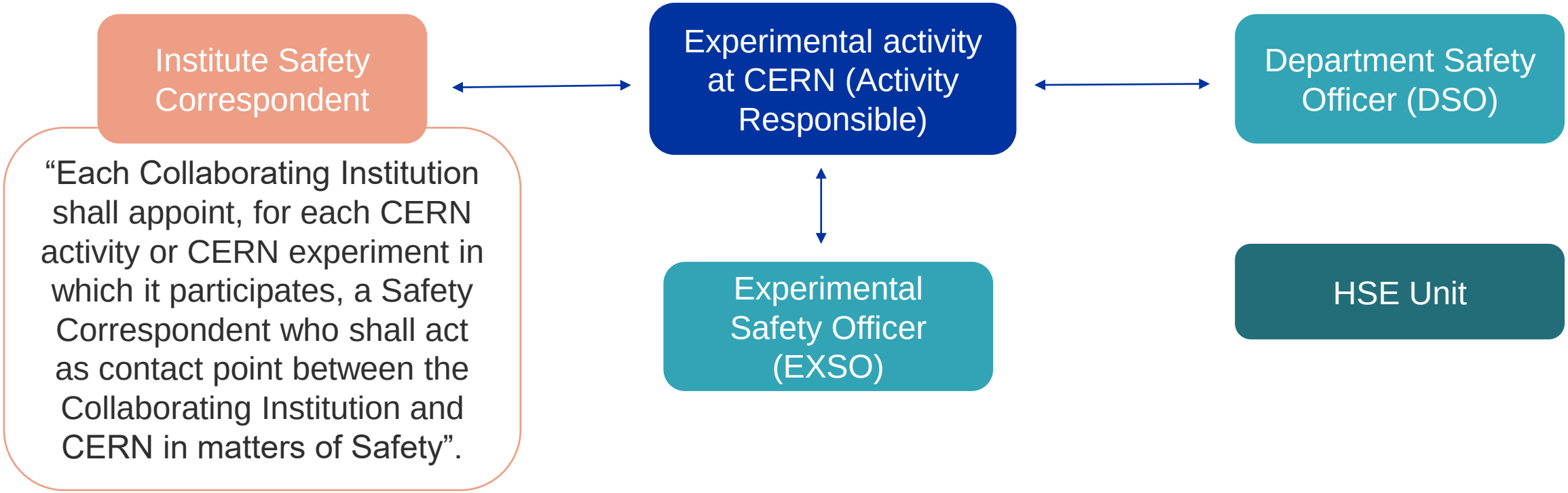
ISOLDE – Incidents and Lessons Learned

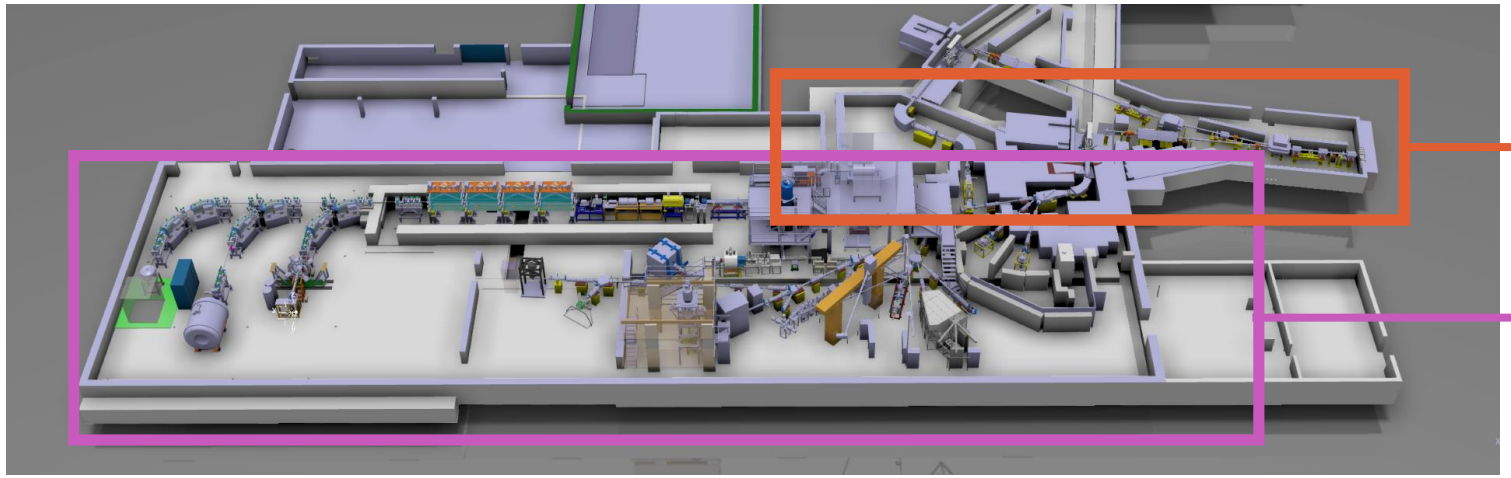
Safety Officers – Experiments

- Reference Safety Rule at CERN is SR-SO: *"Responsibilties and organisational structure in matters of safety at CERN"*



Safety Officers – ISOLDE Experiments

HSE-RP always responsible for Safety matters related to Radiation Protection!



Target + separators + RILIS:
SY (→ **SY DSO**)

Experimental Hall:
Infrastructure and accelerator beam lines are **BE** (→ **BE DSO**),
Experiments are **EP** (→ **EP DSO**)

- EP-UIS Users and EP-SME-IS CERN employees are under the CERN EP Department
  - **EP DSO representatives** assigned (myself and James Devine)
  - **ISOLDE EXSO** nominated (Hanne Heylen)
  - One **Deputy EXSO for each permanent set-up** NEW

CERN Safety Incident Management

In case of incident, always submit an Incident Declaration via EDH

- Reference Safety Rule at CERN is:

SR-SIM *“Responsibilities in matters of safety incident management at CERN”*

Safety incident is an unintended event or situation that has a non-negligible, negative consequence or potential consequence from the point of view of Safety. The term Safety Incident covers: Radiological Events, Deviations, Unsafe Situations, Near Misses, Accidents (including Commuting Accidents)

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Deviation from the normal regulatory functioning of an installation/ activity whose consequences or potential consequences are non-negligible from point of view of Safety

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Situation that may lead to a radiological Event, a Near Miss or an Accident

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An unintended event that could have led to an Accident

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An unintended event resulting in injuries to persons, material damage or negative impact on environment

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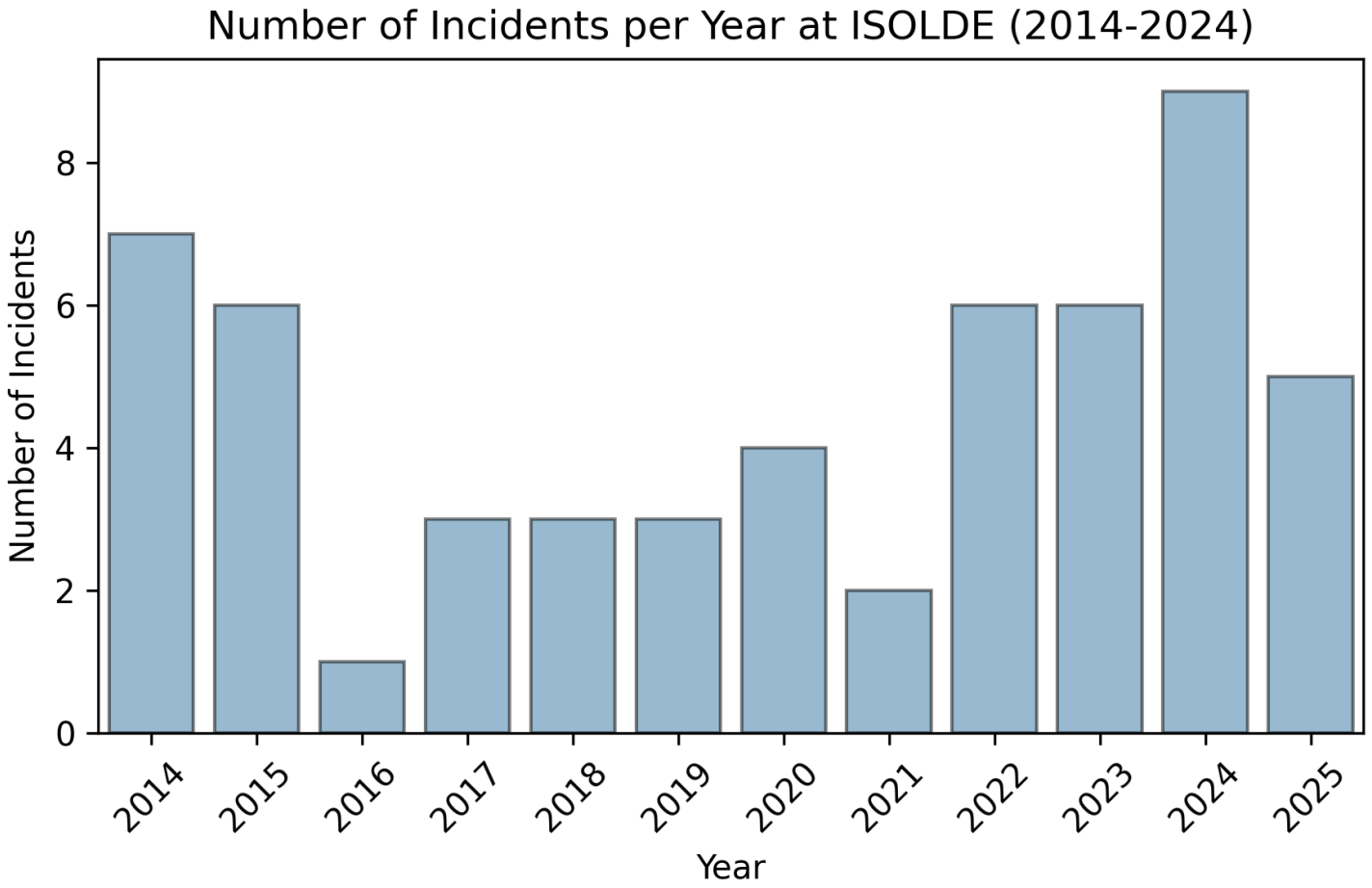
- Incident classification (depends on **consequences and potential consequences**):

MINOR | SERIOUS | MAJOR

Incidents in ISOLDE

- In the past 10 years, there have been about 50 incidents in ISOLDE (for the full Facility, BE, SY, EP analysis)
- The yearly number of incidents is not decreasing; however, it's important to remember that people are **increasingly reporting them**



The increase in reporting is an encouraging sign!

Still, our aim is to decrease these numbers

Incidents in ISOLDE - SIAG

- Following Serious incident in ISOLDE, CERN HSE Unit Head mandated a **Safety Incident Analysis Group** to analyse the past 10 years of incident, looking for recurrent root causes

- **35 recommendations**, divided in
  - Transversal: repetition of good pratices that were already implemented (as safety inspections, reporting of incidents and lesson learnt) and recently added (as workplace inductions)
  - Technical: needed upgrades in terms of safety (as the new source storage, new management of chemicals, new flammable gas distribution system)
  - Organisational: needed clarifcations in terms of mangerial roles and their safety implications (as clear mandates for ISOLDE Collaboration Spokesperson and Physics Coordinator, and nomination of DEXSOs)

EP founded ISOLDE safety projects for **150k CHF in 2025**!

Lessons Learned

- Sharing lessons learned is one of the most important part in the follow up of an incident, aiming at **avoiding that the same event happens again**

- Most common elements:
  - Describe in the procedure the **totality of the steps** to be performed, ensure it is fully reviewed by Safety
  - Take your time to **read and understand the safety procedures**
  - If an unexpected event requires **deviation from procedure**:
    - **Stop the activity** immediately
    - **Discuss the revised plan** with Safety (EXSO or DEXSO, RP, EP Safety Office)

  - Only perform **high-risk activities if you feel alert and physically fit**!

Lessons Learned – Event 1 (2023)

- Alkali metals can produce fire when in contact with humidity or water. During handling, pentane is used to avoid exposure to humidity
- **ATEX area was created unintendingly, due to misuse of pentane**
- A spark produced by static electricity ignited the pentane vapours, creating the flash fire fed by **flammable material present** on the working table
- Fire extinguished by colleagues using a jacket and a **fire extinguisher**

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- **Do not adapt procedures** without review from Safety Officers, even well-intended changes (higher quantity of pentane) can introduce new risks while trying to control known ones
- Ensure everyone is briefed on the **official, verified up-to-date procedure (Released on EDMS!)**
- Before start, always check that you have the **right PPEs** and that the **working area is safe**. Take also a moment to **locate the safety equipment**: fire extinguishers, AUG, …

Lessons Learned – Event 2 (2024)

- **Sample of a toxic element found in the b. 508 kitchen** after an experiment, where large number of samples implanted and studied
- This sample was not irradiated but the hazards related to the element itself were not thoroughly considered
- The experimental team not aware this sample was missing

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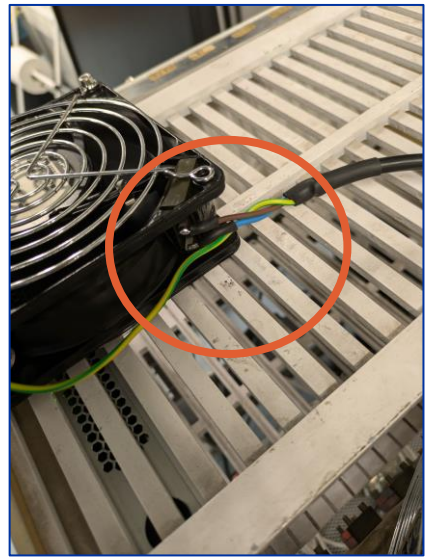
- Proper **sample management and formal tracking** is essential, even more when working with large number of samples
- Hazardous chemicals need to be **stored, handled and transported appropriately. Safety Data Sheet of the entire composite element** need to be readily available for users
- Avoid mixing laboratory items (including PPEs like safety shoes) with personal belongings

Lessons Learned – Event 3 (2024)

- During an experiment, the team added extra fans to their setup. These **fans were added after the electrical safety inspection**
- Instead of buying the correct connectors, **they improvised the power connection**. This left **exposed metal contacts live at 230V** on each of their fans
- This was spotted during a follow up safety inspection. It could have caused a **serious electric shock** if touched



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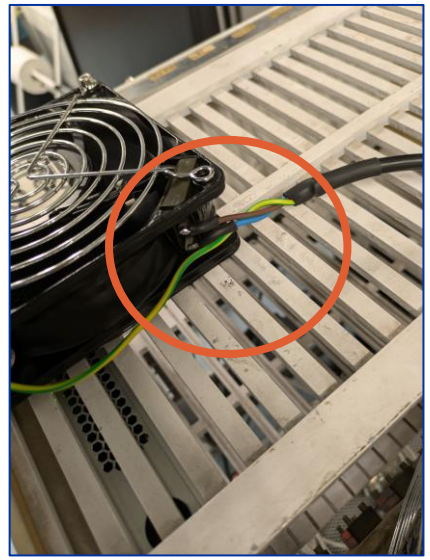


- **Modifications to a setup after the initial inspection can introduce additional risks**. In case of need, contact the Safety Officer for further inspections
- The **correct selection of connectors** is critical for safety at 230V AC. This information is also included in the training “Electrical Safety – Working in EP experiments”; **ensure everyone is trained!**

Conclusion

Important to have up to date procedures in one repository!

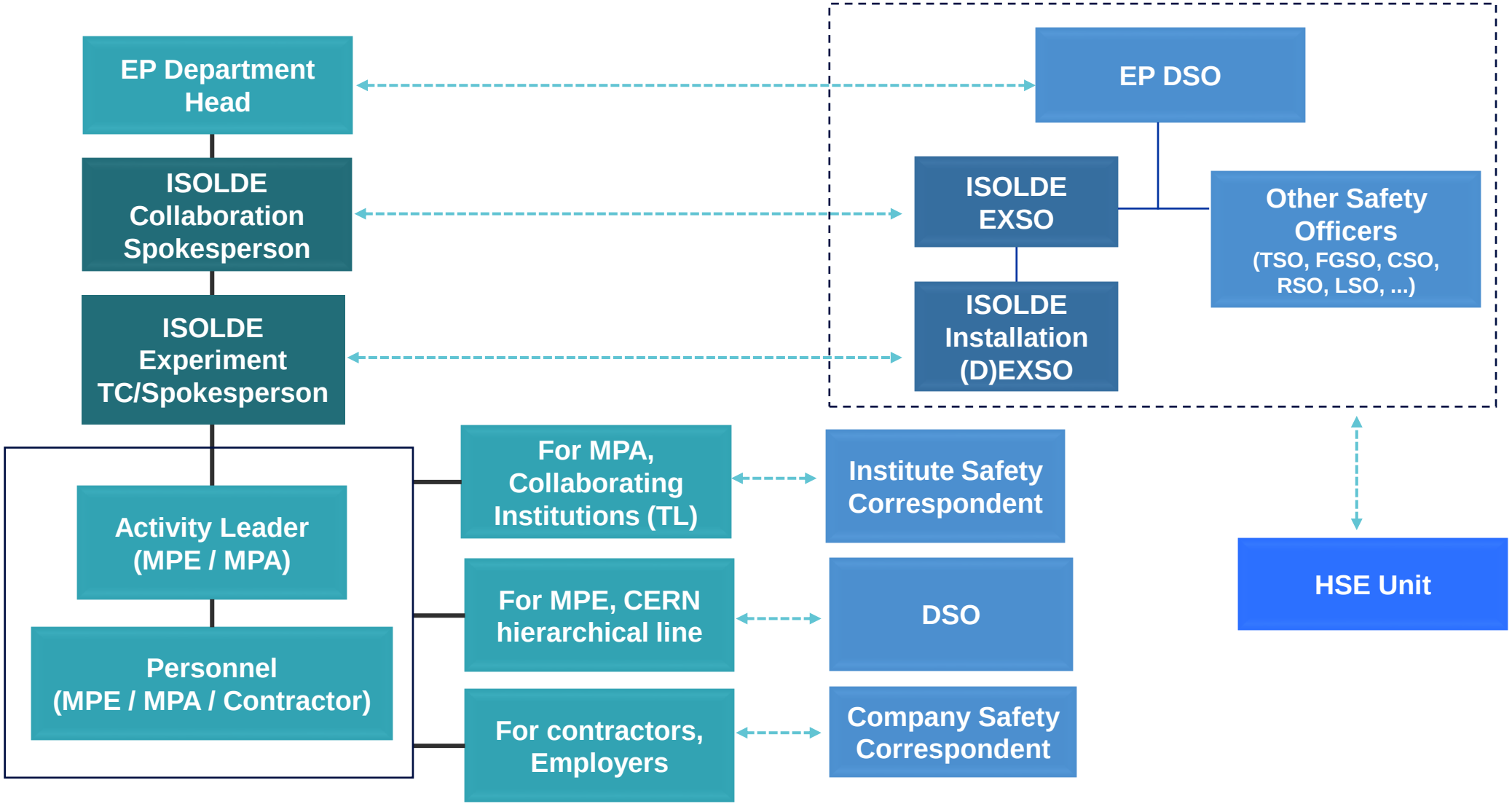
- **Challenges**: many set-ups in a constrained place, numerous parallel activities, high turnover of personnel
- We witnessed an **increase of the general Safety Culture** within the ISOLDE collaboration
- The EDMS Safety Files are more and more populated, however, to be ensured they are **always up-to-date during the life cycle of the installations**!
- The newly appointed (Deputy) **Experimental Safety Officers** for the installations are a key role to **continue on this positive trend**. Always **ensure communication with them**!
- From our Safety Officers side, we keep being **available in case of any doubts, questions, review or inspections**

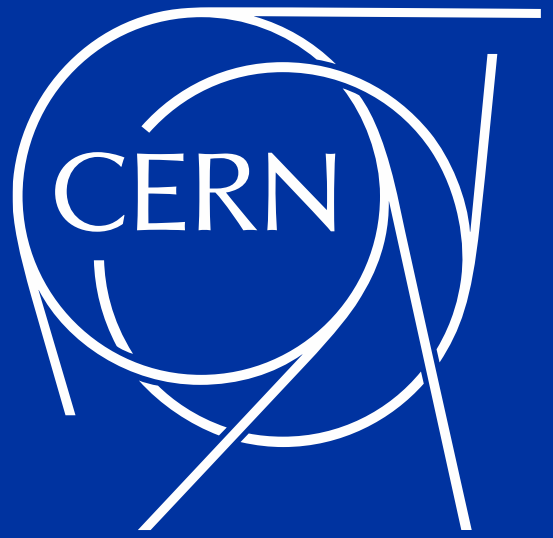
Thank you very much for your attention!

Questions?

Spare slides

Safety in EP Department and at ISOLDE

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