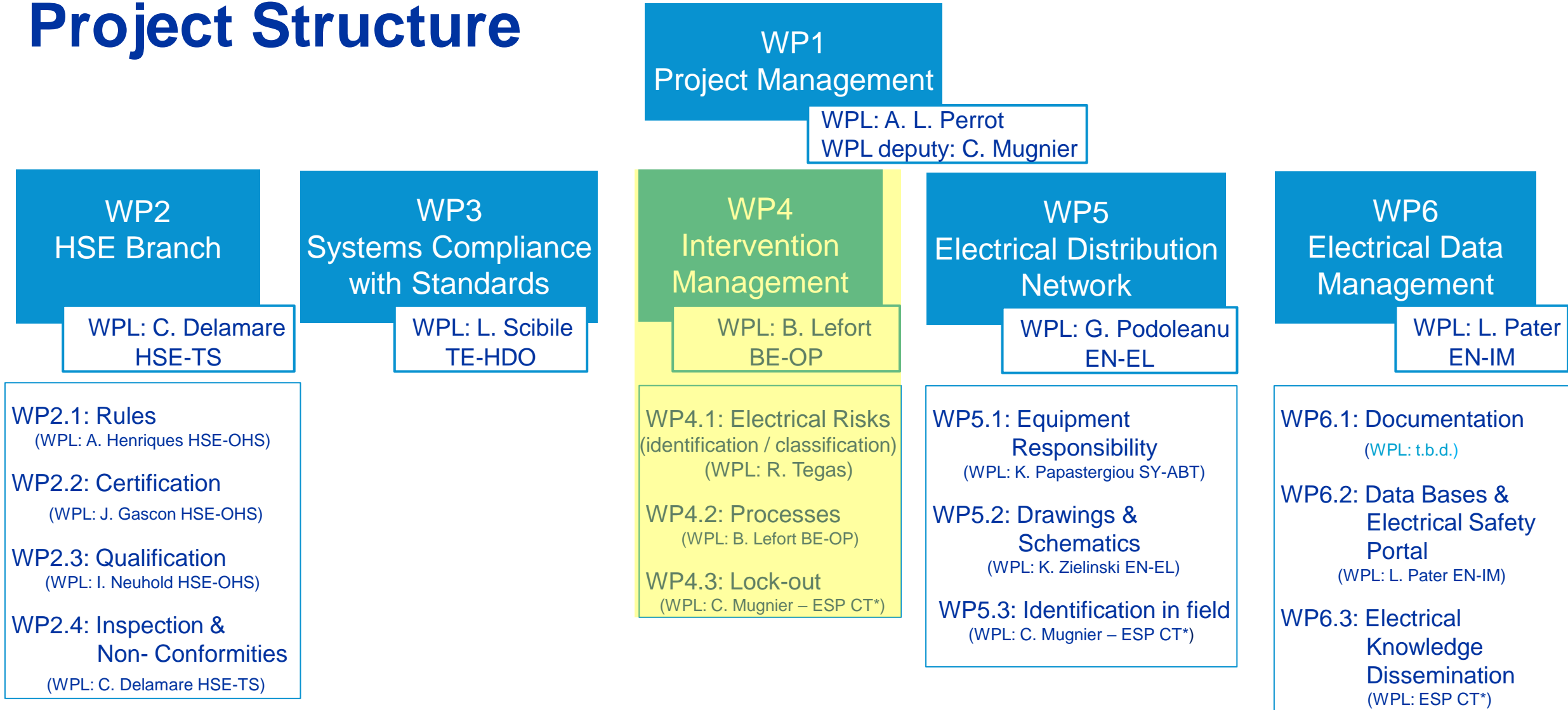




Electrical Safety Project First Review

15/12/2023

Project Structure



(*) ESP CT: Electrical Safety Project Core Team

WP4: Intervention Management

WP4 Contributors	Dept. Group
B. Lefort, J. Ridewood, V. Barbet	BE
J. Panigoni, N. Mornand, J. Etheridge	EN-ACE
O. Crespo, S. Deleval	EN-CV
D. Ribiollet	EN-EL
J. Borburgh, V. Montabonnet, R. Tegas	SY
M. Pezzetti, T. Barbe	TE-CRG
D. Bozzini (G. d'Angelo)	TE-MPE
t.b.d.	TE-MSD
G. Pigny, R. Ferreira	TE-VSC
J. Fernandez	On behalf of ATS DSOs
O. Beltramello, J. Devine, L. Di Giulio,	EP-DI
G. Velazquez, L. Roy	LEXGLIMOS
C. Delamare, J. Gascon	HSE
C. Mugnier, A. L. Perrot,	ESP Project Office

WP4 – Scope and Mandate

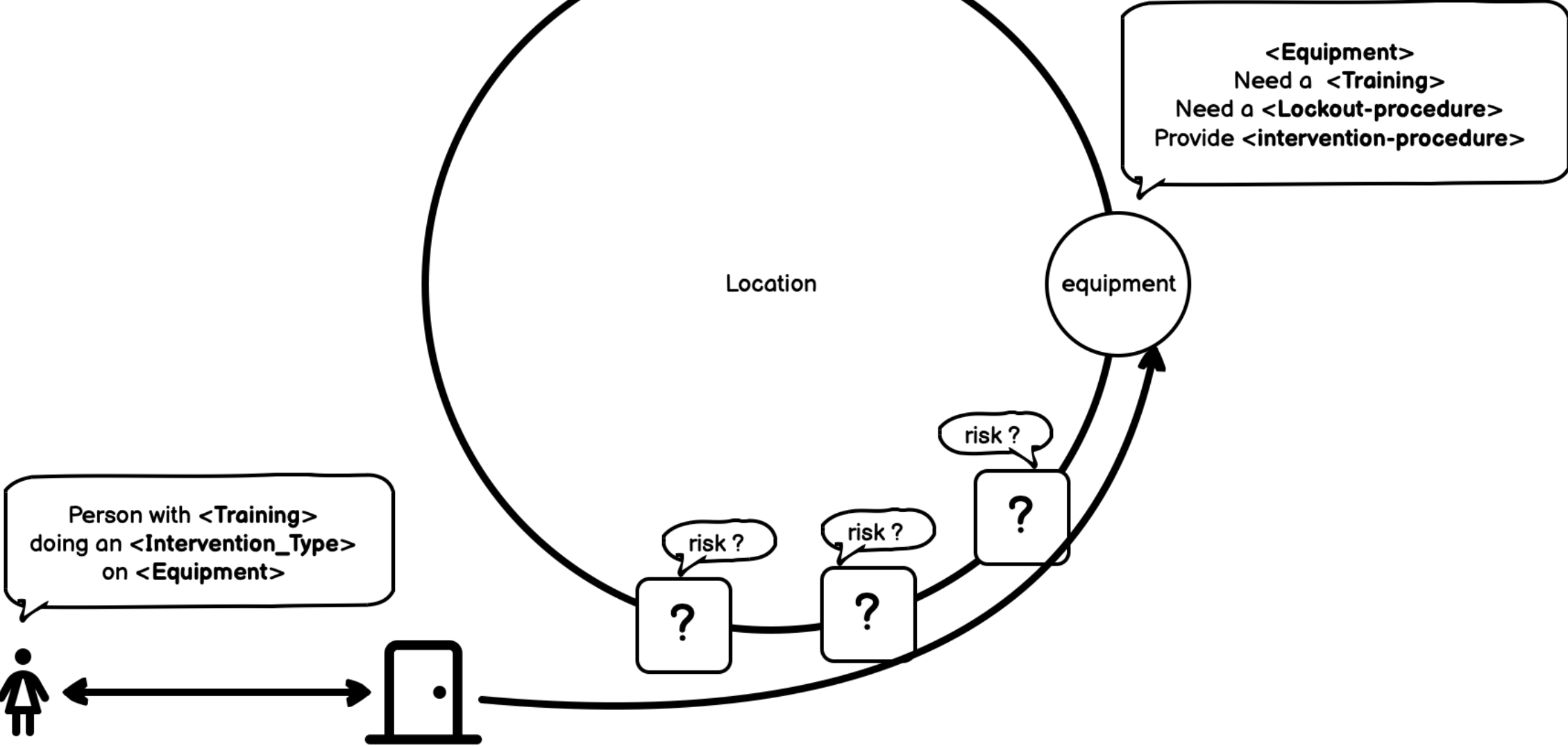
MANDATE:

- Deploy integrated start-to-end methodology / protocols to mitigate risks from electrical hazards during interventions on machines and facilities during all operational phases (i.e., operation, TS, YETS, LS).

SCOPE:

- **Accelerator equipment:**
 - Accelerators complex: injectors, LHC and transfer lines.
 - Experimental areas: EA, NA, ISOLDE/HIE- ISOLDE, CLEAR, NTOF, AD, HiRadMat.
 - ATS projects: HL-LHC, AWAKE, NA-CONS.
 - Machine buildings linked to the accelerators complex.

Problematic



WP4 – Deliverables

D4.1.: Definition and then deployment of processes to allow groups to identify, evaluate and classify the electrical risks and the corresponding safety procedures / measures to mitigate the electrical risk;

D4.2.: Definition and allocation of the roles with respect to electrical safety within the intervention processes; workflow and procedure to deliver work permits should be clearly defined.

D4.3.: Definition of lock-out procedures (sources and worksite) and validation of the existing ones.

D4.4.: Definition of the required conditions to allow access / work in an area where an electrical risk is identified.

D4.5.: Definition of access management process in working area where an electrical risk is identified.

D4.6.: Set-up of the Electrical Safety Expert (ESET) to support the implementation of the electrical safety by the ATS groups in the long term.

D4.7.: Support to processes implementation / update

What we have done so far...



Step #1 : Brainstorming



HOW:

Test-Driven Development,
using no prior knowledge

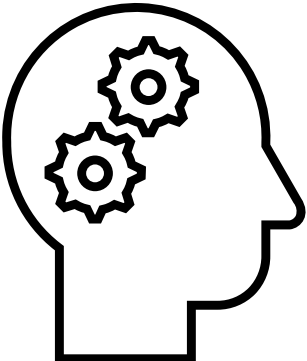
ON WHAT:

Our ideal way of authorizing
works from CCC

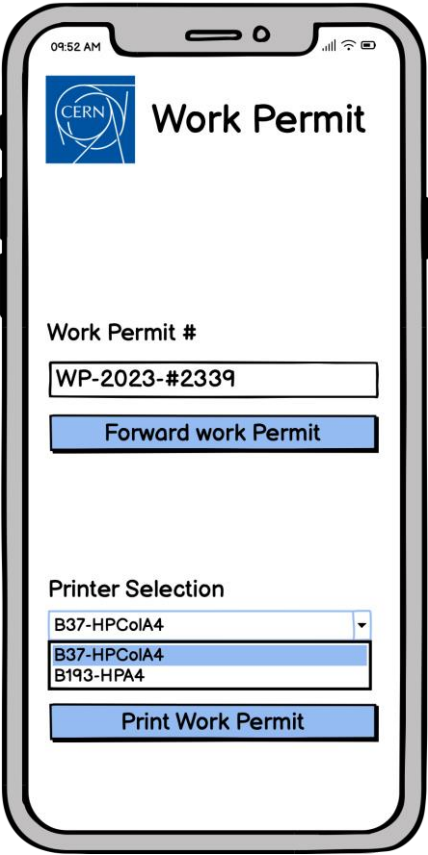
WHAT FOR:

Get an idea on the basic
requirements

Dreamy App...



KISS*, "Keep it super simple!"

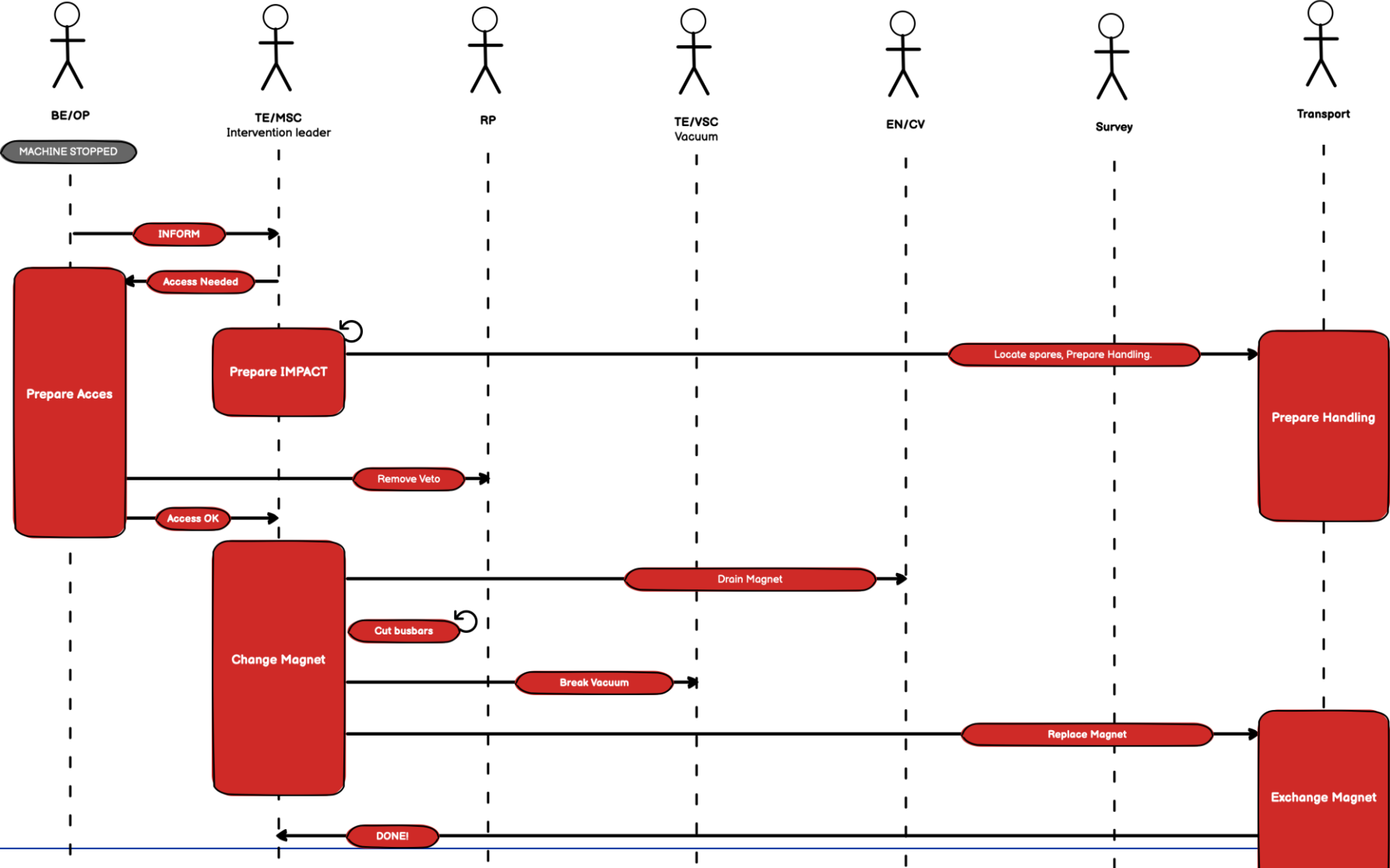


* KISS principle states that most systems work best if they are kept simple rather than made complicated; therefore, simplicity should be a key goal in design, and unnecessary complexity should be avoided.

Step #2 : Existing Literature

- Electrical Intervention Working Group (J. Gascon, C Mugnier and al.) [\(link\)](#)
- SY Electrical Safety Team (J. Borburgh, A. Frassier and al.) [\(link\)](#)
- EDF : *Centrale du Bugey* (feedback after the visit)
- *Procédure Opérationnelle de Mise en Sécurité des équipements au LHC* (J. Panigoni) [\(link\)](#)
- *Procédure Opérationnelle de Mise hors tension partielle* (C. Mugnier and al.)[\(link\)](#)

Step #3 : Real Life Scenarios



Concept #1: Electrical Safety Form

A Web Page
https://esp.cern.ch

CERN Equipment Safety Form

Equipment Name: DR.AC10-25 Location: AD-RING

Equipment Type: AD-CAVITY

Equipment Description
The C10 cavities in the AD are used to rotate the injected beam distribution in the longitudinal phase space and then adiabatically debunch it, hence significantly reducing the momentum spread compared injection. The cavities must be correctly phased relative to each other and to the injected beam to maximise the transmission.

Equipment Known Risks:

<input checked="" type="checkbox"/> Electric	<input type="checkbox"/> Chemical
<input type="checkbox"/> Cryogenic	<input checked="" type="checkbox"/> Mechanical
<input type="checkbox"/> Pressure	<input type="checkbox"/> Other
<input checked="" type="checkbox"/> Ionising	

Comments...

Documentation	Procedure
Lock-out	link
Safety Recommendations	link

Trainings Requirements.
Safety @ CERN
Electrical Awareness
Habilitation Level #1



Results: Straight Forward Outcomes

Dependencies (other WP)

- Electrical Safety Roles
- Risk Classification
- Training needs
- Equipment and Location Safety Form

Functional needs

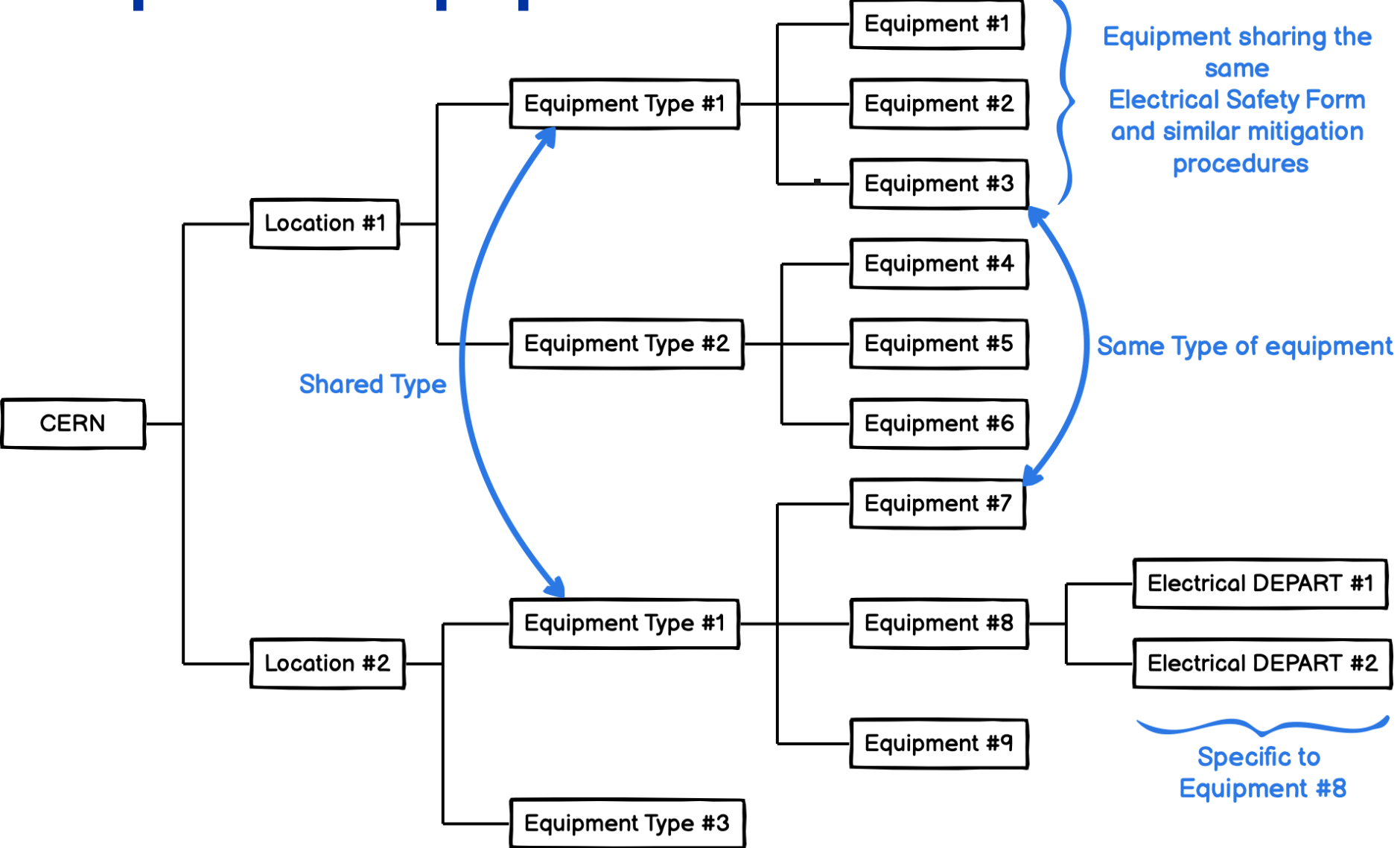
- Reactive System
- Dynamic *Habilitation** process
- Dynamic Equipment Status
- Dynamic work permit delivery

Data requirements

- Equipment
- Location
- Training
- Lockout
- ...

***Habilitation** : a recognition of the capacity of a person to carry out, in safety on a given installation and for a defined period, activities presenting risks for himself/herself and/or its environment.

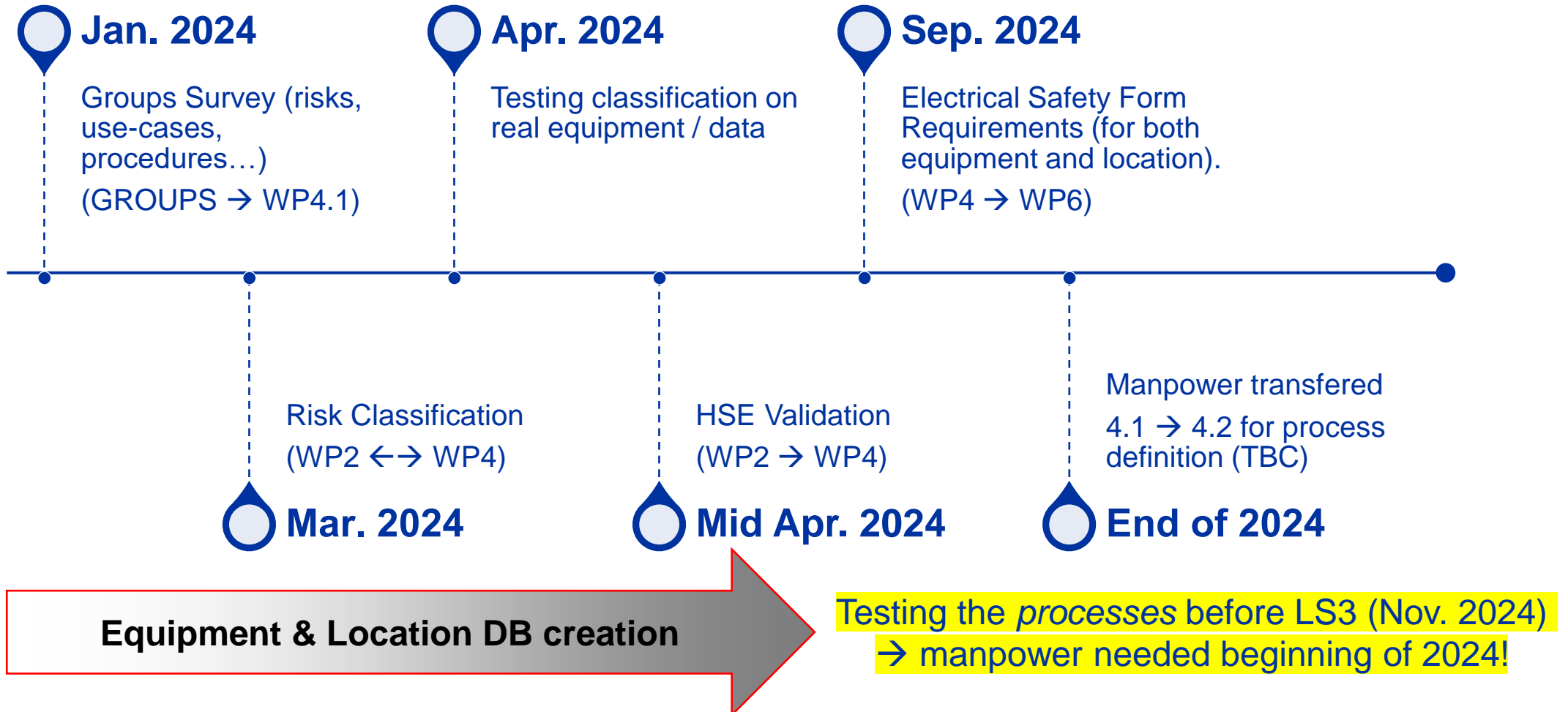
Concept #2 : Equipment Tree



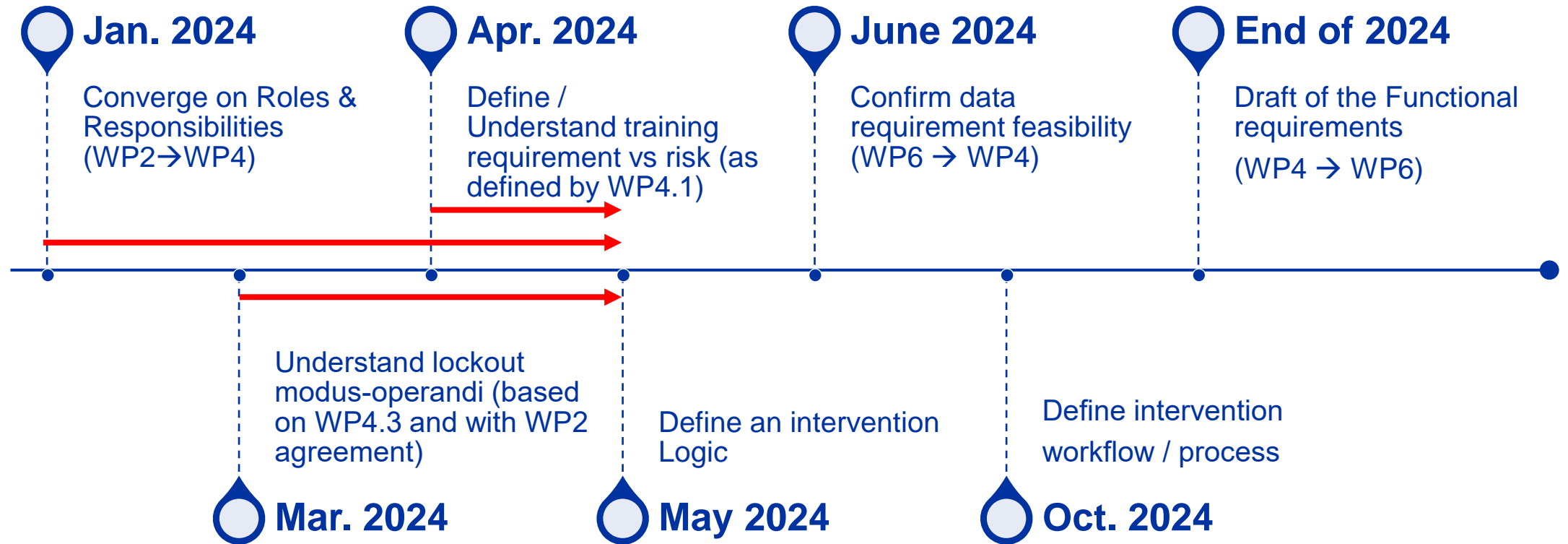
2024 Timeline

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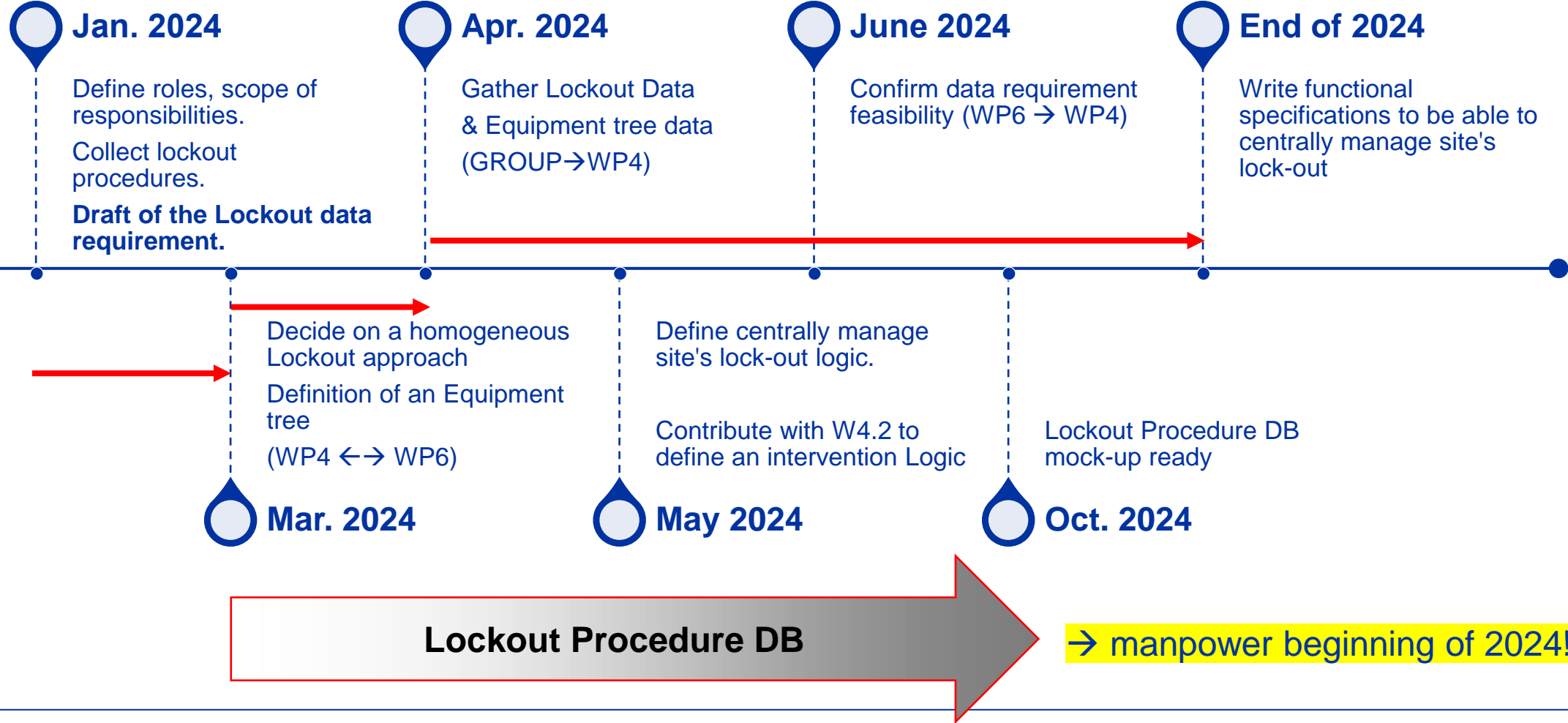
WP4.1: Electrical Risks



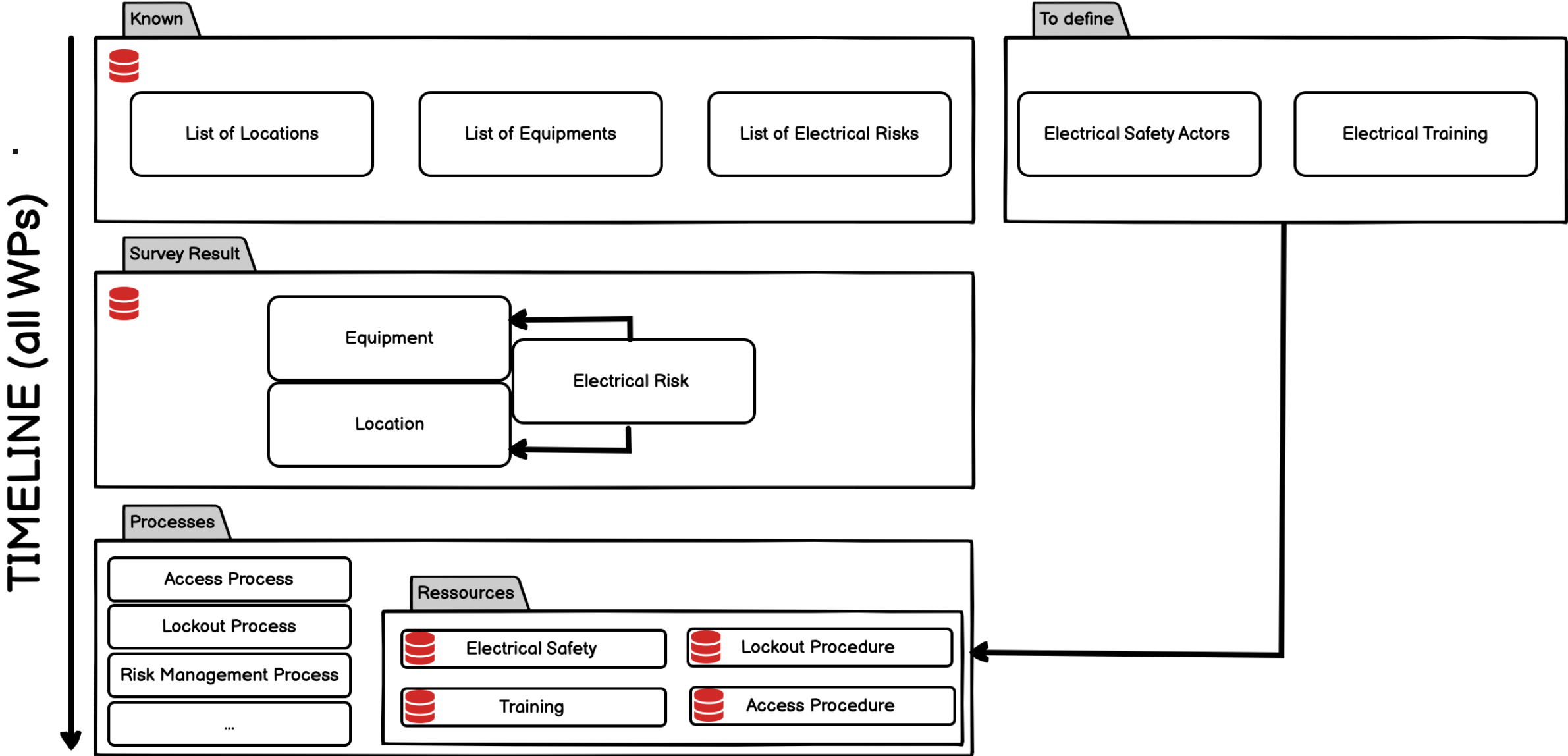
WP4.2: Processes



WP4.3: Lockout



Global Timeline



CONCLUSIONS

- **WP4 scope is well defined**
 - **KISS** processes to allow access / work in an area where an electrical risk is identified.
- **Strong links with the other WPs have been identified**
 - Roles & Responsibilities definition **blocking** (WP2)
 - Heavy data requirements, paradigm shift may be needed when it comes to save data.
- **Ressource Estimation**
 - 0.4 FTE divided between involved equipment groups (0.2 for WP4.1 survey, 0.2 for WP4.3 Lockout procedure)
 - 0.5 FTE always available at WP6 to create web forms, setup DBs, import/merge existing data.
- **Next steps are (even if it seems crazy and too ambitious)**
 - Create web forms
 - Gather Electrical Safety Information
 - Be nice with WP2 (as we badly need them)