On behalf of Katy Foraz,
Head of the EN Department,

Welcome
to all of you!

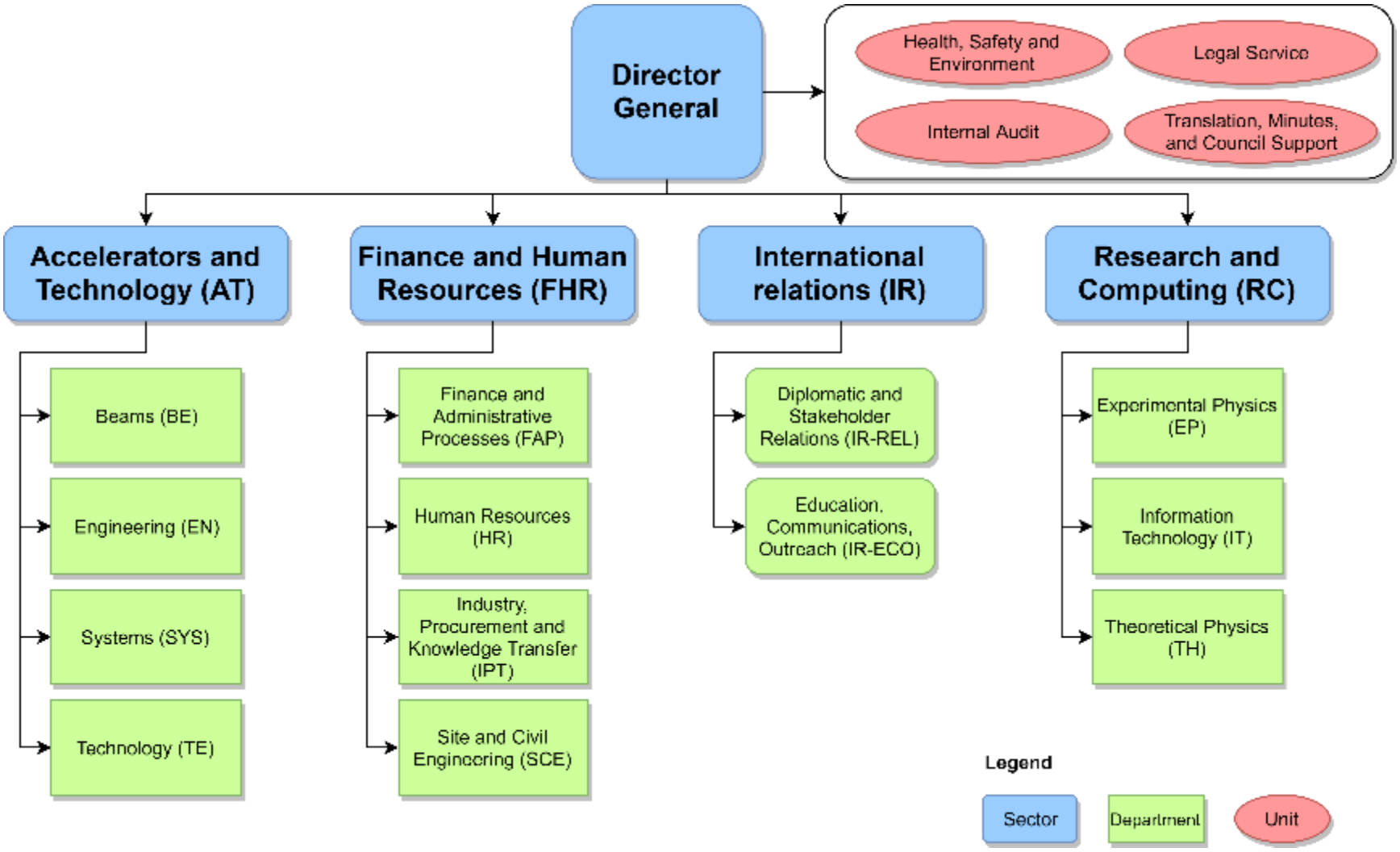
The Engineering Department in a Nutshell

Katy Foraz

CERN | EN ENGINEERING DEPARTMENT

Who are we?

CERN Structure



CERN Structure

Directorate	
Director-General	Fabiola Gianotti
Director for Finance and Human Resources	Raphaël Bello
Director for Accelerators and Technology	Mike Lamont
Director for Research and Computing	Joachim Mnich
Director for International Relations	Charlotte Warakaulle

CERN Structure

Heads of departments	
Accelerator Systems	Brennan Goddard
Beams	Rhodri Jones
Engineering	Katy Foraz
Experimental Physics	Manfred Krammer
Finance and Administrative Processes	Florian Sonnemann
Human Resources	James Purvis
Industry, Procurement and Knowledge Transfer	Christopher Hartley
Information Technology	Enrica Porcari
Site and Civil Engineering	Mar Capeans Garrido
Technology	José Miguel Jiménez
Theoretical Physics	Gian Francesco Giudice

Department Head: Katy Foraz

Head of Department: *K. Foraz*
Deputy: *M. Nonis*

Department Head Office
(EN-HDO)
Assistant: *J. Madden*

Access and Alarms
(EN-AA)
GL: *P. Ninin*
DGL: *R. Nunes*

Accelerator Coordination & Engineering
(EN-ACE)
GL: *J.-Ph. Tock*
DGL: *S. Chemli*

Planning, Administration & Safety
(EN-PAS)
GL: *M. Nonis*
DGL: *S. Knoops*

Cooling & Ventilation
(EN-CV)
GL: *I. Ruehl*
DGL: *S. Deleval*

Information Management
(EN-IM)
GL: *D. Widegren*
DGL: *J. de Jonghe*

Electrical Engineering
(EN-EL)
GL: *J. Voght*
DGL: *M. Parodi*
DGL: D. Ricci

Handling Engineering
(EN- HE)
GL: *C. Colloca*
DGL: *C. Bertone*

Mechanical & Materials Engineering
(EN-MME)
GL: *S. Atieh*
DGL: A. Bertarelli

- Operation
  - Infrastructure
  - Accelerators
- Projects
  - Consolidation
  - Upgrades
  - New facilities
  - Design & Manufacturing
- Studies

Who are we in EN?

27 Nationalities

AT	BE	BG	CH	CZ	DE	DK	ES	FI	FR	GB	GR	HU	IN	IT	NL	NO	PK	PL	PT	RO	RS	SE	SK	TR	UA	IE
4	20	2	20	1	10	3	32	7	198	14	9	2	2	45	4	1	1	16	19	2	2	1	1	1	2	1

Professional Category

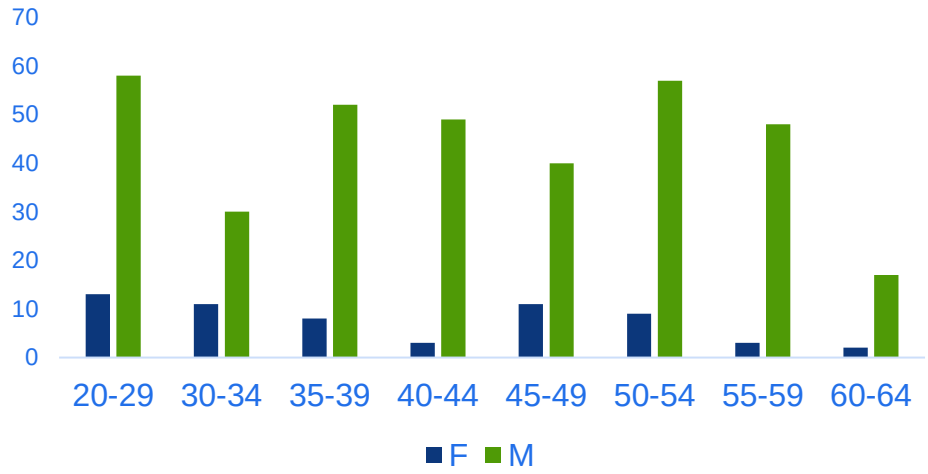
Administrative work	3	5%
Office & Administrative work	14	
Scientific & Engineering Work	180	46%
Scientific Work (Experimental & Theoretical Physics)	3	
Technical work	199	50%
Manual work, Crafts & Trades	1	

F	M
15%	85%

Status

Cooperation Associates	3
Doctoral Students	3
Fellows	46
Project Associates	9
Staff	327
Technical Students	11
Trainees	12
TOTAL	**411**

MP age distribution



AA : Access and Alarms

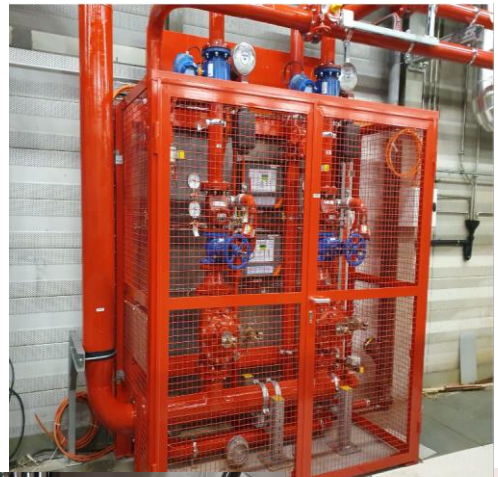
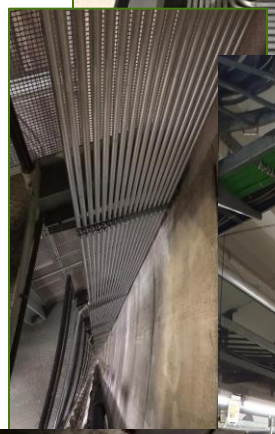
The AA group is in charge of the specification, engineering, installation and maintenance of the systems that ensures the Safety of the CERN Personnel, Users and Visitors, on all its site and facilities.
The Safety Systems concerns:

- *Fire and Gas/ODH detection, emergency phones and evacuation, alarm transmission and monitoring,*
- *Interlocks to protect people radioactivity, X rays, lasers, electricity and cryogenics hazards,*
- *Access control to all CERN conventional or nuclear facilities and sites,*
- *Video surveillance, protection and intrusion detection,*
- *Access data management applications.*

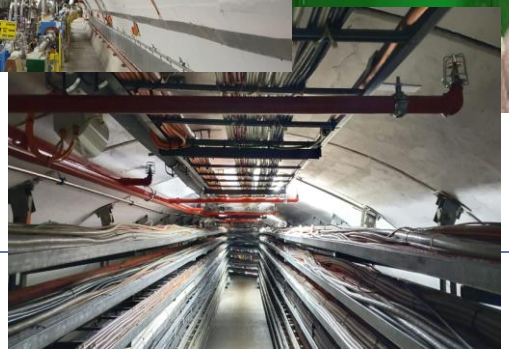
Group Leader
Pierre Ninin

SPS-FIRE Safety Project: new automatic fire detection & fire protection

SPS-ACCESS Project: new access and safety system to the SPS underground areas







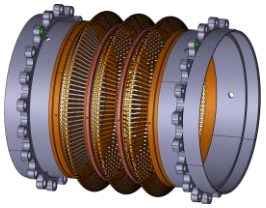


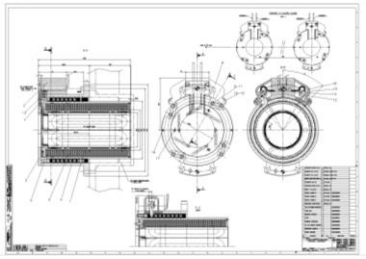
IM : Information Management

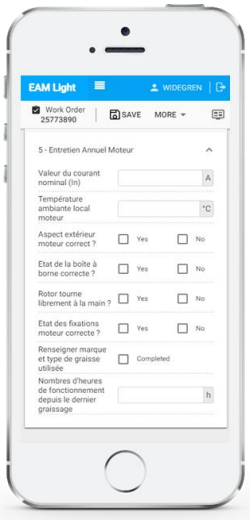
The IM group provides applications and support for engineering information management throughout the whole Organization and its different projects.

This includes for example mechanical CAD tools (such as CATIA), Product Lifecycle Management systems (Smarteam / Aras), the Engineering Data Management Service (EDMS) as well as the Enterprise Asset Management platform (Infor EAM).

The group helps implementing and configuring these tools according to user needs while ensuring that coherent processes are applied and provides user training.



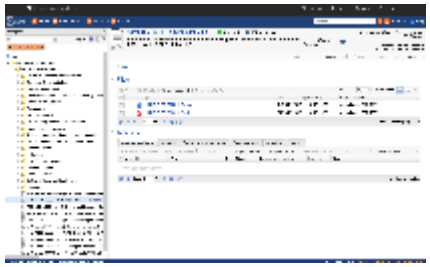


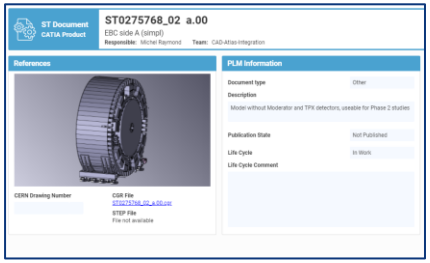


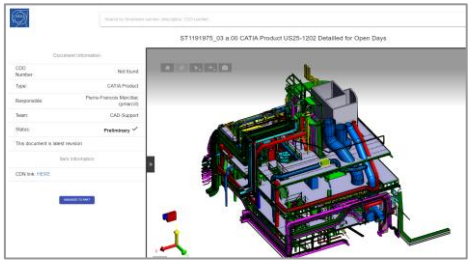
Group Leader
David Widegren

IM : Information Management

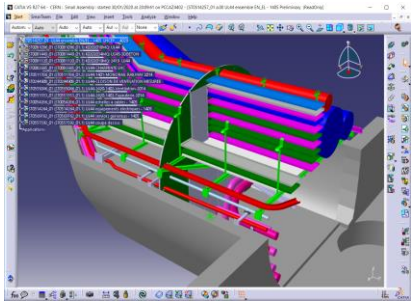
A key goal is to provide the tools required to manage and document the entire lifecycles of CERN's equipment and installations – also known as "Digital Thread".

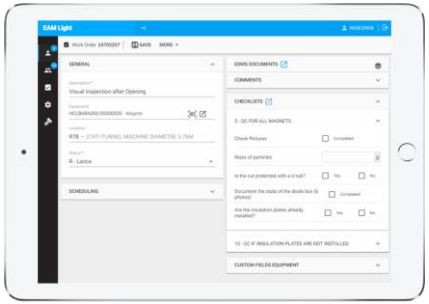






Specification & Requirements → Design → Manufacturing → Installation & Commissioning → Operation & Maintenance → Dismantling & Waste management





ACE : Accelerator Coordination & Engineering Group

The group coordinates the activities for the interventions and changes to the LHC and its injectors. This includes configuration & layout management, integration studies and maintenance of the related 3D-CAD representations, organization and scheduling of programmed stops, management of the mid- and long-term schedule, worksites follow-up and management of the LHC sites, management of electrical lock-out in LHC and operational safety coordination.

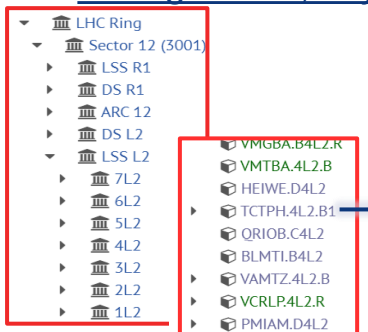
The group is responsible for the ATS Quality Service, giving support to the stakeholders of the ATS.

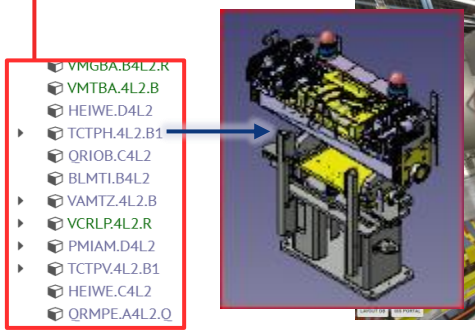
The group also provides support and/or advices in its key competencies.

Group Leader
Jean-Philippe Tock

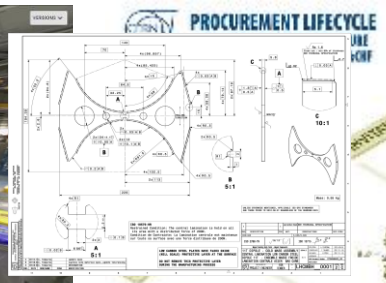
ACE : Accelerator Coordination & Engineering Group

Configuration, Layout, Naming and Integration

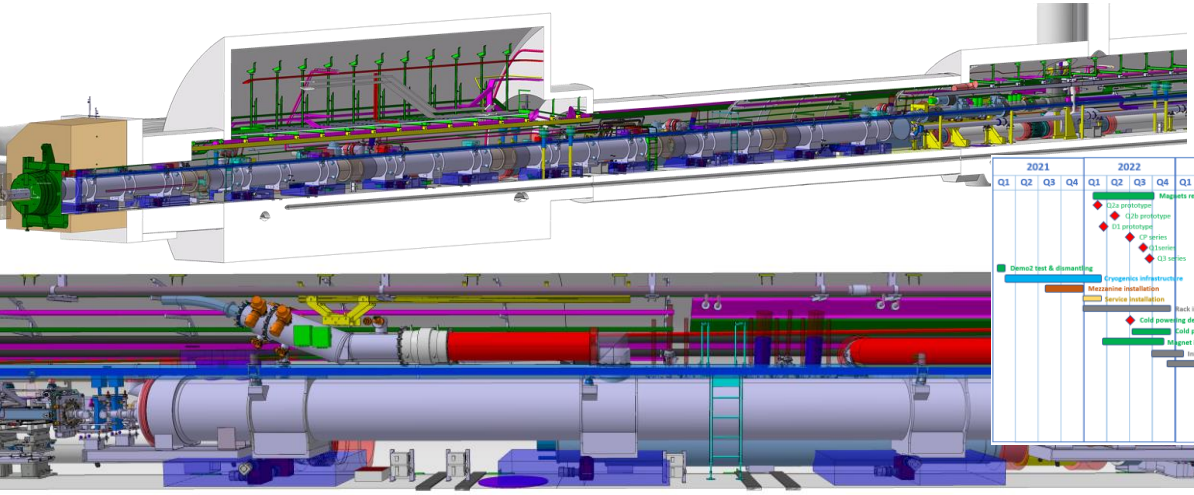


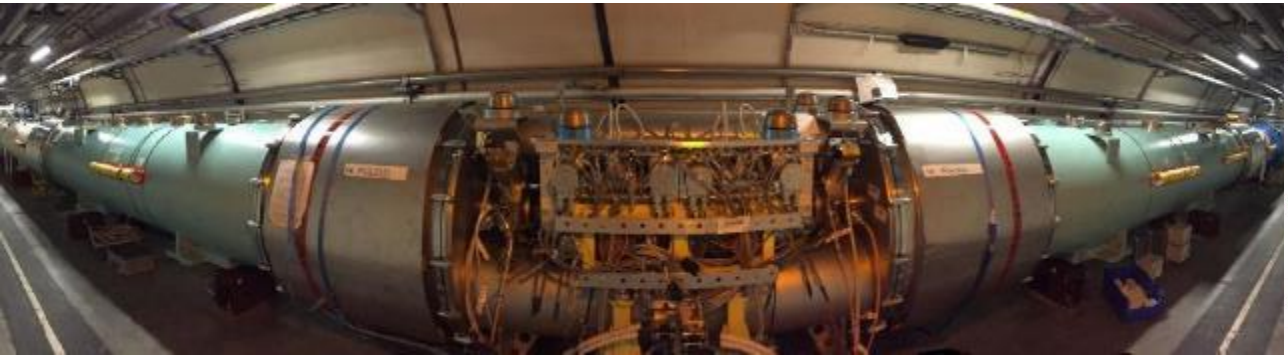


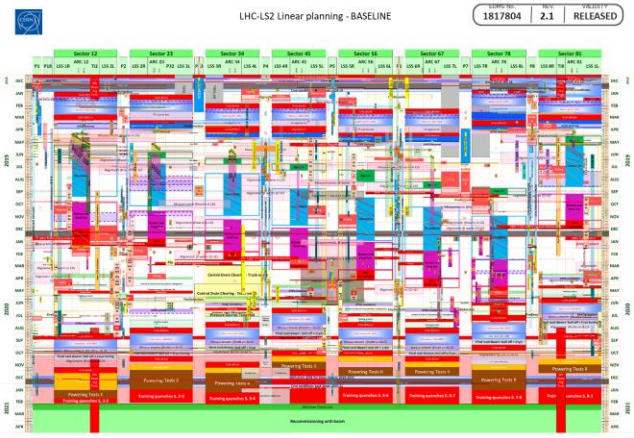
Specification Committee



Organisation and Scheduling



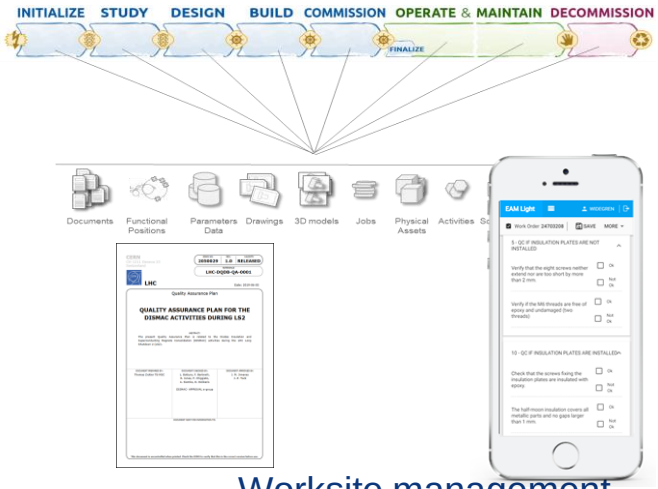




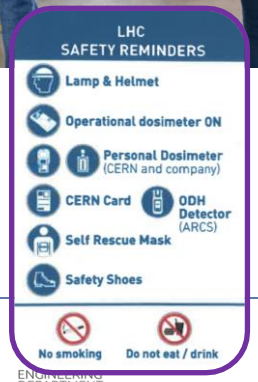
ACE : Accelerator Coordination & Engineering Group

Electrical lock-out

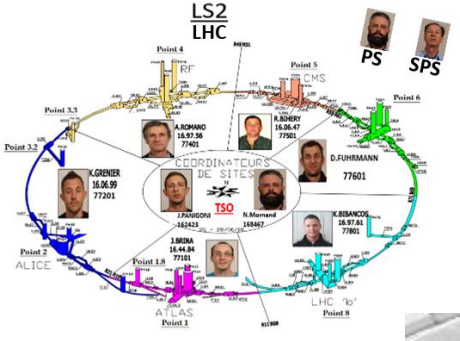
Quality Assurance Service

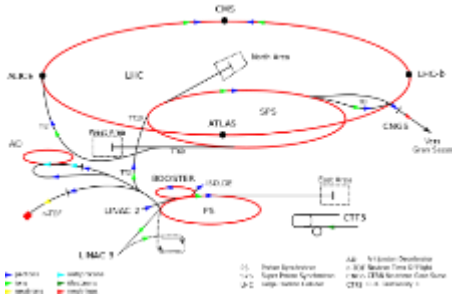


Operational Safety



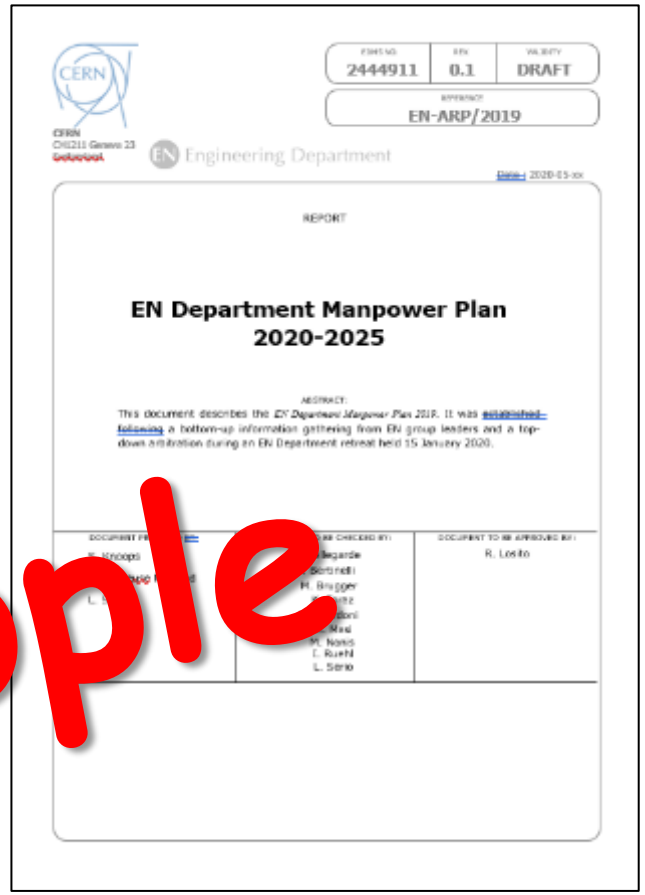
Worksite management





PAS : Planning, Administration and Safety

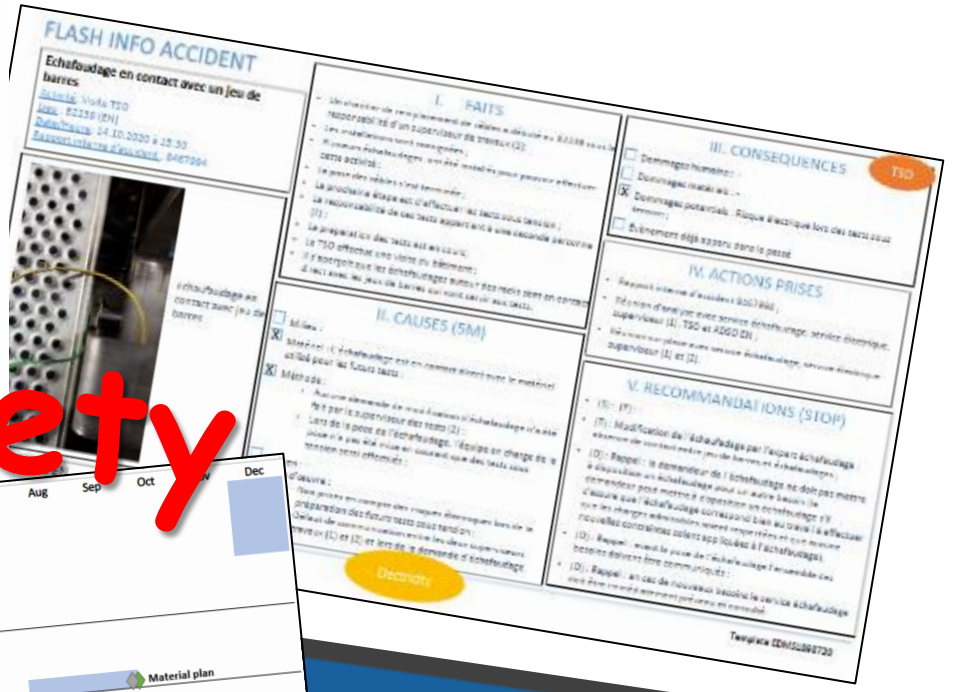
The group is responsible for supporting the Department Head in the management and planning of the department's **material and personnel resources**, as well as for all matters related to **safety and environment**. It represents the department in CERN-wide or inter-departmental bodies dealing with administrative, personnel, budget and safety matters. It also defines and implements safety and administrative procedures, for both the personnel and the material within the Department.



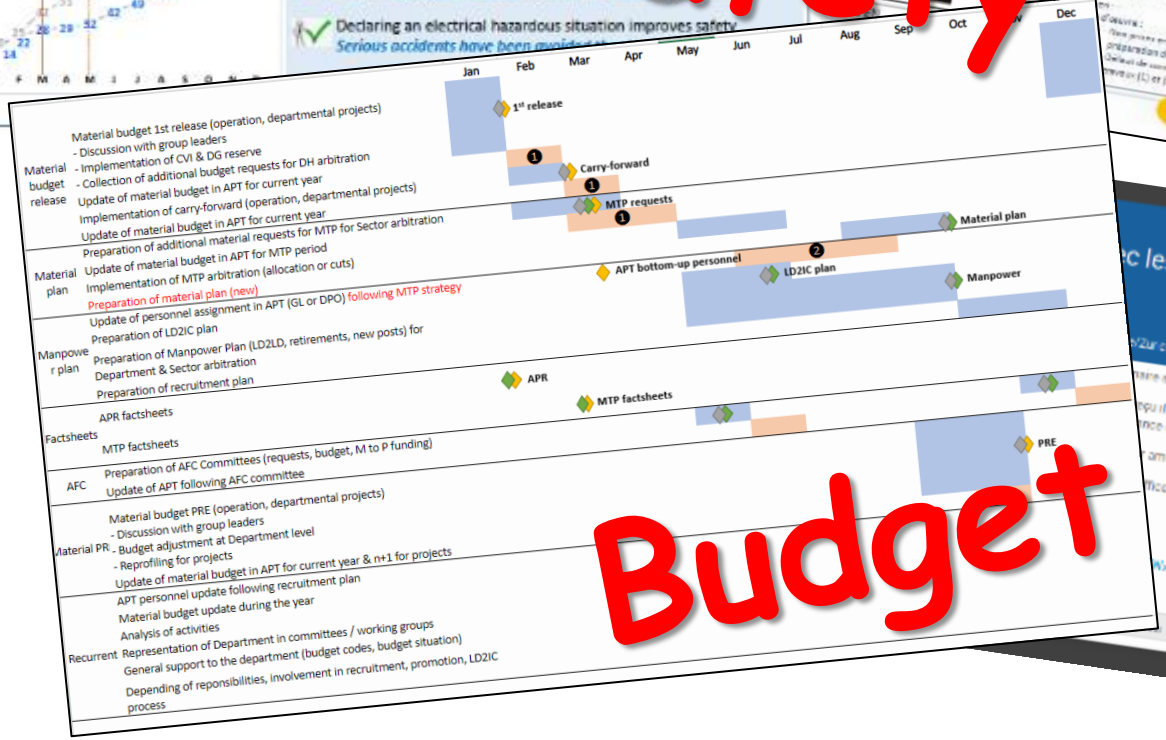
People

Group Leader
Mauro Nonis

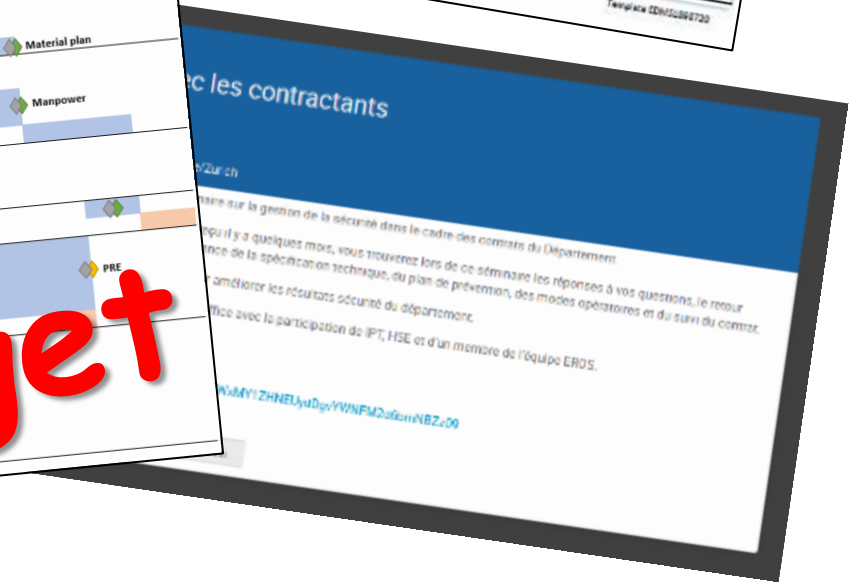
PAS : Planning, Administration and Safety



Safety



Budget



CV: Cooling and Ventilation Group

The group is in charge of:

- Design, installation, commissioning, operation and maintenance of the cooling systems, pumping stations, air conditioning plants and fluid distribution systems of all accelerators, their experimental areas and some of the special cooling systems of LHC sub-detectors.
- Computational fluid dynamics (CFD) simulations, as well as studies on fluid dynamics, ventilation, heat transfer, smoke behavior, gas and radio nuclides propagation are performed by the group.

Group Leader
Ingo Ruehl

Cooling

Cooling plants (raw, demin. water, C_3F_8, C_6F_{14})	150
Pipelines	800 km
Hydrants	800 points
Cooling towers (450 MW)	22
Chilled water plants 6-12 °C (73 MW)	35
Water consumption (peak)	1’260 m^3/h
Water network (3 pumping stations)	5’400 m^3/h

Equivalent to a small town of 25’000 inhabitants.
Annual consumption reduced by 40% in last 8 yrs.

Ventilation

Heating, ventilation and air conditioning	> 1’500 units from 2’000 to 120’000 m^3/h each
Compressed air	14 stations 200 km network

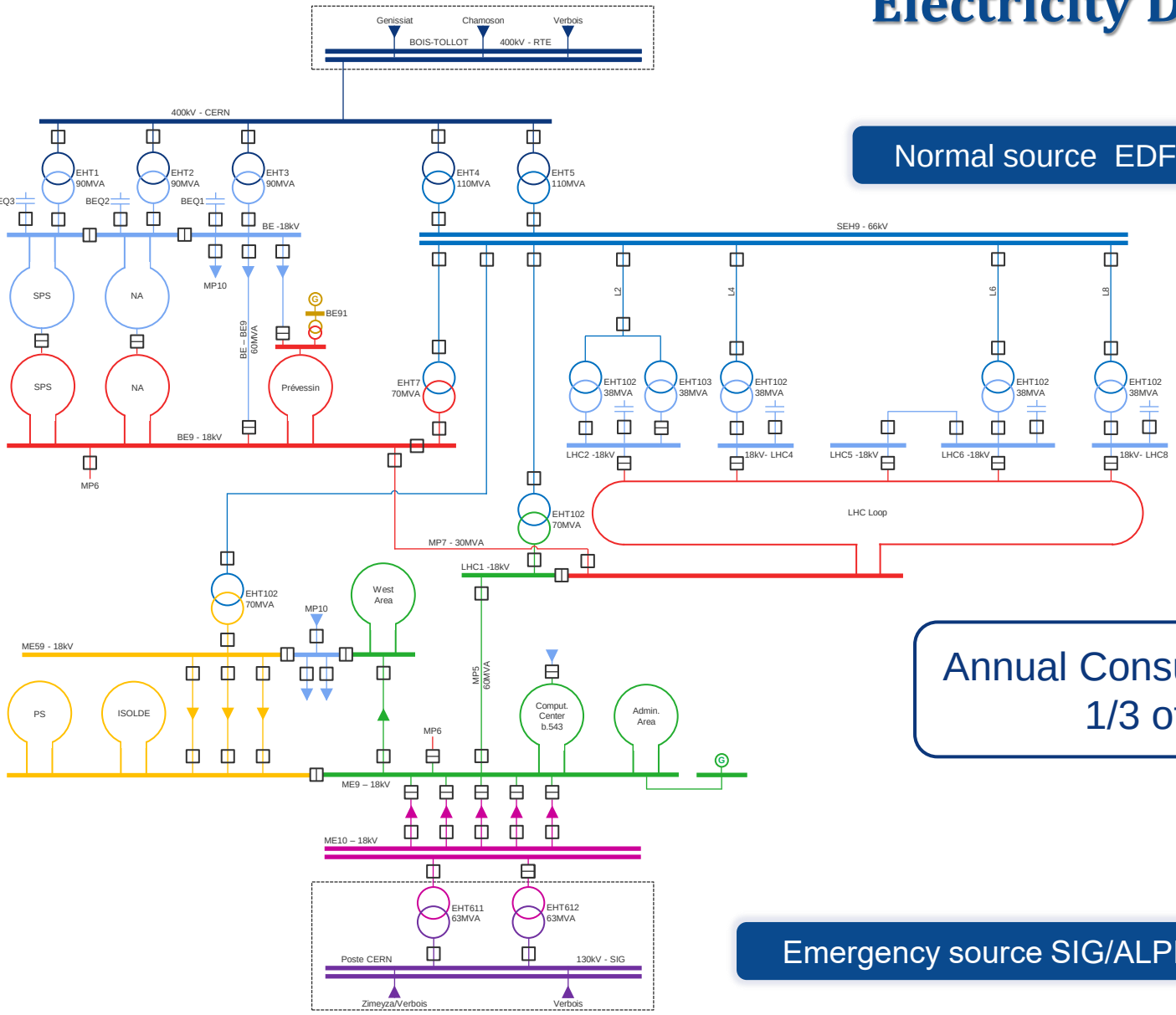
	km	m^3/h
Eurotunnel	50	*540’000*
LHC	27	*72’000*

EL : Electrical Engineering Group

The mandate concerns the **electrical distribution network** from 400 kV to 400/230 V. Its main missions are to operate, maintain, extend and renovate the network, analyse and make projections for CERN electrical energy consumption and manage relations with the energy suppliers.

Group Leader
Jan De Voght

Electricity Distribution



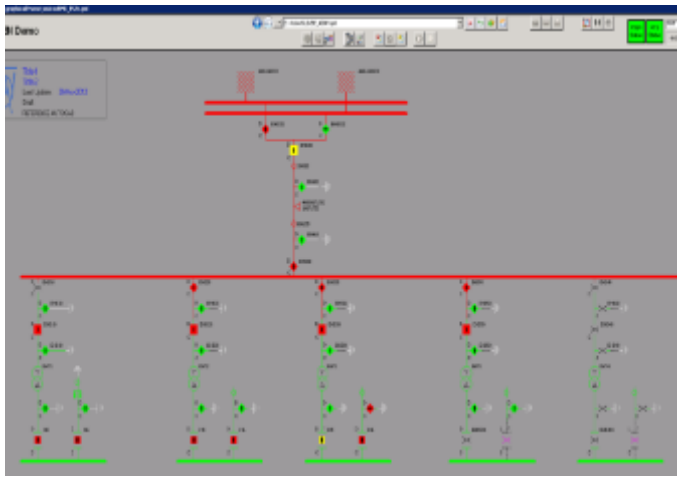
Normal source EDF > 200 MW

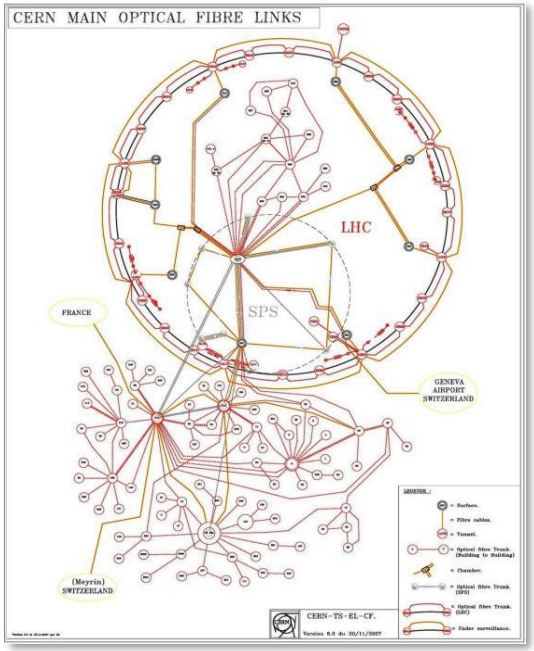
Annual Consumption 1.2 TWh
1/3 of Geneva

Emergency source SIG/ALPIQ ≤ 60 MW

EL : Electrical Engineering Group

The mandate also concerns the **cabling activities**. Its main missions are to install control cables, water cooled cables, and fibre optics for users. This activities include the management of infrastructures (cable trays, ducts, patch panels,etc.) and the necessary removal of old and unused installations.
EN-EL is also in charge of the controls of their distribution network.





HE : Handling Engineering Group

From enormous pieces of equipment with unconventional shapes, to extremely delicate detector parts, the careful handling and transportation of components is essential at CERN.

The Handling Engineering (HE) Group prepares, organizes and coordinates all transport and handling operations for the CERN accelerators and experiments as well as the transport of thousands of conventional items, chemical and radioactive products per year.

The Group is specialized in the design, integration and feasibility studies related to the transport and handling operations. Both standard industrial and custom-built transport and handling equipment is being procured, installed and commissioned.

The Group manages and maintains all the industrial transport, handling and lifting equipment to ensure the perfect performance all along its lifecycle.

With the accelerator complex deep underground and about 700 buildings on surface, both passenger and goods lifts are very important. The HE Group is responsible for the purchase, installation and maintenance of all of them, regularly checking their performance.

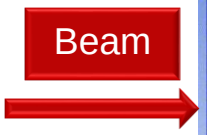
Group Leader
Cristiana Colloca

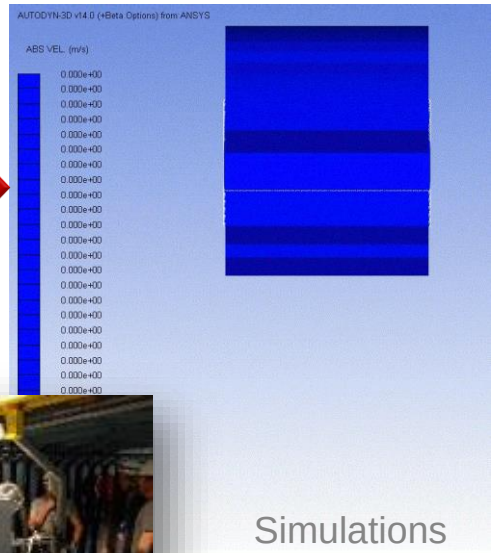
HE : Handling Engineering Group

MME: Mechanical and Materials Engineering Group

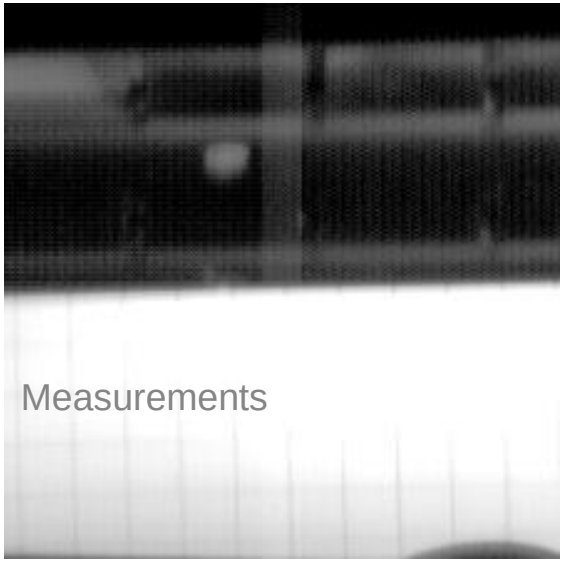
The mandate of the MME group is to provide to the CERN community specific engineering solutions combining mechanical design, fabrication and material sciences, using in-house and industry facilities, for beam accelerator components and physics detectors.

➲Prototypes and development work

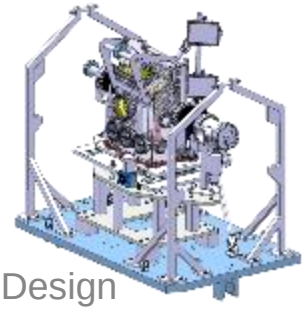




Simulations



Measurements

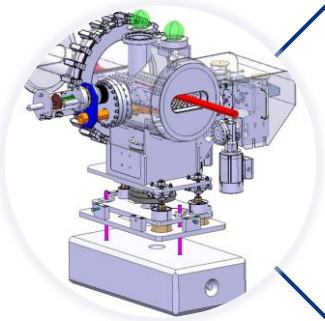


Design

Fabrication & Assembly

Group Leader
Said ATIEH

MME : Domains of activities



Design

- **Design Office**
  - 50+ designers and 15+ engineers
  - CATIA v5 / SmarTeam, ANSYS, LS-Dyna
- **Mechanical Measurements Lab.**

Fabrication

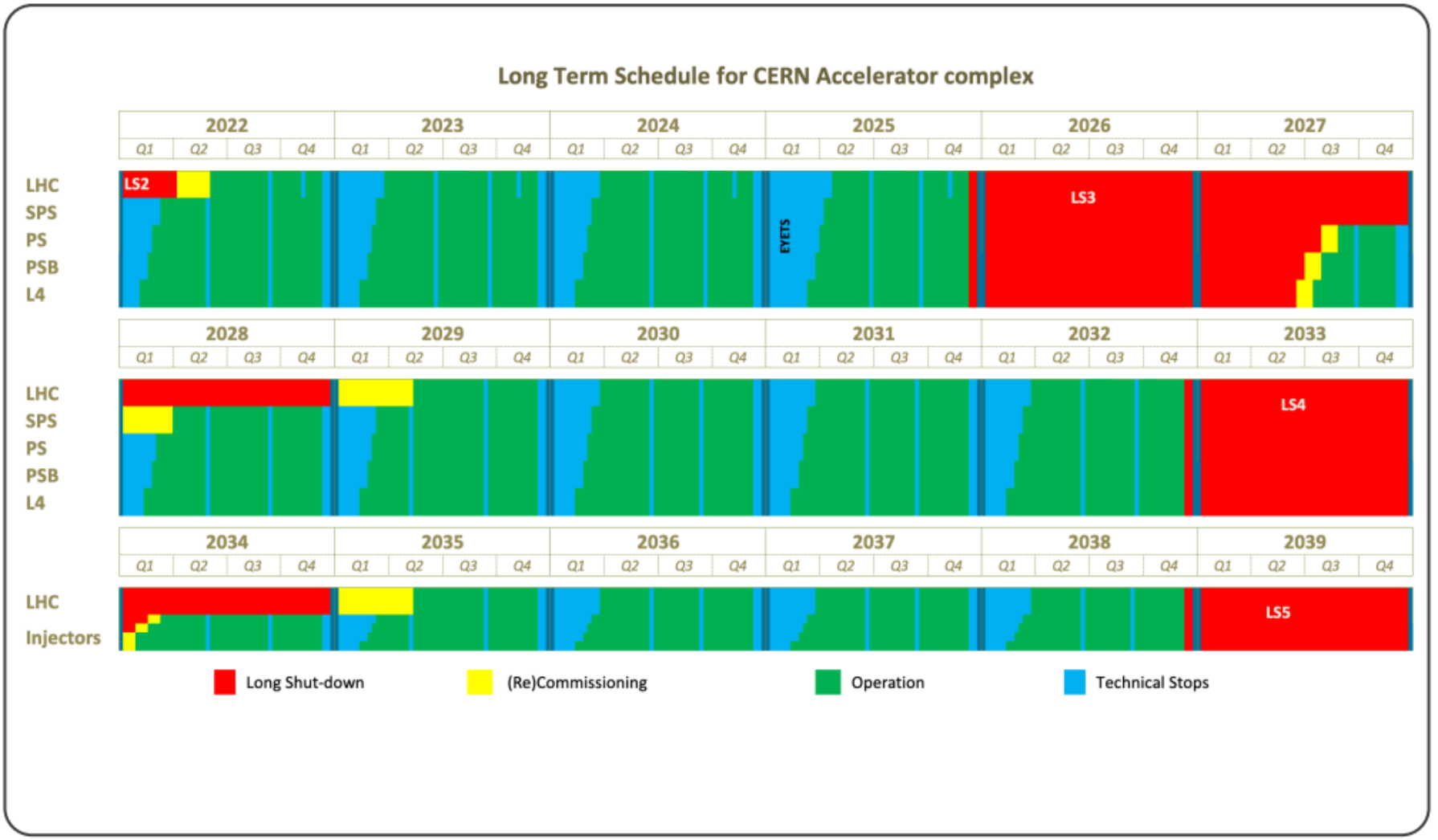
- **Mechanical workshop** (4000 m^2)
  - 60+ technicians and 10+ engineers
  - CNC machining
  - Assembly & metal forming
  - Metal Additive Manufacturing
  - Welding (TIG, MIG, electron beam, laser, vacuum brazing)
- **Technical Subcontracting unit**

Materials

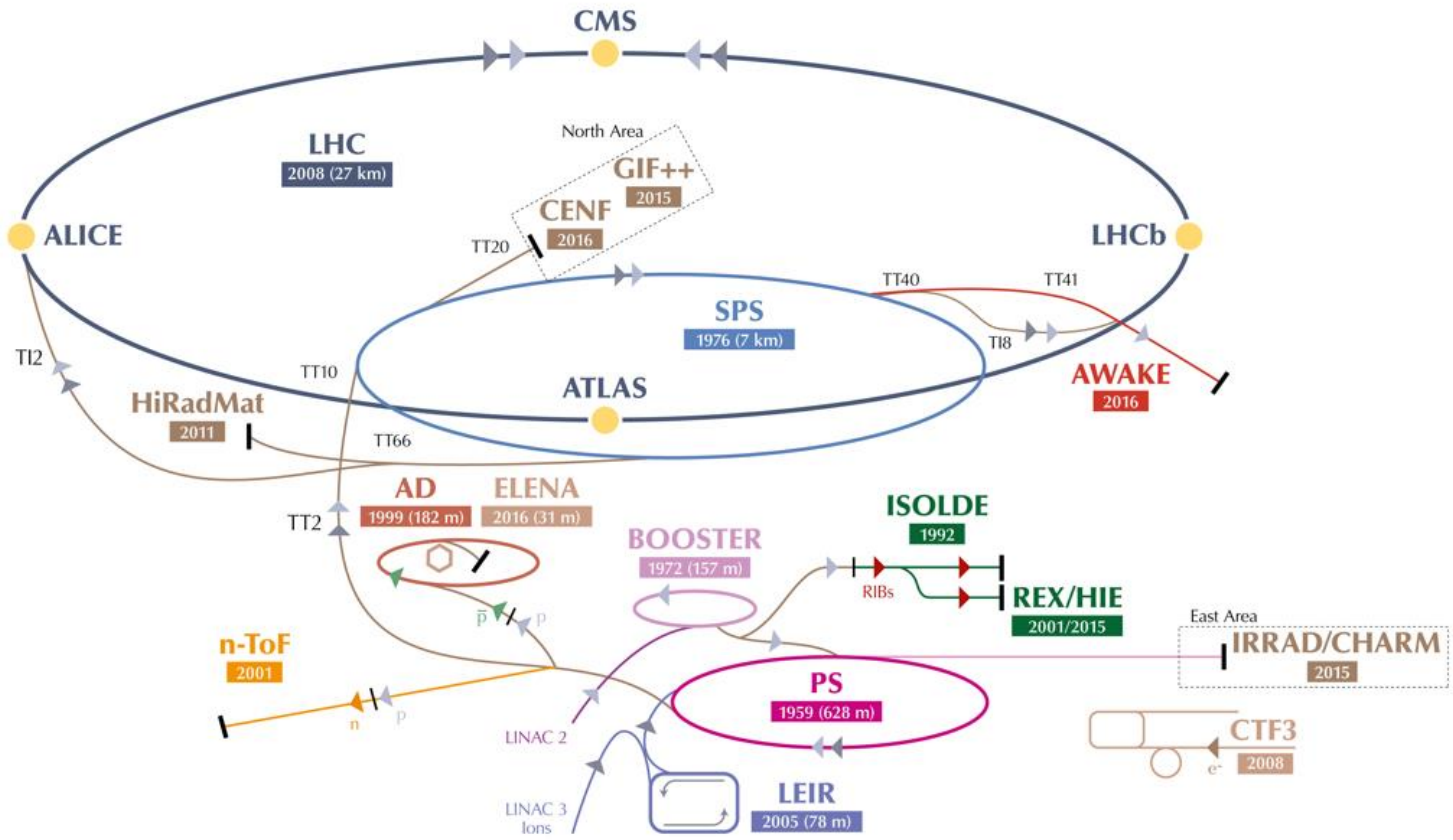
- **Material science consultancy**
  - metallurgical analyses, microscopy including FIB, mechanical tests
- **NDT:** UT, radiography, microtomography
- **Metrology:** 350 m^2 Lab., several CMM

When will we be doing
what we are expected to do?

A long-term perspective



The CERN accelerator complex



MAGIC OF CERN

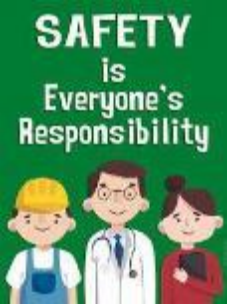
- Science is an extraordinary human endeavor
- Our understanding of nature at the fundamental level has reached astounding results
- The complexity of science requires a combined effort **technology + experiments + theory**

- CERN is a superb example of this combined effort at work

The scientific success of CERN belongs to all of us

What are our priorities?

Our priorities



CERN Safety responsabilities

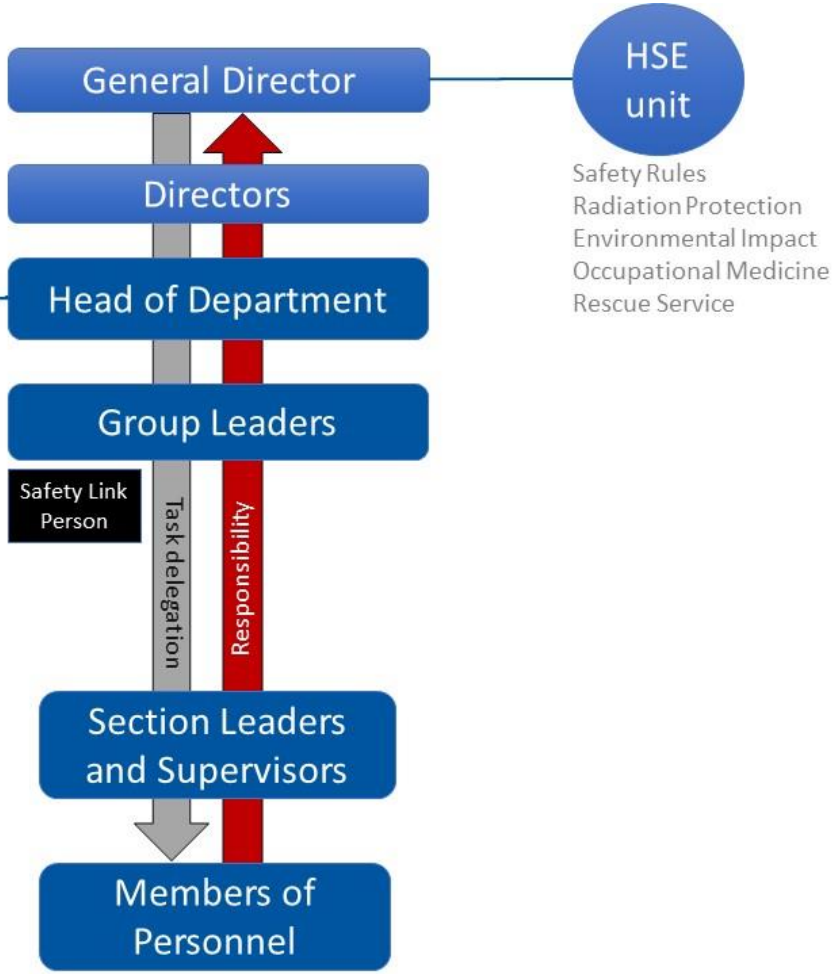
- Responsibilities and organisational structure in matters of Safety at CERN are defined in Safety Regulation SR-SO
- The Department Leader and your Group Leader have the overall responsibility for your safety conditions at work
- Each of us is responsible for safety in our work so **YOU** are the first person involved in your own safety

Each person participating in the activities of the Organization or present on its site shall actively contribute to the implementation of the CERN Safety Policy through exemplary conduct and, in particular, compliance with the CERN Safety Rules, the CERN Safety Objectives and best practices, actively seeking information to minimise risks, avoiding dangerous situations for herself/himself and others and exercising the responsibilities assigned to her/him safely.

Safety organization

Specialized **Safety Officers** providing expertise and guidance to implement the Safety Rules

- Departmental Safety Officer — DSO
- Territorial — TSO
- Radiation Protection — RSO
- Flammable Gases — FGSO
- Laser — LSO
- Cryogenic — CSO
- Experiment — EXSO
- Referent Operational Safety — EROS



Safety Rules
Radiation Protection
Environmental Impact
Occupational Medicine
Rescue Service

Safety first steps

The first steps to do when arriving at CERN regarding safety matters:

1. **Define your activity and identify the hazards** associated to it with your supervisor
   - Fill the documents (https://edh.cern.ch/Document/General/OHS)

2. **Purchase the needed safety equipment** via the CERN catalogue(https://edh.cern.ch)
   - Ask your supervisor for a budget code
   - Wear the appropriate PPE according to potential risks
   - Self-rescue mask, ODH detector and personal dosimeter are mandatory for particular activities

3. Once the hazards have been identified: **Follow the appropriate safety training courses** via Learning Hub

   Mandatory training:
   - Safety at CERN
   - Emergency Evacuation
   - Radiation Protection –Awareness

   Recommanded training
   - First Aid – Life Saving Actions

4. Request access permission via ADaMS

   Always follow the appropriate safety training courses before requesting the access and mention a clear justification (otherwise the access will not be approved)

Workplace

Be familiar with your working environment & make sure that you know:


Evacuation path

Territorial Safety Officer (TSO)

First-aider

Emergency stop


Defibrillator


Fire extinguisher


Assembly Point

Reliability techniques

PreJob Briefing
- Define the expected outcome
- Analyse the risks
- Identify error-prone situations
- Find ways to counteract them
- Rely on feedback

Secured communication
- Deliver a clear, comprehensive and targeted message
- Have the recipient repeat the message
- Confirm by saying "Correct!

Cross-checking
- Say out loud and mime what I am going to do
- Have the person check and get the agreement of his/her colleague
- Carry out the action after the colleague agrees

One-minute stop
- Observe the working environment and detect potential hazards/risks
- Check key points (Local, equipment)
- Stop action: ask questions about protection
- Take advice from hierarchy and/or experienced colleagues

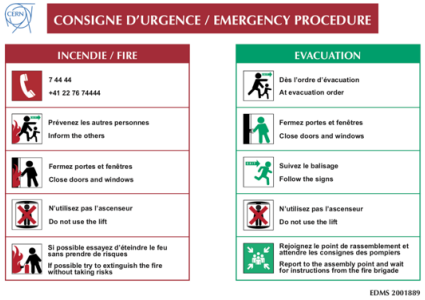
Autocontrol
- Read aloud and follow the action with your finger
- Identify with the finger and read aloud the material to be acted upon

Debriefing
- Report back to the manager on how the activity was carried out
- If necessary, write down the remarks to be taken into account by the manager

In case of emergency

- KEEP CALM
- Call the fire brigade n°(+41 22 76) 74444 and communicate

1. Who you are (CERN ID, phone number)
2. Where you are (building, number on the door)
3. What is going on



Never hang up without fire brigade authorization

Important: Do not use the European Emergency call 112
➔Your call will be treated outside CERN

Incident report

- Must be done within 48 hours
- « Incident declaration » via EDH
  - ➢ 4 topics
    - Circumstances (Date/Time/Location/Description)
      - Allows to understand the event
    - Consequences (Personal injury/Material damage/Environmental consequences)
      - To determine whether an accident or near miss has occurred
      - Allows to determine the routing of information
    - Witnesses
    - Comments
  - ➢ Don’t forget to fill in the declaration of occupational accident if necessary (In case of injury/consultation)

Safety starts with me!

Together we all contribute to ensure CERN is a safe place to work.

Think safe. Work safe. Move safe. Be safe.

Safety Always

HSE
Occupational Health & Safety and Environmental Protection unit

My contribution to Safety

I am informed
I know CERN's Safety Policy and applicable rules.
I am aware of potential hazards in my environment.

I am prepared
I understand prevention and protection measures and wear PPE if required.
I follow the necessary training.
I know emergency procedures, exits and assembly points.

I am ready
In case of emergency, I call +41 22 76 **74444.**
I attend Life Saving Actions Training.

I am mindful
I recognize safety signs and comply with them.
I take part in workplace safety.

I am responsible
I report incidents and near-misses.
I integrate lessons learnt.

I am open
I speak up about my concerns.
I share about safety with my colleagues, supervisor and safety officers.

Essential rules for my personal safety

I stop, I think, I act.

I don't know, I don't touch.

I stay alert and check my surroundings.

I respect access restrictions.

Conclusions

What is expected from you?

BE AWARE OF AND FOLLOW CERN SAFETY POLICY AND RULES

USE PPES WHERE REQUIRED

REPORT INCIDENT

ATTEND COMPULSORY SAFETY TRAINING

Warm welcome again!