

The logo for CEA (Commissariat à l'énergie atomique et aux énergies alternatives) features the lowercase letters 'cea' in a white, rounded, sans-serif font. A horizontal green line is positioned below the letters.

DE LA RECHERCHE À L'INDUSTRIE



Quality Assurance / Quality Control

Environment, Safety and Health

LB650 Cryomodule

Christelle Cloué

- **Document management**
- **Configuration management**
- **Nonconformance process**
- **Quality requirements for component manufacturing**
- **Factory Acceptance Test, Site Acceptance Test**
- **Cryomodule assembly and test documentation**
- **ESH – Safety organisation**
- **ESH - CEA Safety Analysis and Hazard Prevention**

The purpose of the Quality Assurance Plan (QAP) is to ensure that deliverables will meet the specified requirements

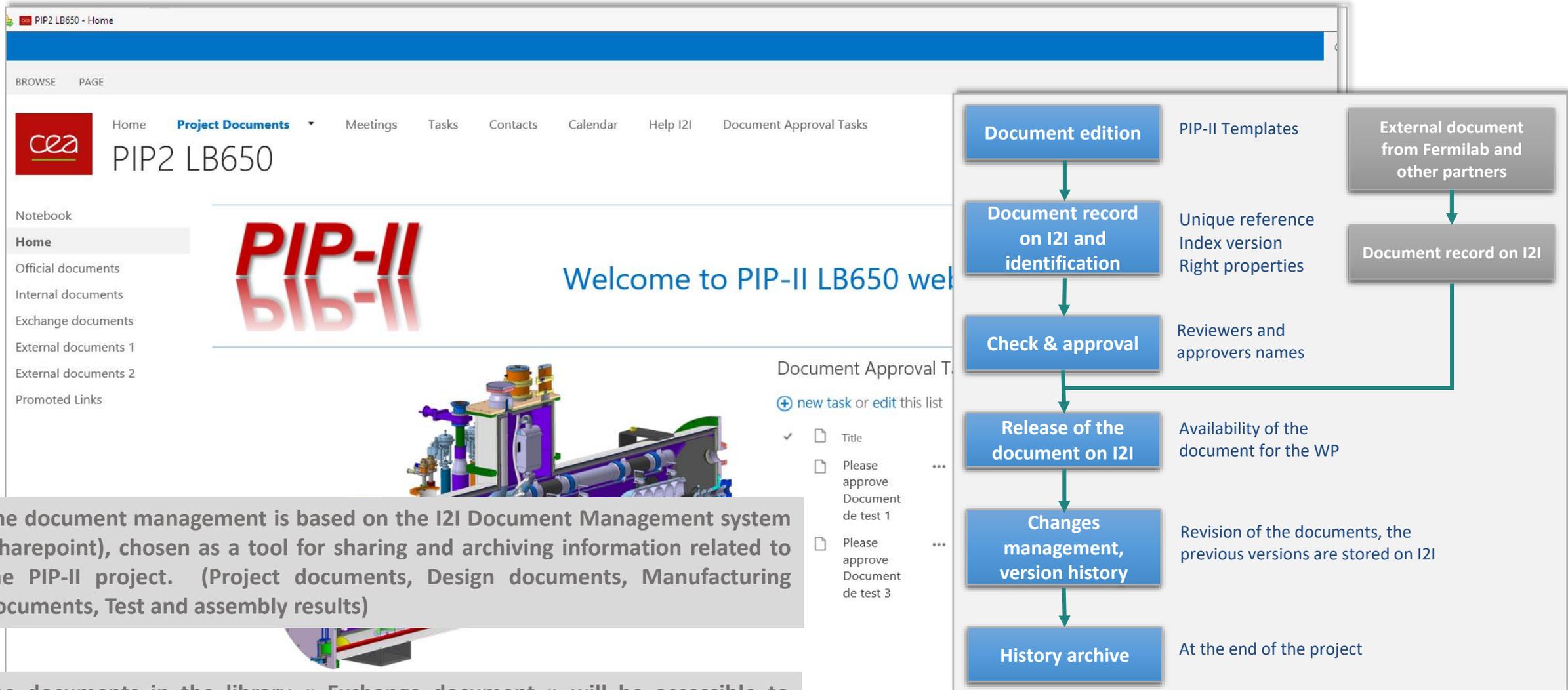
The PIP2 QAP will cover the following:

- Communication plan
- Document management
- Configuration management
- Non-conformance management
- Quality control (manufacturing, assembly and tests)
- Quality for storage, handling and transport
- Measurement and test equipment monitoring

A draft version of the QAP has been reviewed by Fermilab.

	REDACTEUR Edited by	VERIFICATEURS Reviewed by	APPROBATEUR Approved by
NOM Prénom Name	C. Cloué		
Fonctions Functions	Quality manager	C. Simon	O. Napoly
Date et signatures Date and visas		Project manager	Technical coordinator

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The document management is based on the I2I Document Management system (sharepoint), chosen as a tool for sharing and archiving information related to the PIP-II project. (Project documents, Design documents, Manufacturing documents, Test and assembly results)

The documents in the library « Exchange document » will be accessible to Fermilab

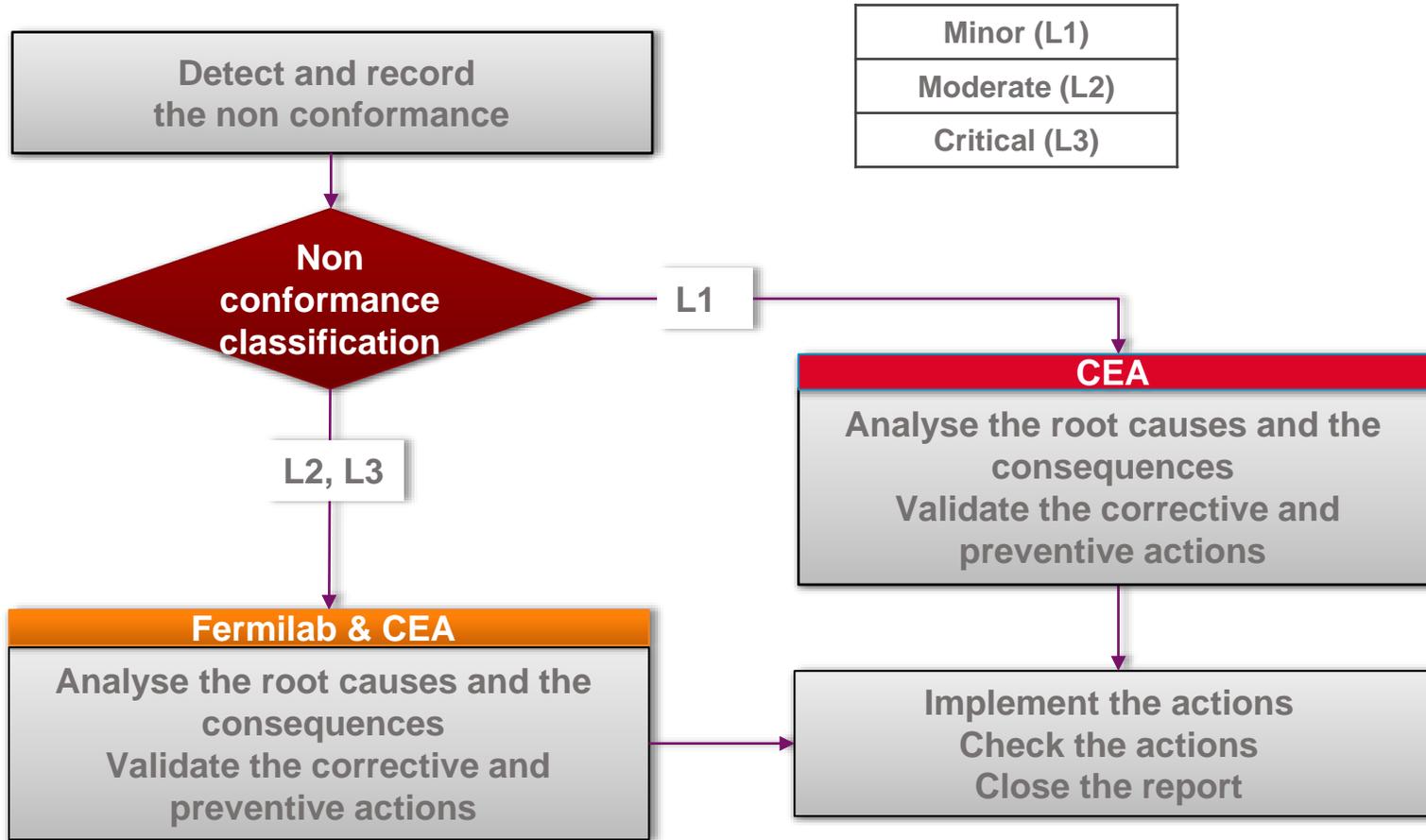
Main objectives of the configuration management

- ▶ To identify the baseline configuration and the applied configuration, to detect and trace deviations during production, testing and shipment of the deliverables;
- ▶ To know the technical description of the products and their components at any time in the lifecycle, using reliable approved documentation
- ▶ To monitor any changes in the technical description of the CEA PIP-II project;
- ▶ To provide traceability of developments in the technical description of the CEA PIP-II project;
- ▶ To verify that the documentation is and remains the exact picture of the products it describes;
- ▶ To enable PIP-II (as a user) to know the operational capabilities and possibly the limitations of each component and, if deviated, know which component is affected.

Change request process

- ▶ Once the reference configuration has been adopted, all configuration change wishes are formalized and are subject to a Change Request (CR).
- ▶ Change requests are managed according to change request process defined by Fermilab for PIP-II.

Non-conformances affecting part are subject to formalized management and treatment once the reference configuration is established.

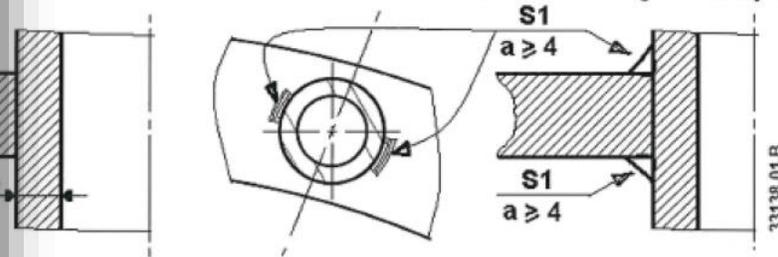


NON CONFORMITY REPORT					Page : 1 sur 2
			Reference : CEA-ESS-xxx-NC-xxxx-x		
TITLE :		Edited by :		Date :	
2	SUB SYSTEM <i>(Select a subsystem in the list).</i>	COMPONENT	S/N COMPONENT	PHASE <i>(Select a phase in the list)</i>	CRITICITY <input type="checkbox"/> L1 <input type="checkbox"/> L2 <input type="checkbox"/> L3
DESCRIPTION				Affected parameters:	
Document references:				<input type="checkbox"/> Internal interfaces <input type="checkbox"/> Interfaces with subsystems of the accelerator <input type="checkbox"/> Performances and functional requirements <input type="checkbox"/> Qualified/established process <input type="checkbox"/> Reliability, lifetime <input type="checkbox"/> Safety of people or equipment <input type="checkbox"/> Other	
3	ANALYSIS	Responsible :		Item of causes :	
				<input type="checkbox"/> Material <input type="checkbox"/> Cleanliness, environment <input type="checkbox"/> Test equipment <input type="checkbox"/> Transport, Handling, <input type="checkbox"/> Storage <input type="checkbox"/> Documentation <input type="checkbox"/> Indetermined	
4	CORRECTIVE ACTIONS	Responsible :		Final dispositions :	
				<input type="checkbox"/> Use as is <input type="checkbox"/> Repair <input type="checkbox"/> Rework <input type="checkbox"/> Return to supplier <input type="checkbox"/> Scrap <input type="checkbox"/> Action on other product <input type="checkbox"/> Cancelled	
5	PREVENTIVE ACTIONS	Responsible :		Waiver :	
				<input type="checkbox"/> Request for waiver (Use as is)	
6	CHECK AND VALIDATION	Technical officer	Quality	Project officer	
Sub-contractor :		Name Date :	Name Date :	Name Date :	
CEA :		Name Date :	Name Date :	Name Date :	
ESS :		Name Date :	Name Date :	Name Date :	

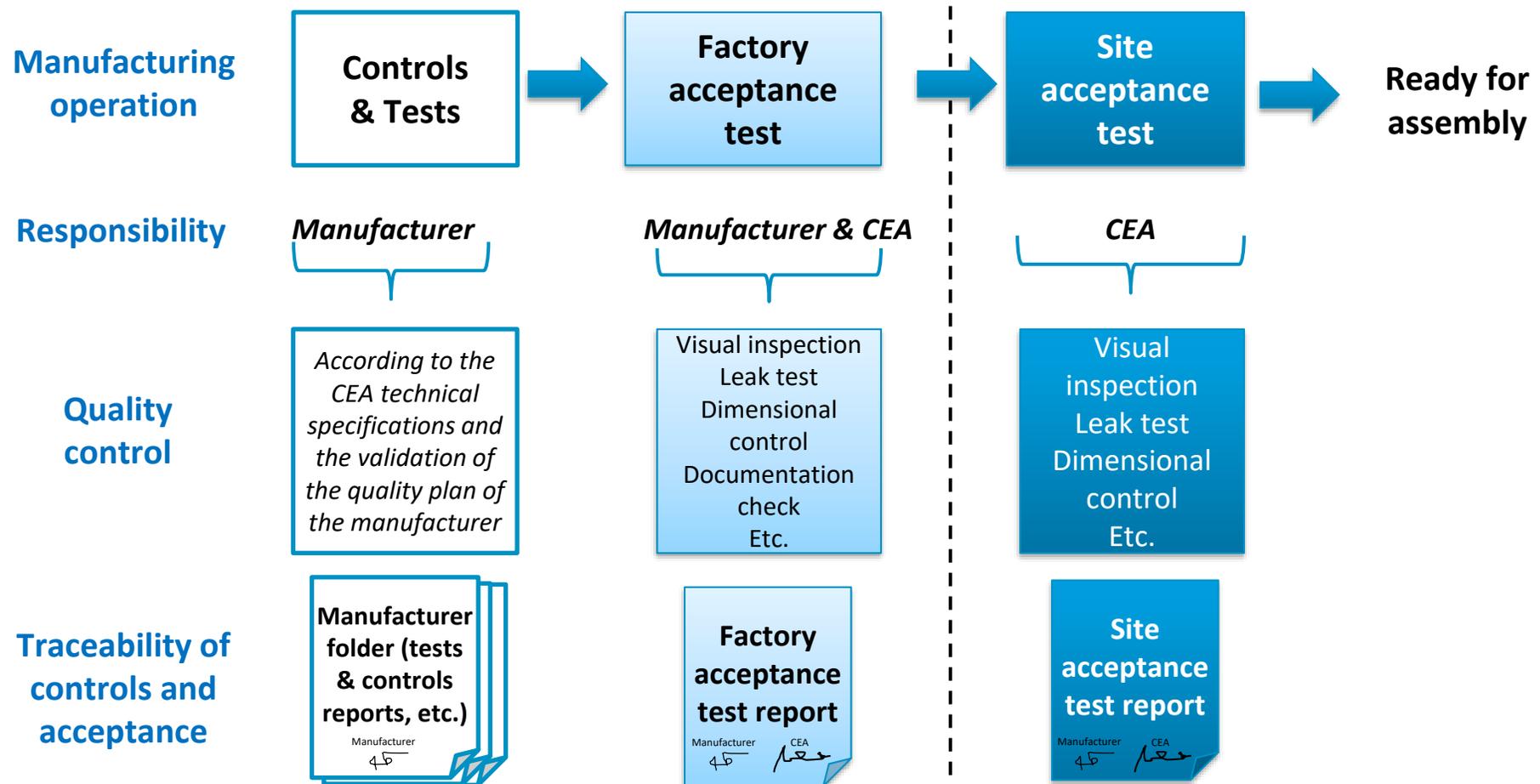
The quality requirements are included in the technical specifications

- ▶ Manufacturing quality plan including quality control
- ▶ Application of ISO 9001;
- ▶ Application of manufacturing and materials standards
- ▶ Identification and labelling of each component under the responsibility of CEA;

PLAN QUALITE										33138-LOFC-01 Révision: C Page: 5		Ref. doct : 33138-P-U Révision : E Page:	
* Notifications: A = Point d'arrêt, R = Rapport requis, C = Convocation. Les étapes avec notifications SDMS sont à valider par le service contrôle..										DMOS N° 33138-01			
N° Opération	Description de l'opération	Instructions applicables	REVISION notification	SDMS Date Nom Visa	Inspection Date visa	Client Date visa	N° P.V.	OBSERVATIONS					
49	Contrôle dimensionnel	24-J-03-11 33138-P-01	R			C		Contrôle dimensionnel 100% des cotes fonctionnelles sur le proto uniquement					
50	Montage des accessoires	24-J-03-10 A											
60	FABRICATION OUTILLAGE DE BLOCAGE DES ECRANS ET CAVITES												
61	Préusinage des pièces	24-H-01-40 A											
62	Contrôle dimensionnel	33138-P-01	R										
63	Décapage / passivation des pièces en acier inoxydables	33138-P-06											
	Application peinture rouge des	24-H-01-43 A											

MA DE PREPARATION		IDENTIFICATION DES PASSES	
		- Face Avant : 2 cordons de lg. 20 // rayon - Face Arrière : 2 cordons de lg. 20 // au rayon	
			
6060 / 10	5083 / 30	Type de soudure :	FW
		Diamètres :	60 à
		S1	
		1	
		141	
		PB	
		Manuel	
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		S Al 5356	
		(ER5356)	

Each component or set of components must be declared Ready For Assembly (RFA) before being sent to the assembly team. The RFA status is reached when the component has successfully passed the Factory Acceptance Test (FAT) and the Site Acceptance test (SAT).



- ▶ **Flow charts of the assembly sequences, which indicate the sequence of the operations, the tests (electrical, alignment, RF, leak check, RGA), the inspection controls, the hold points.**

- ▶ **Procedures for assembly and test, welding book**

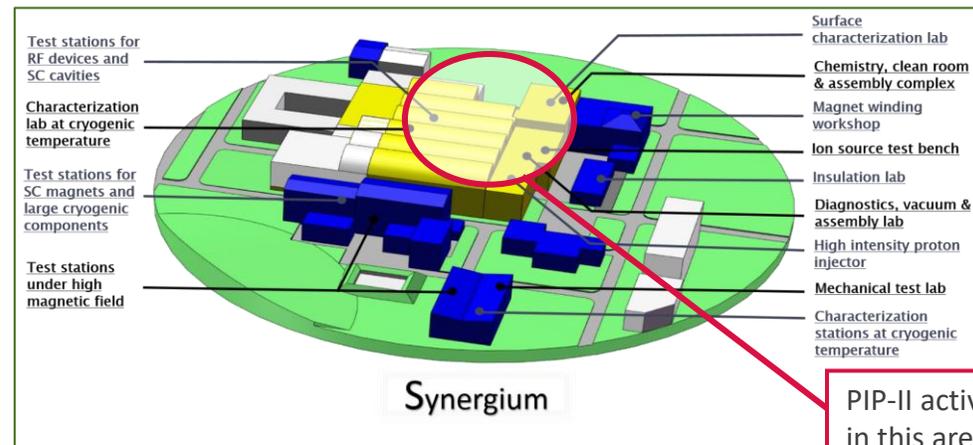
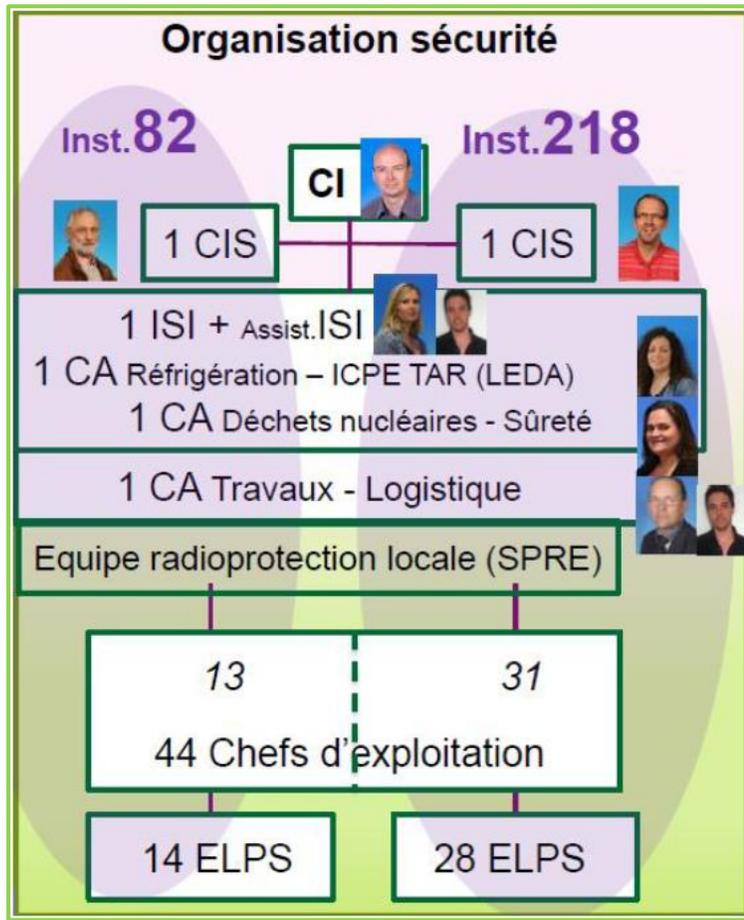
- ▶ **Traceability of the operations, record of all the data relative to the assemblies and the tests to prove the cryomodule's conformity to the defined requirements.**
 - **Travelers for each workstation**

 - **Visual inspection, mechanical and electrical checks, verification of assembly, test reports, configuration follow-up and status of non-conformity reports**

- ▶ **Before shipment to Fermilab - Outgoing inspection of the cryomodule and establishment of the Acceptance Data Package**

CEA safety management during exploitation phase

- ▶ General safety rules and procedures
- ▶ Safety training plan and medical supervision
- ▶ Team leader and deputy for each exploitation station
- ▶ Pre-authorization form to start testing
- ▶ Safety inspection and safety drills
- ▶ Regulatory periodic controls of equipment
- ▶ Co-activity oversight :
 - Bi-monthly meetings for manage exploitation and prevent interferences
 - Quarterly meeting for Technology infrastructure land use
 - Construction works and logistics oversight by ESH Team



► Prototyping Phase

- Safety studies of existing workstations
- PIP-II safety study for project authorization by the CEA-Saclay central « Safety Local Commission » (CLS)
 - Radiation protection safety
 - Pressurized vessel equipment (PED) safety
- Prevention plans, fire permits, etc. for work sites to fit out ESS areas

► Industrial Production Phase

- Safety and environmental requirement for PIP-II specifications
- PIP-II safety study for project authorization by the CEA-Saclay central « Safety Local Commission » (CLS)
- ESH Plan with the selected industrial contractor



THANK YOU