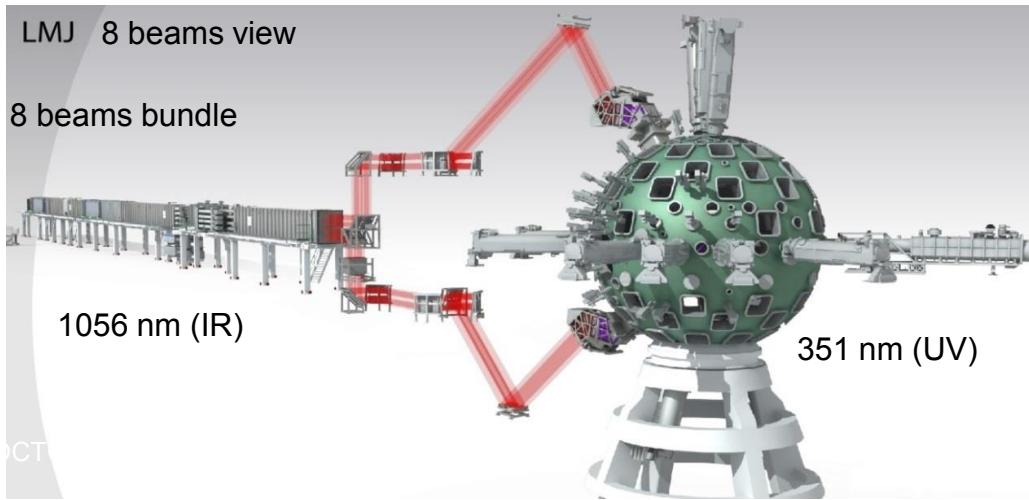
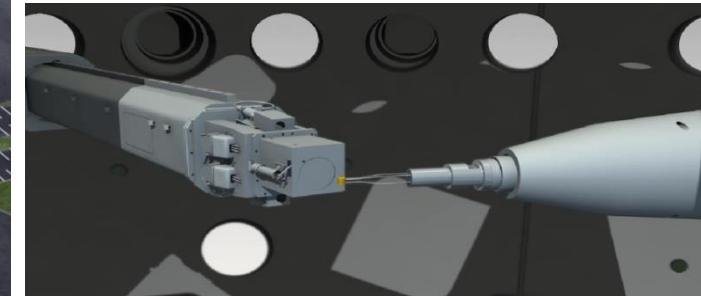
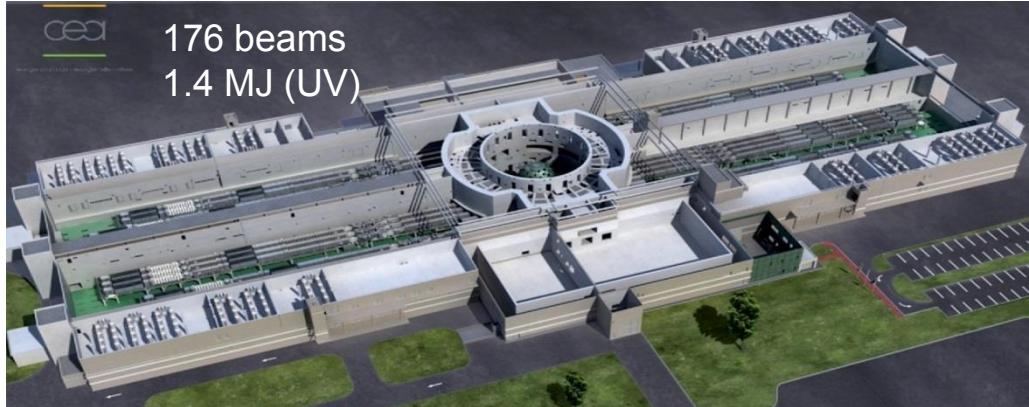


FRENCH MEGAJOULE LASER (LMJ)



DE LA RECHERCHE À L'INDUSTRIE



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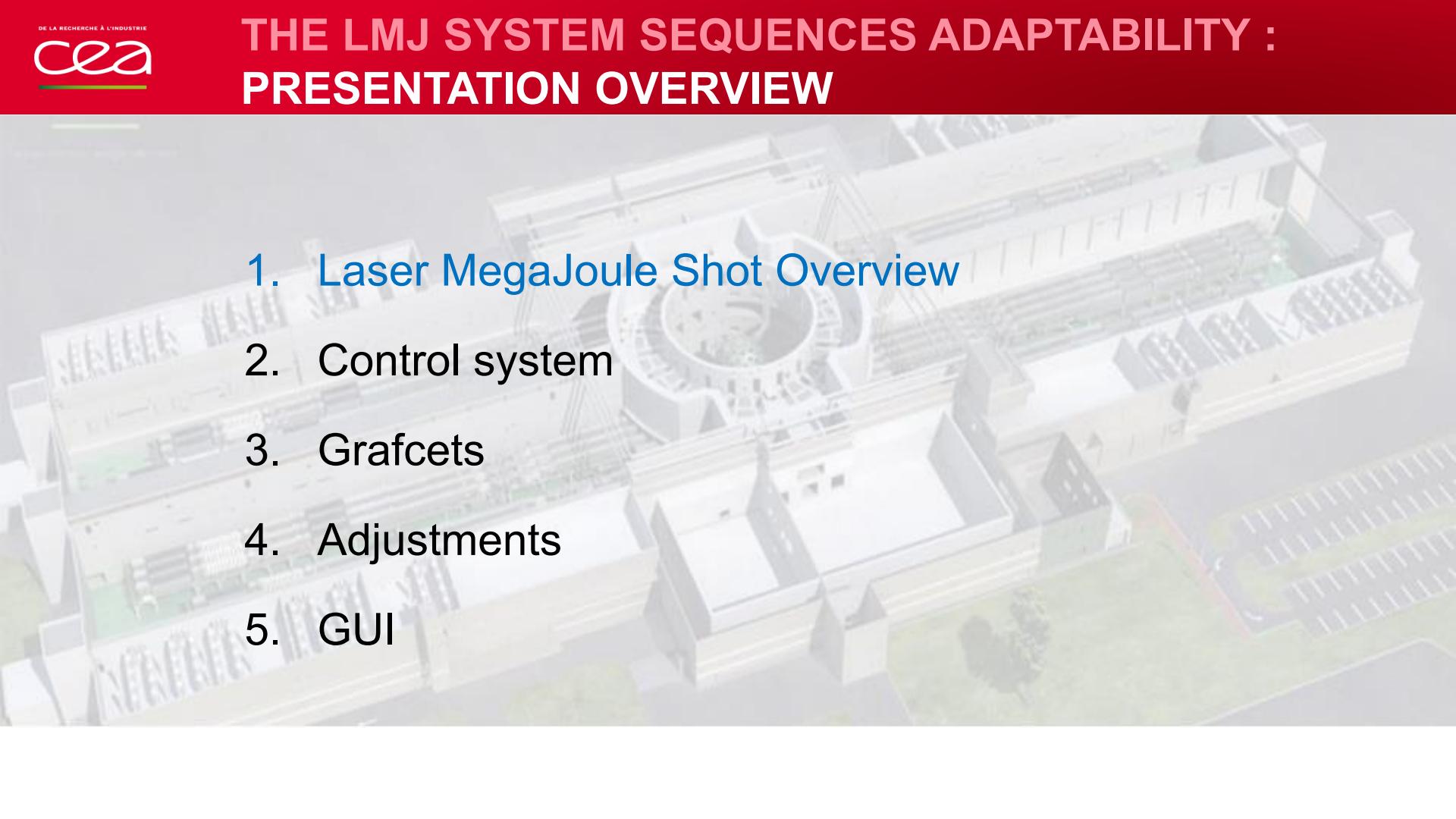
THE LMJ SYSTEM SEQUENCES ADAPTABILITY (FRENCH MEGAJOULE LASER)



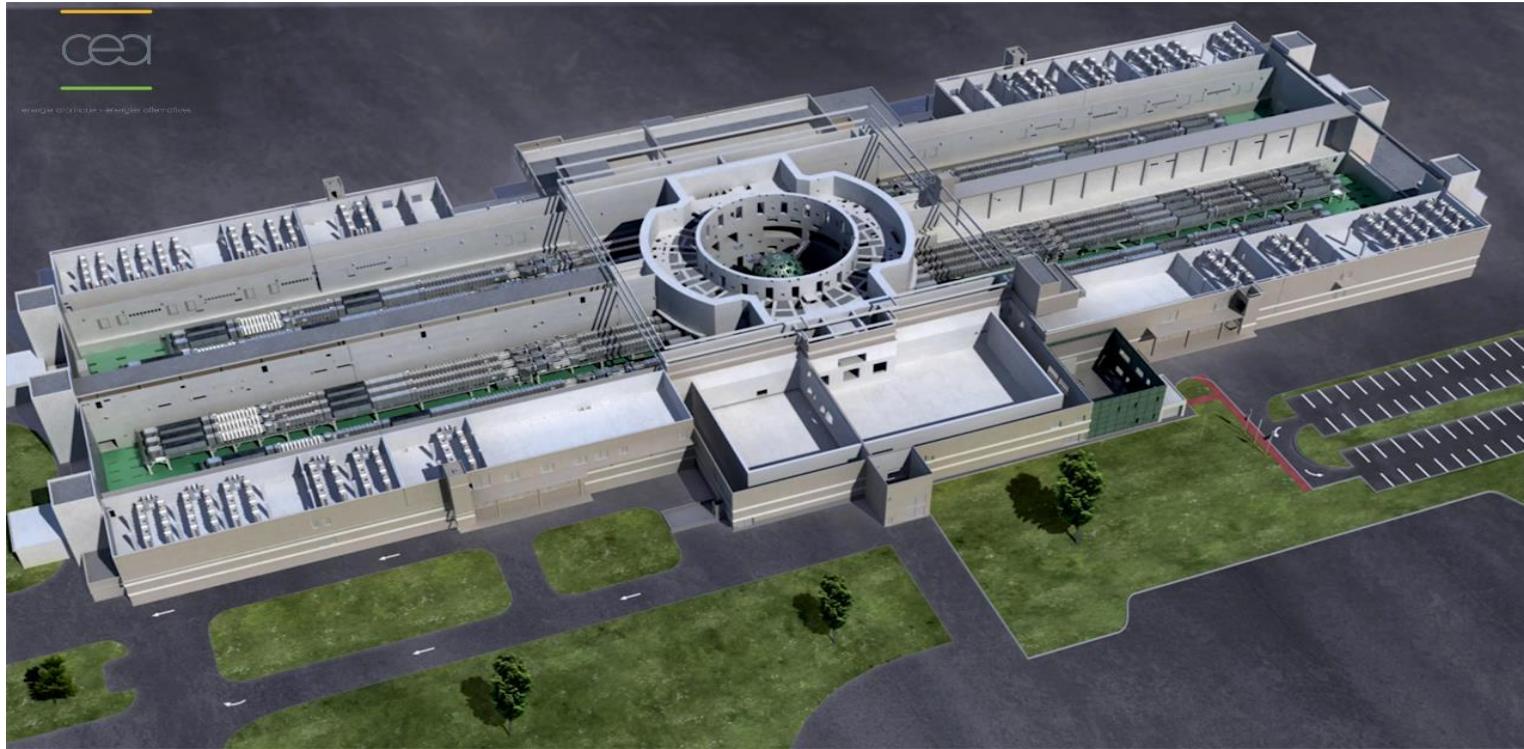
ICALEPCS 2015 | Yves TRANQUILLE-MARQUES

OCTOBER 20, 2015

THE LMJ SYSTEM SEQUENCES ADAPTABILITY : PRESENTATION OVERVIEW

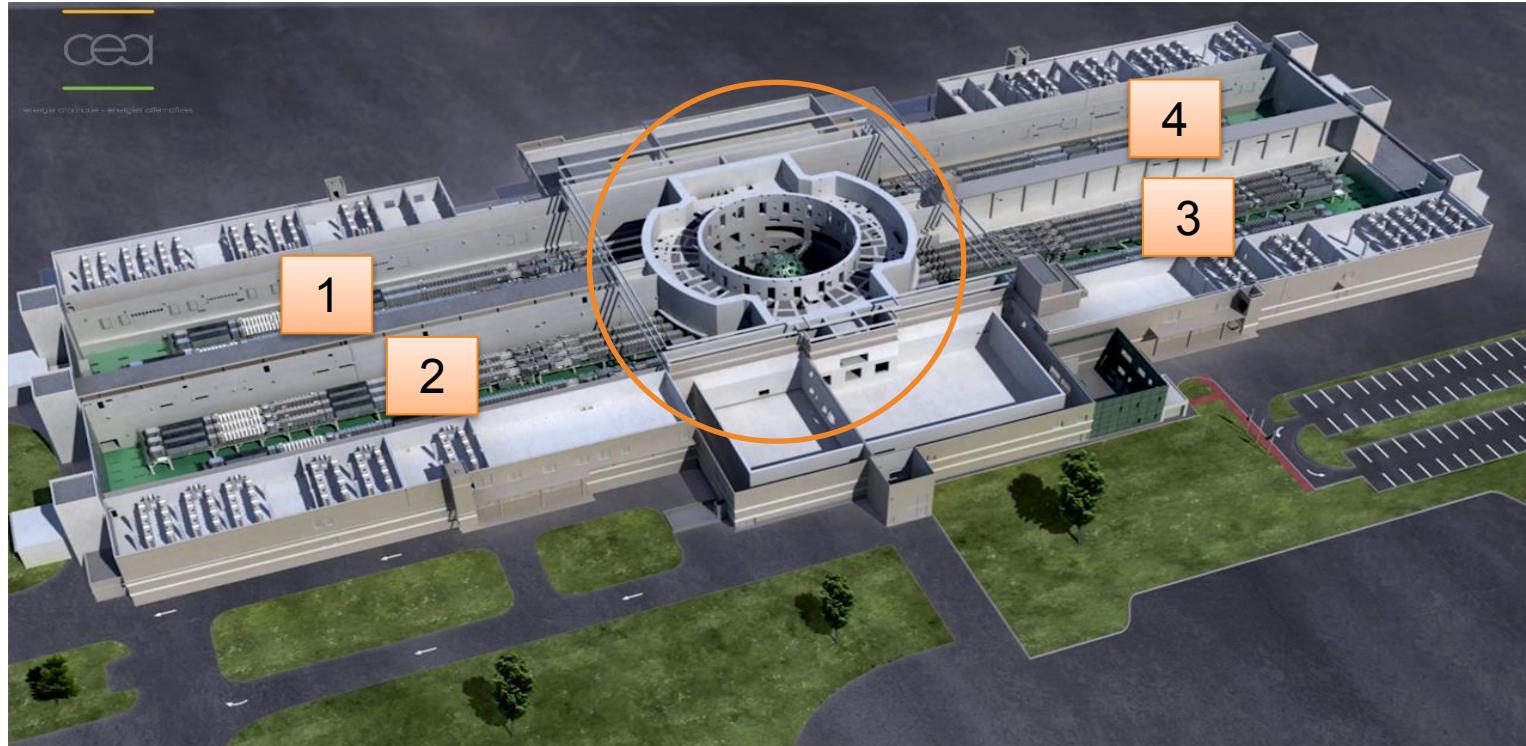
- 
1. Laser MegaJoule Shot Overview
 2. Control system
 3. Grafcats
 4. Adjustments
 5. GUI

THE LMJ SYSTEM SEQUENCES ADAPTABLEITY : SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



THE LMJ SYSTEM SEQUENCES ADAPTABILITY : SHOT OVERVIEW

CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



THE LMJ SYSTEM SEQUENCES ADAPTABILITY : SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

Shot :



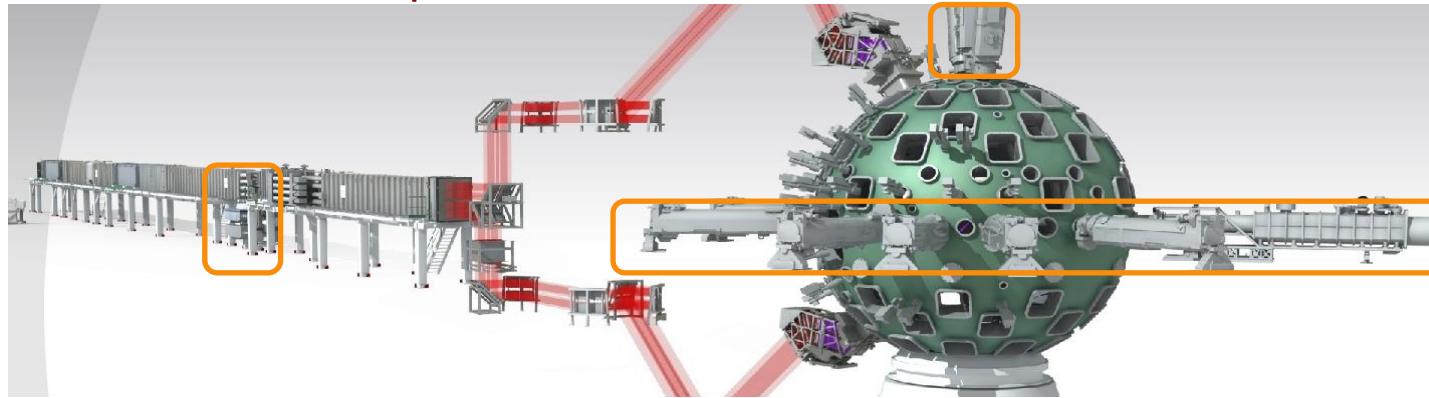
THE LMJ SYSTEM SEQUENCES ADAPTABILITY : SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

Facility Preparation

Timing shot 1s

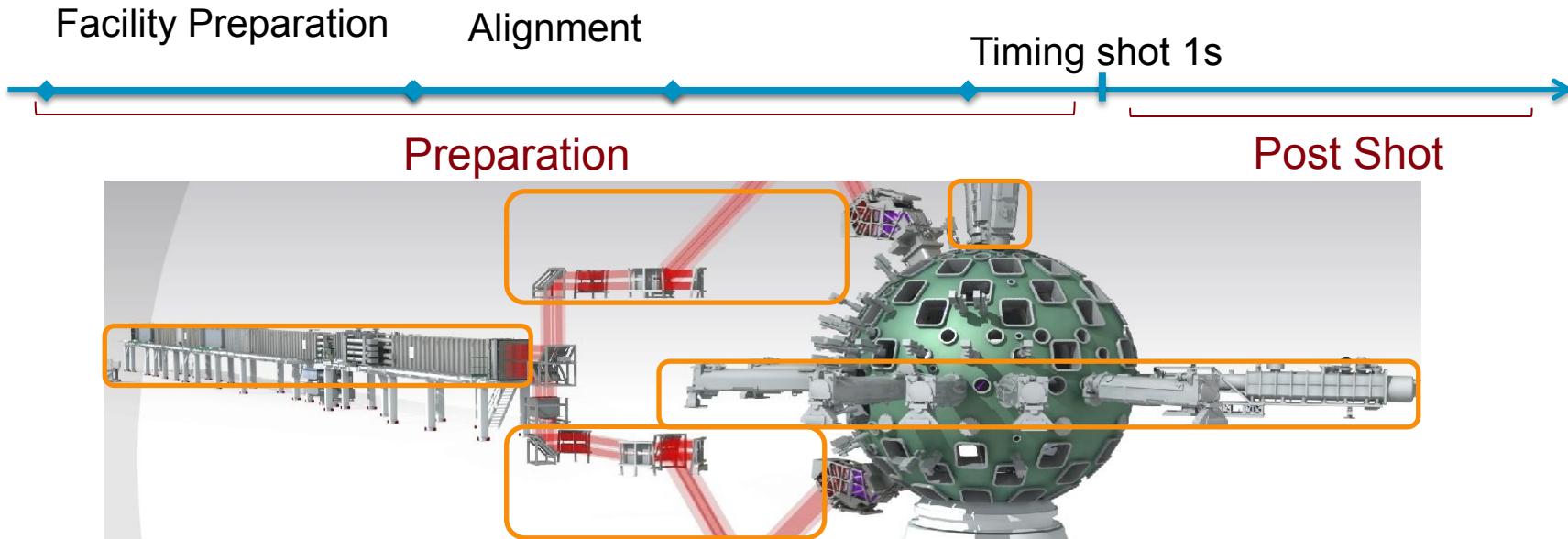
Preparation

Post Shot



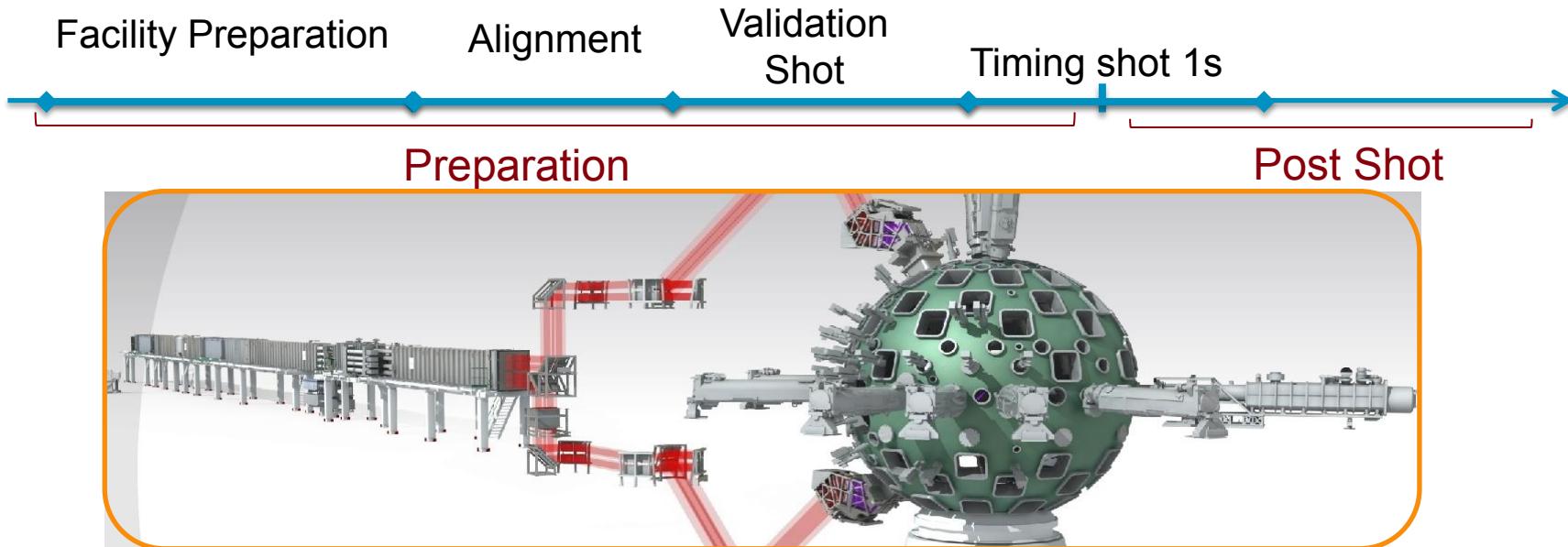
- PreAmplifier : high energy fitting
- Inserters movements
- Alignment Laser thermalization

THE LMJ SYSTEM SEQUENCES ADAPTABLE : SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



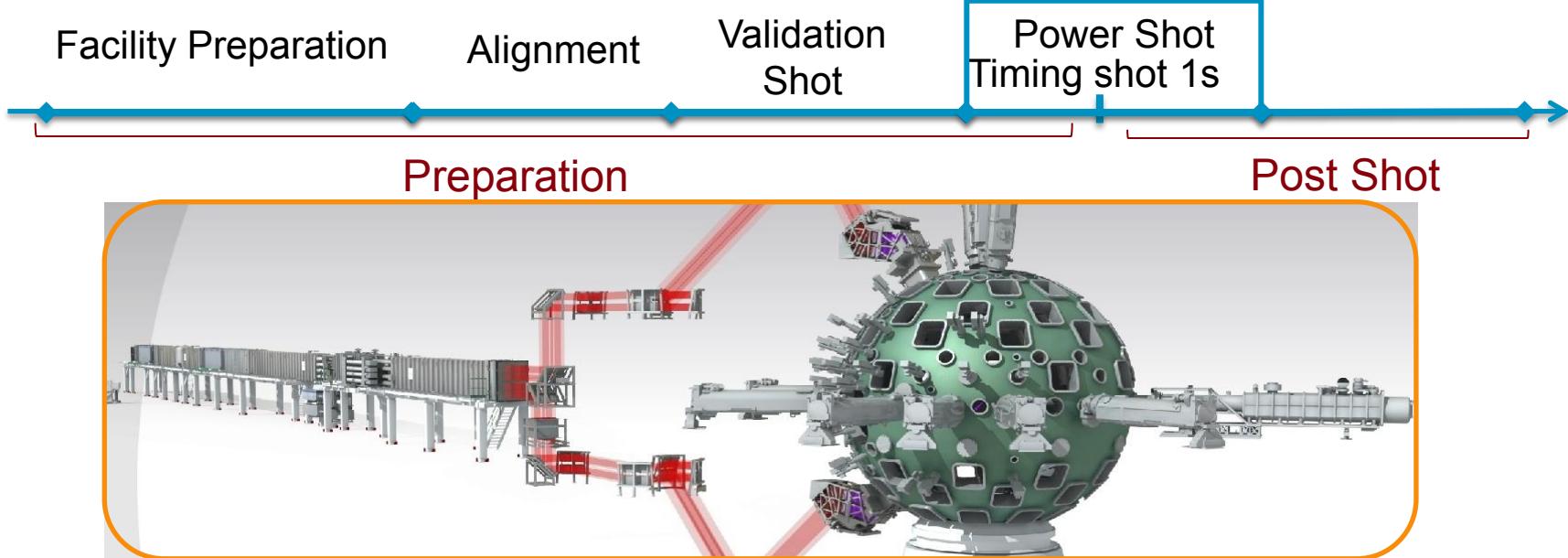
- Beams Alignment
- Target Alignment
- Plasma Diagnostics Alignment

THE LMJ SYSTEM SEQUENCES ADAPTABILITY : SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



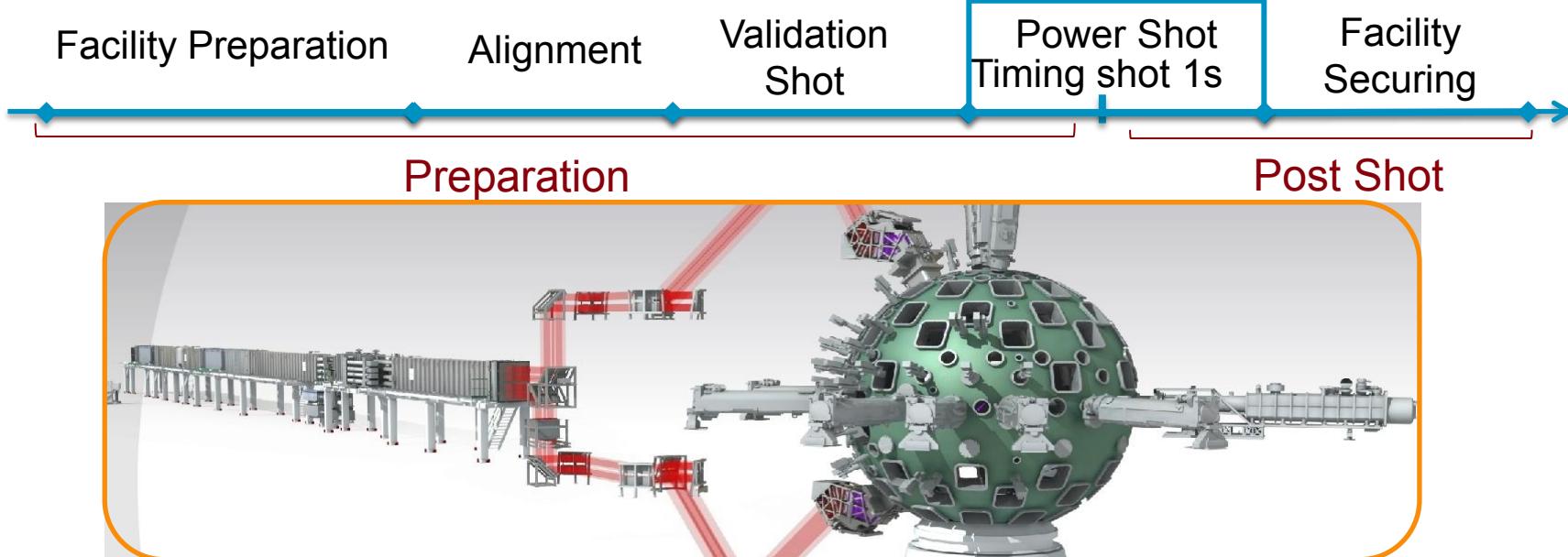
- Non amplified shot
- Equipment Configuration
- Camera Arming
- Timing validation
- Data storage

THE LMJ SYSTEM SEQUENCES ADAPTABLE : SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

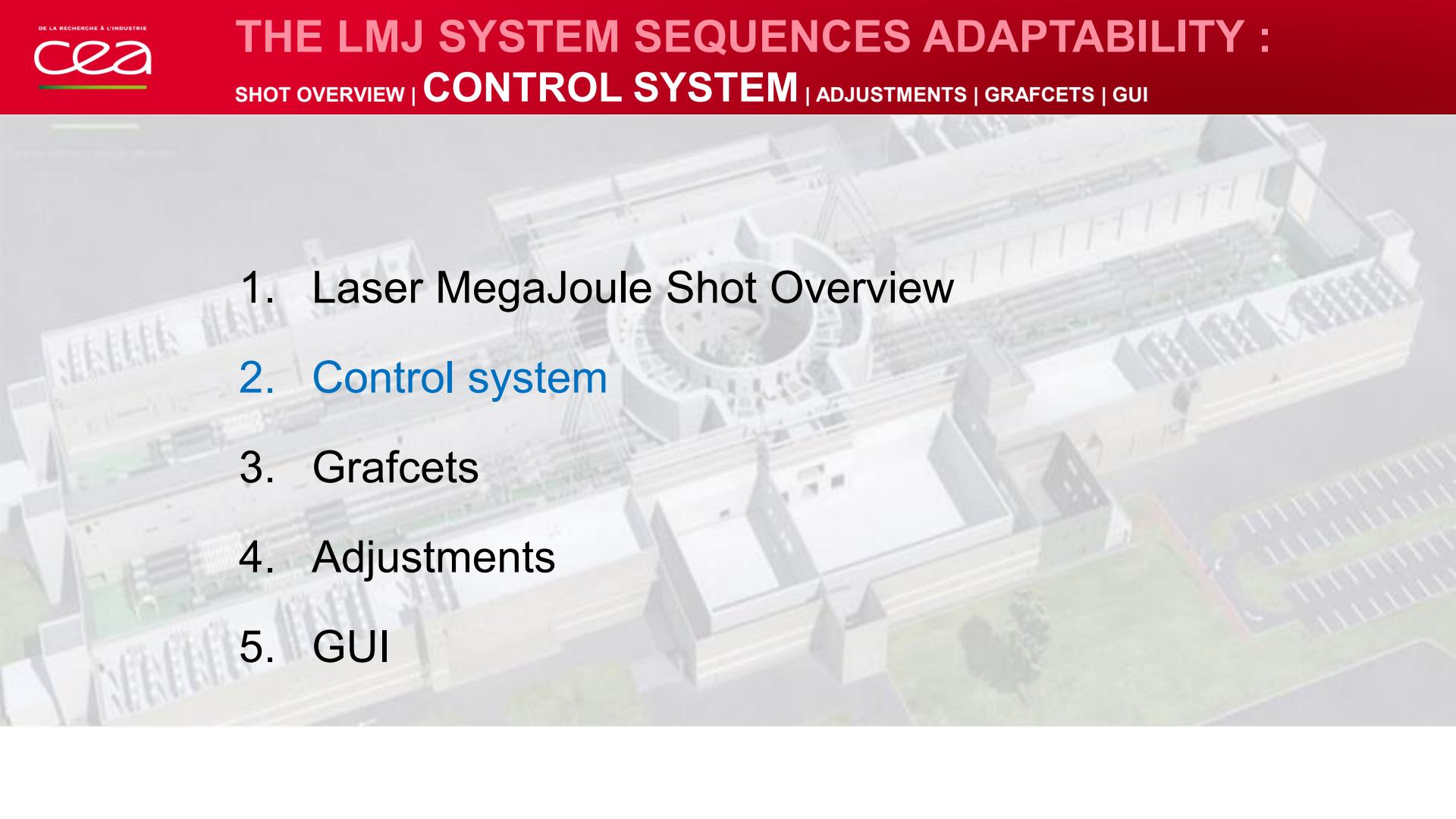


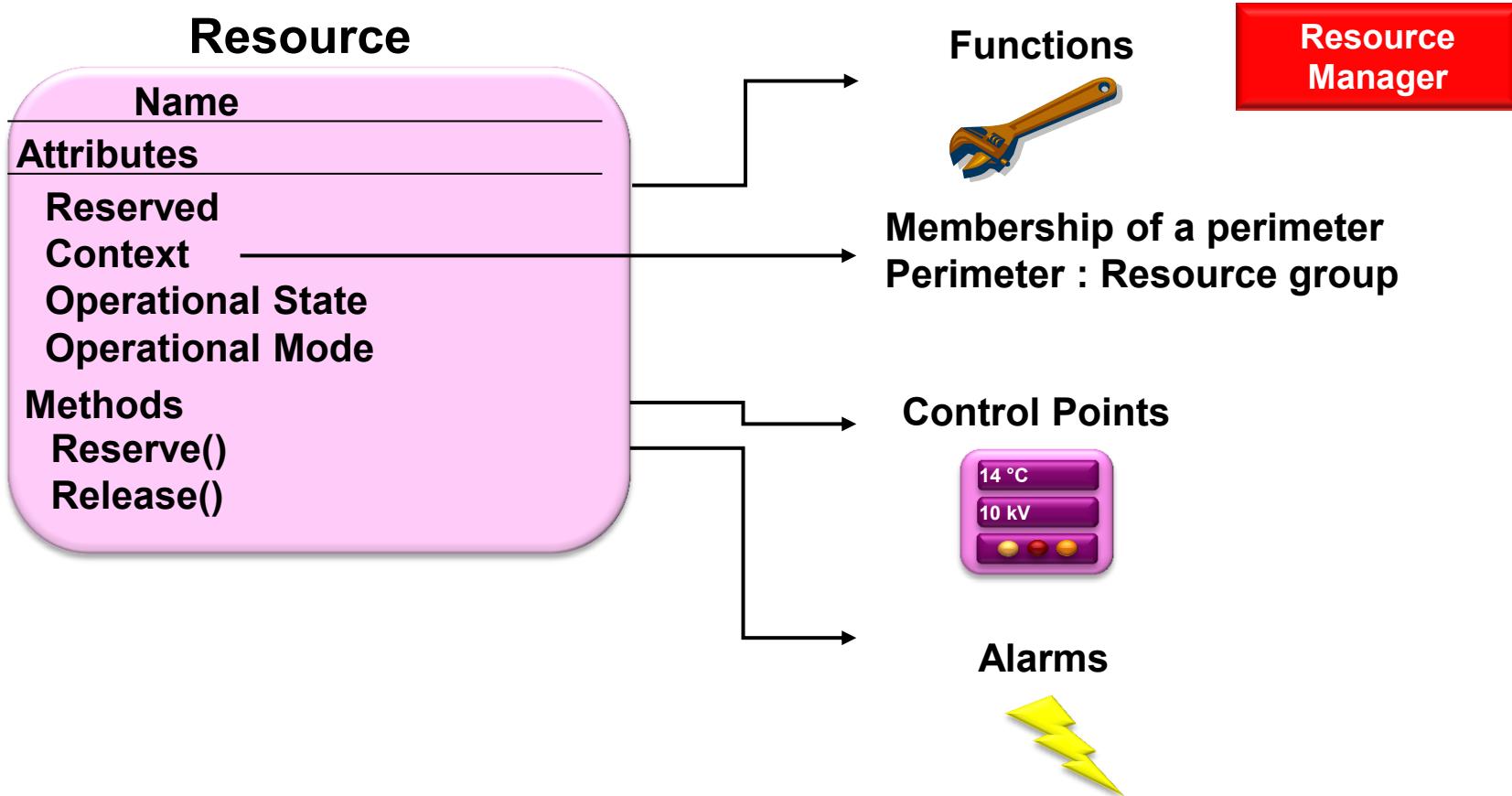
- Amplified shot
- Equipment Configuration
- Camera Arming
- Timing shot
- Data storage

THE LMJ SYSTEM SEQUENCES ADAPTABILITY : SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



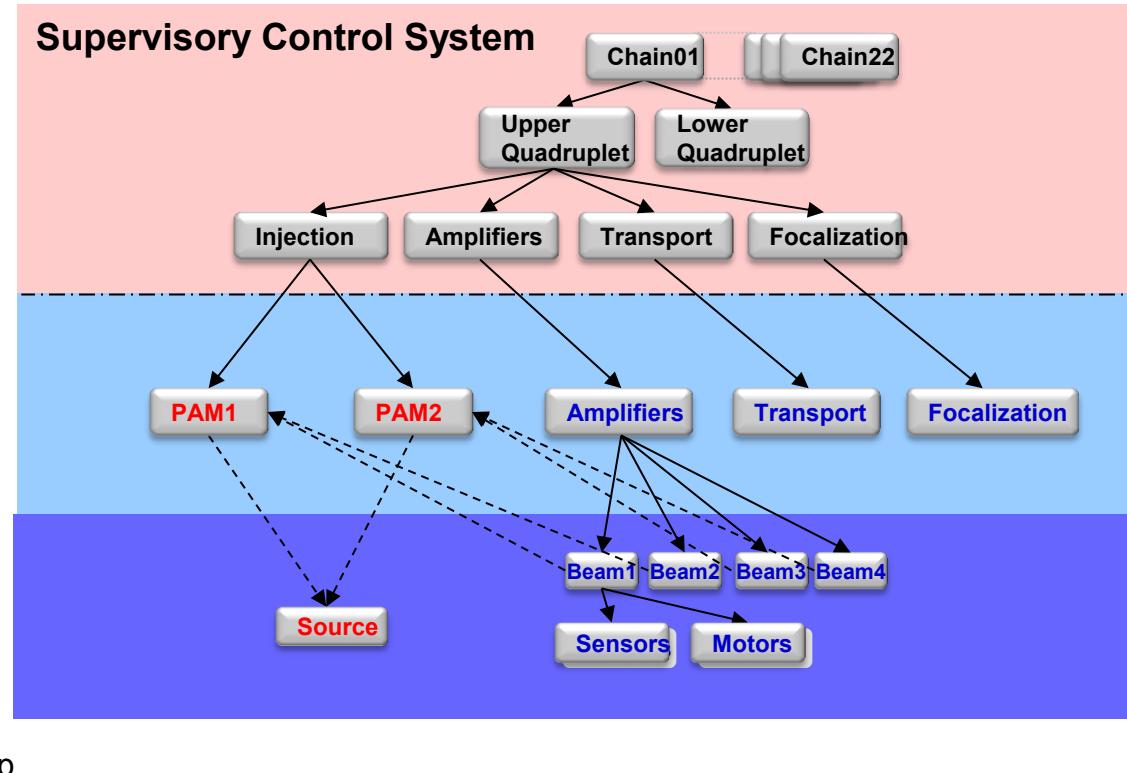
- Equipment Securing
- Power conditionning
- Lamp Test
- Data storage

- 
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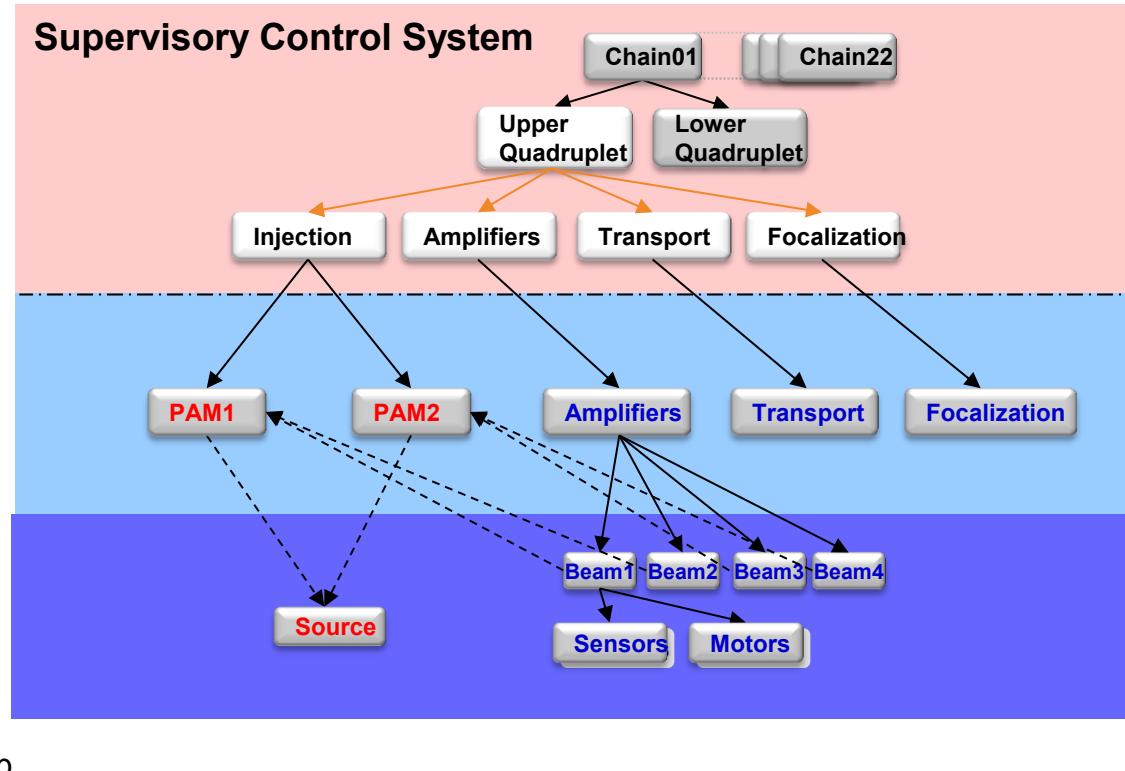
THE LMJ SYSTEM SEQUENCES ADAPTABLEITY :

SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



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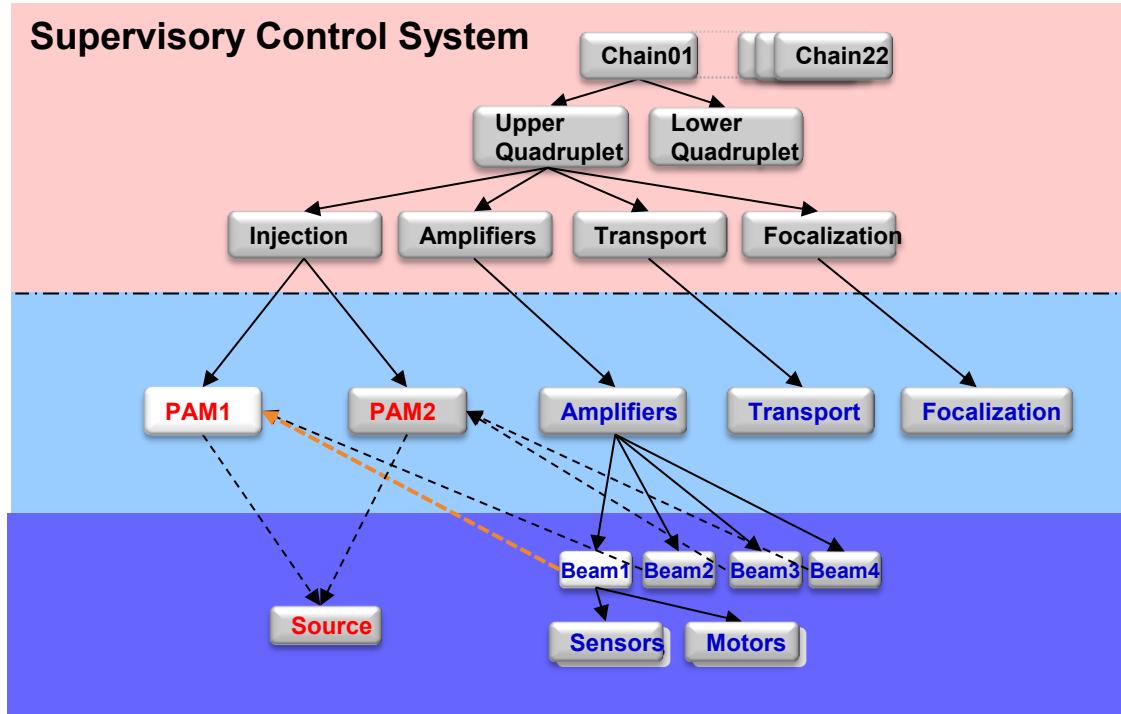
SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



THE LMJ SYSTEM SEQUENCES ADAPTABLEITY :

SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

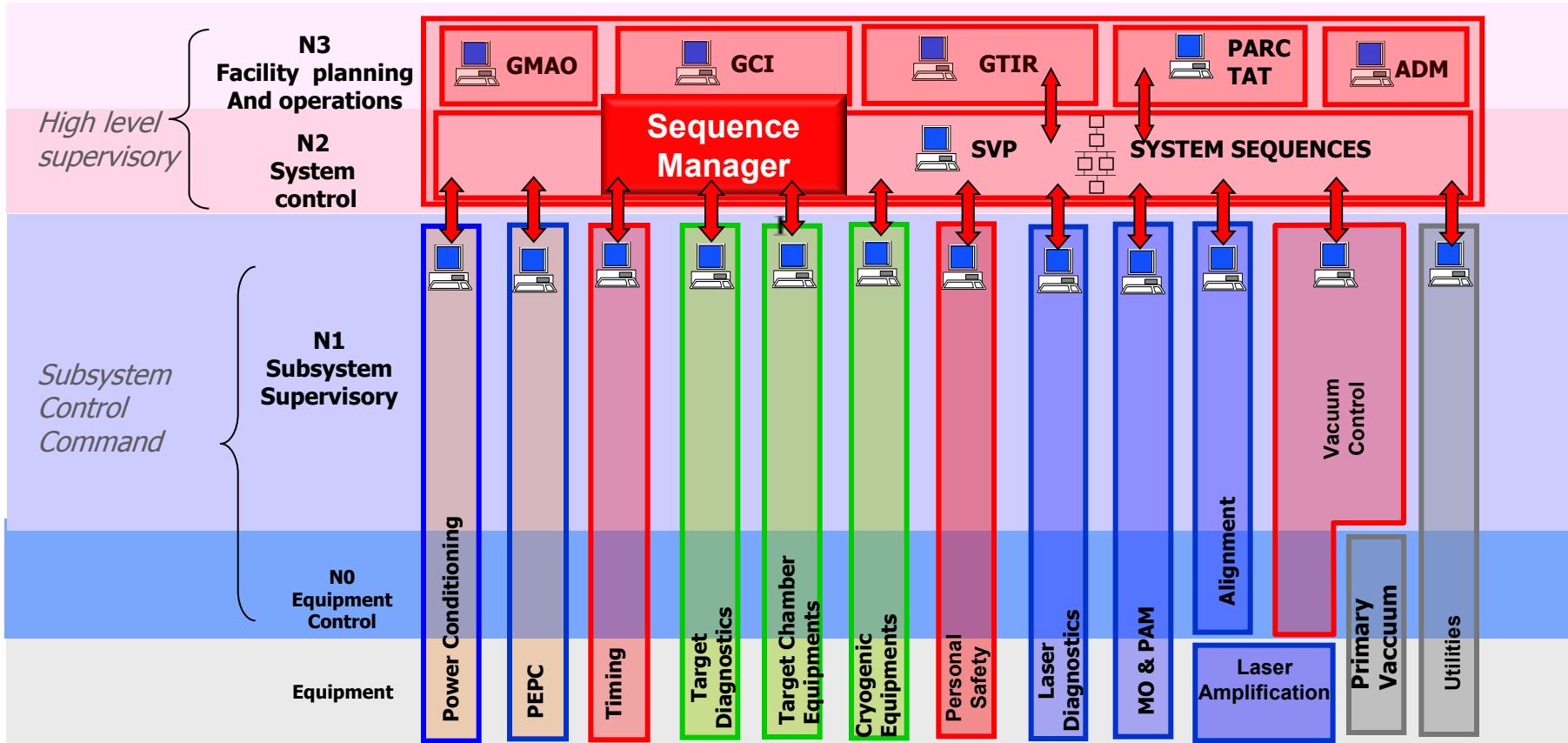
Configuration Manager



Resource
System view
Utilisation relationship

THE LMJ SYSTEM SEQUENCES ADAPTABLEITY :

SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

SHOT OVERVIEW | **CONTROL SYSTEM** | ADJUSTMENTS | GRAFCETS | GUI

Common Framework Tools

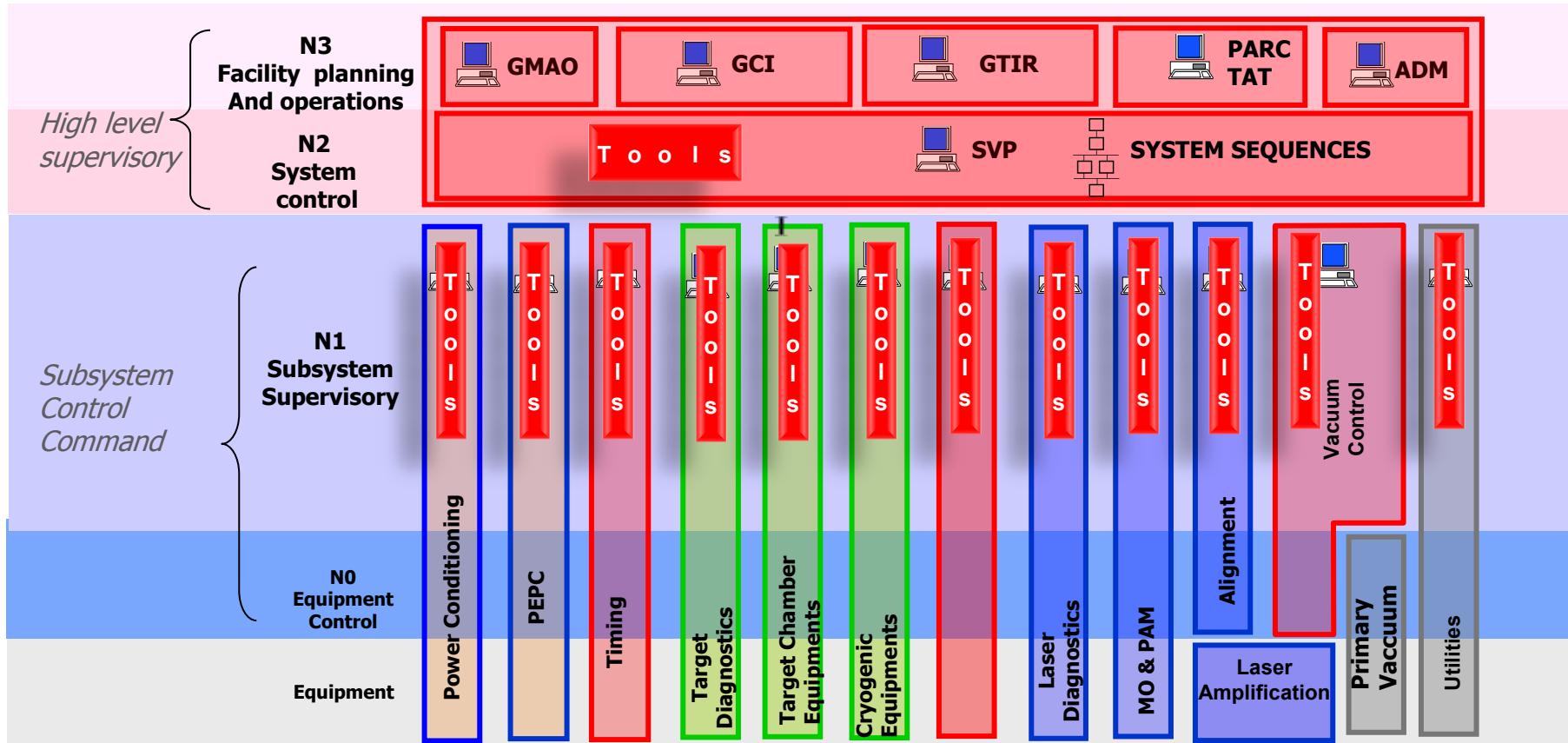
Configuration
Manager

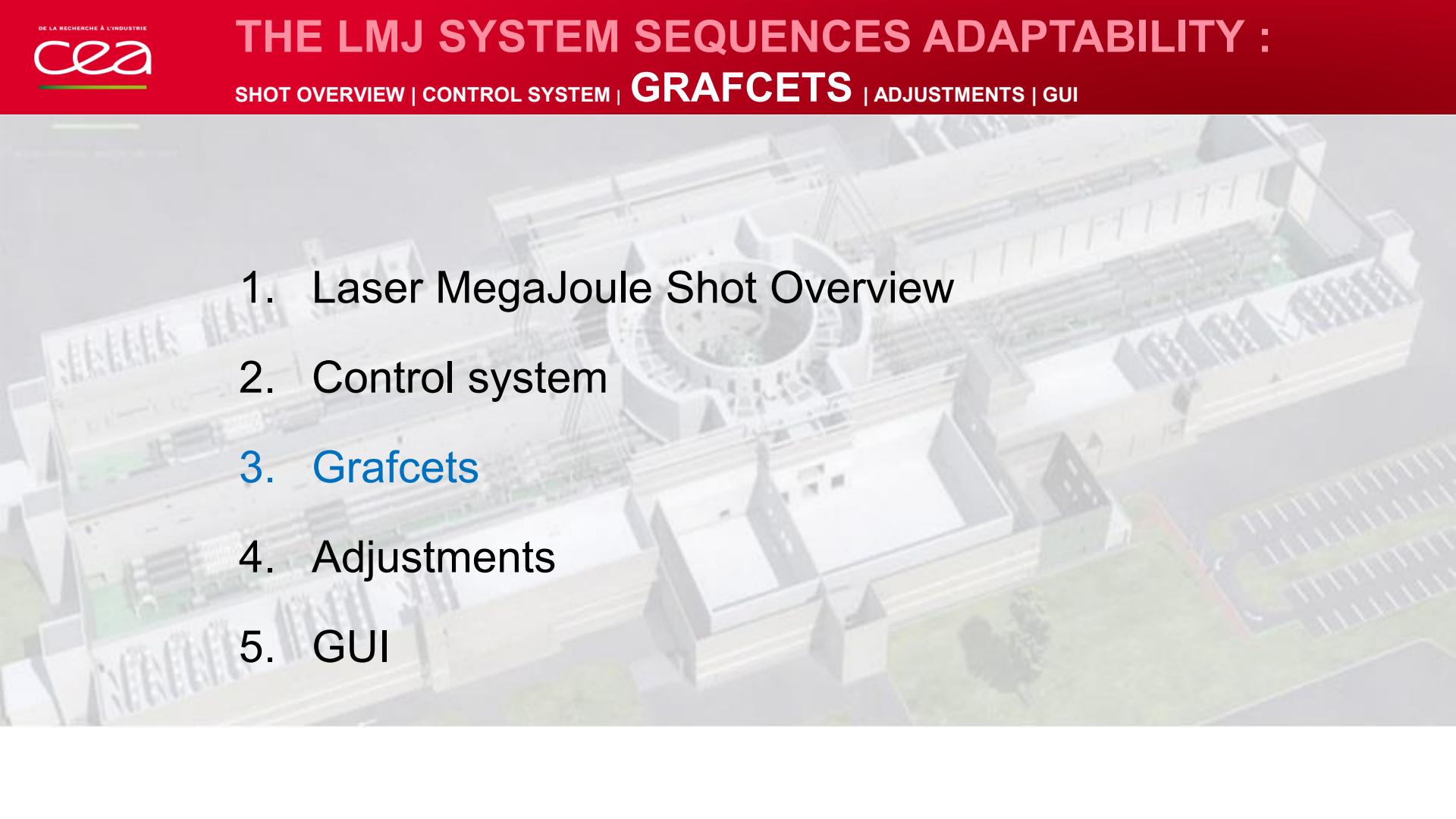
Resource
Manager

Sequence
Manager

THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI



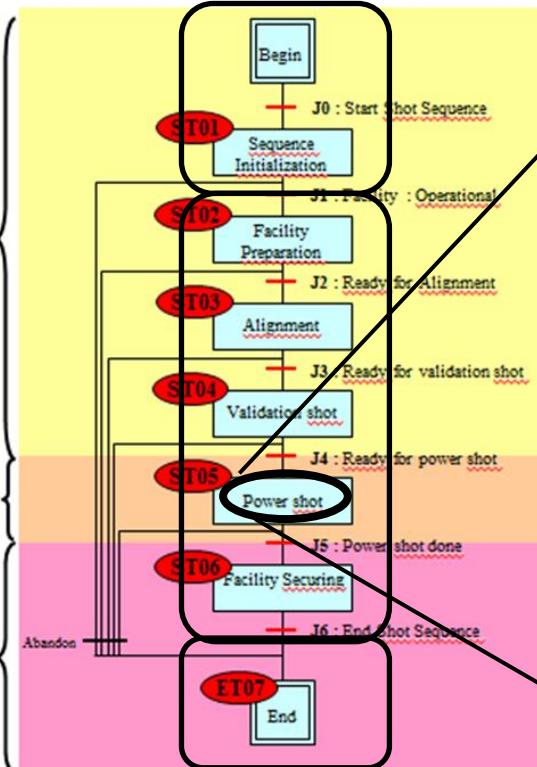
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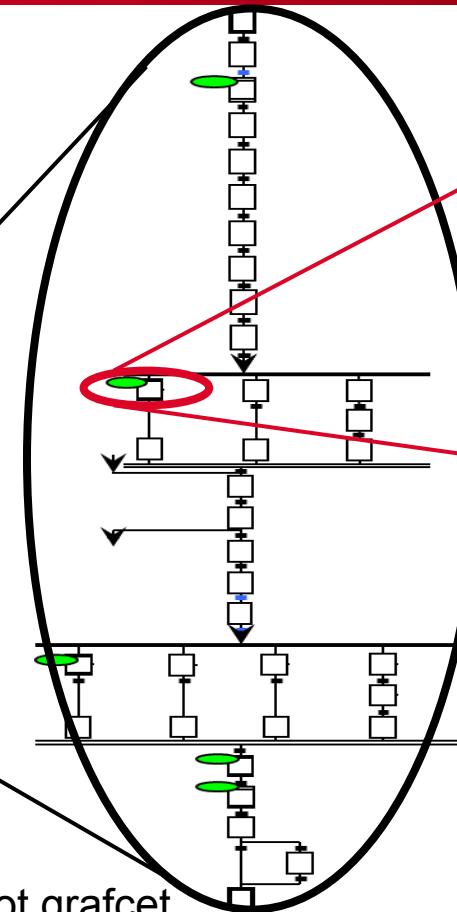
SHOT OVERVIEW | CONTROL SYSTEM | **GRAFCETS** | ADJUSTMENTS | GUI

Shot sequence main grafset

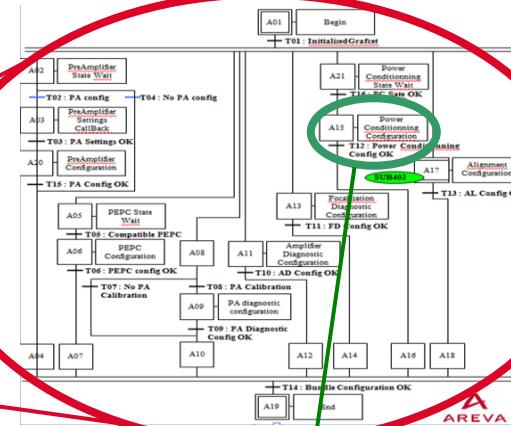
Preparation



Power shot grafset



Laser configuration grafset

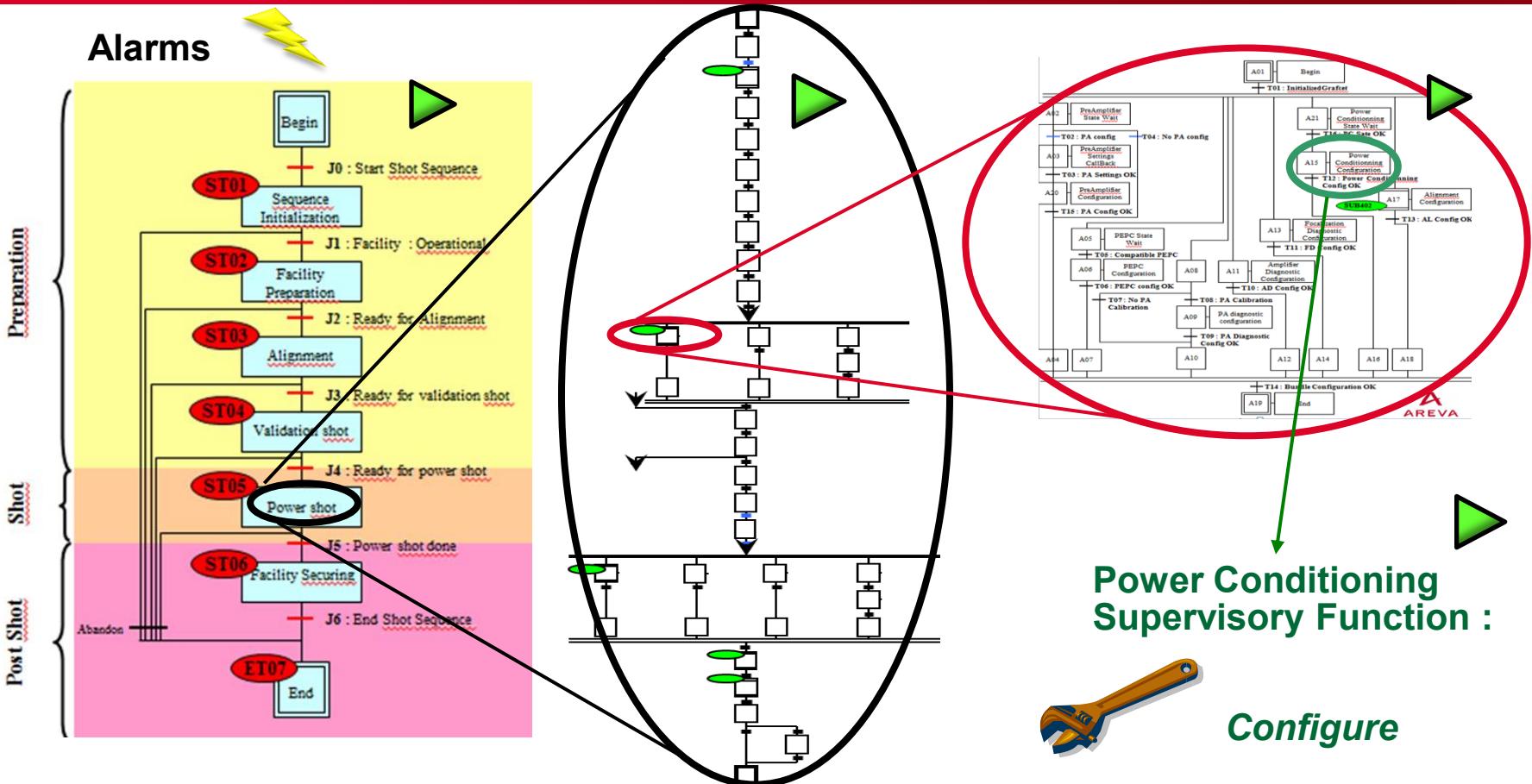


Power Conditioning Supervisory Function : Configure



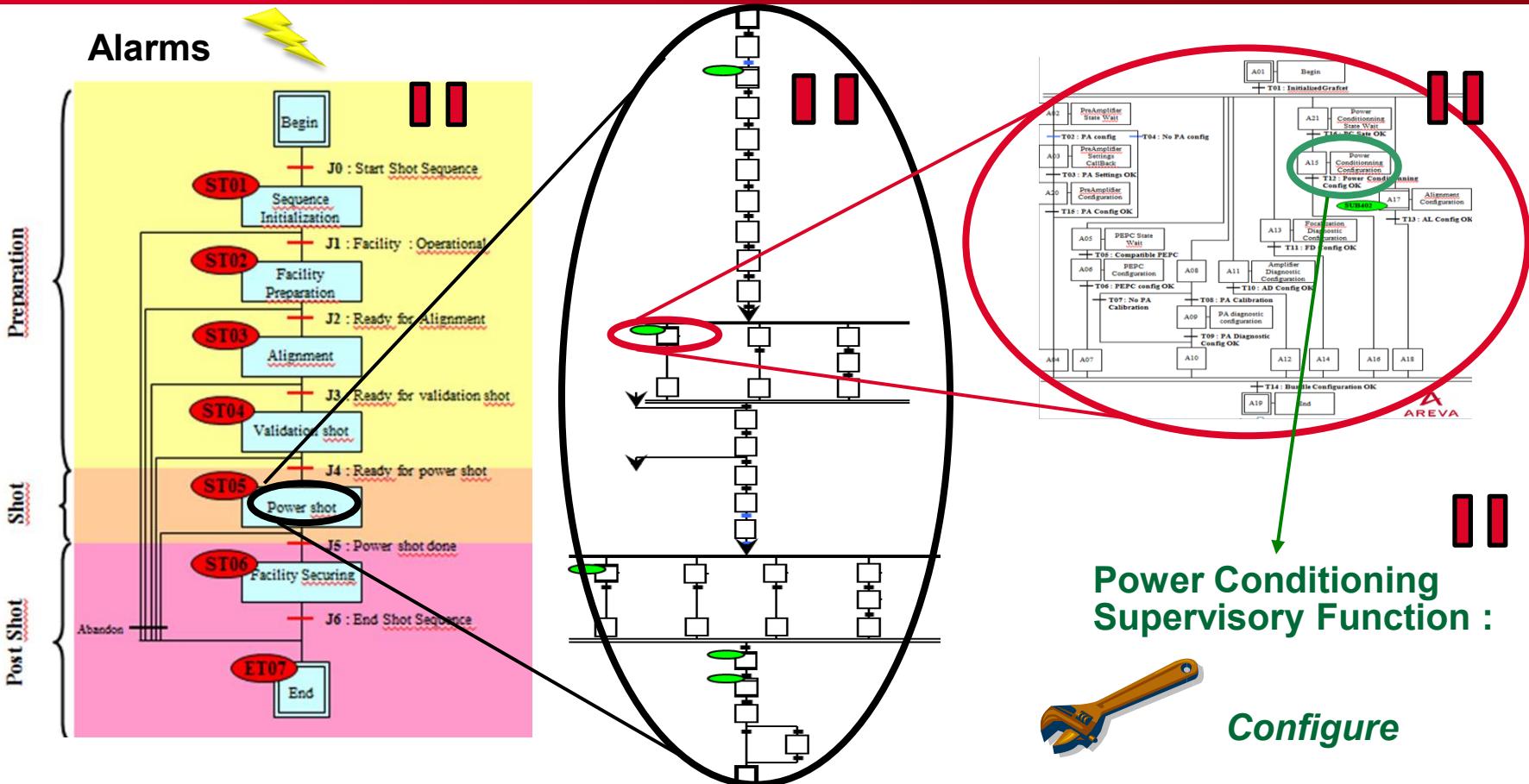
THE LMJ SYSTEM SEQUENCES ADAPTABLEITY :

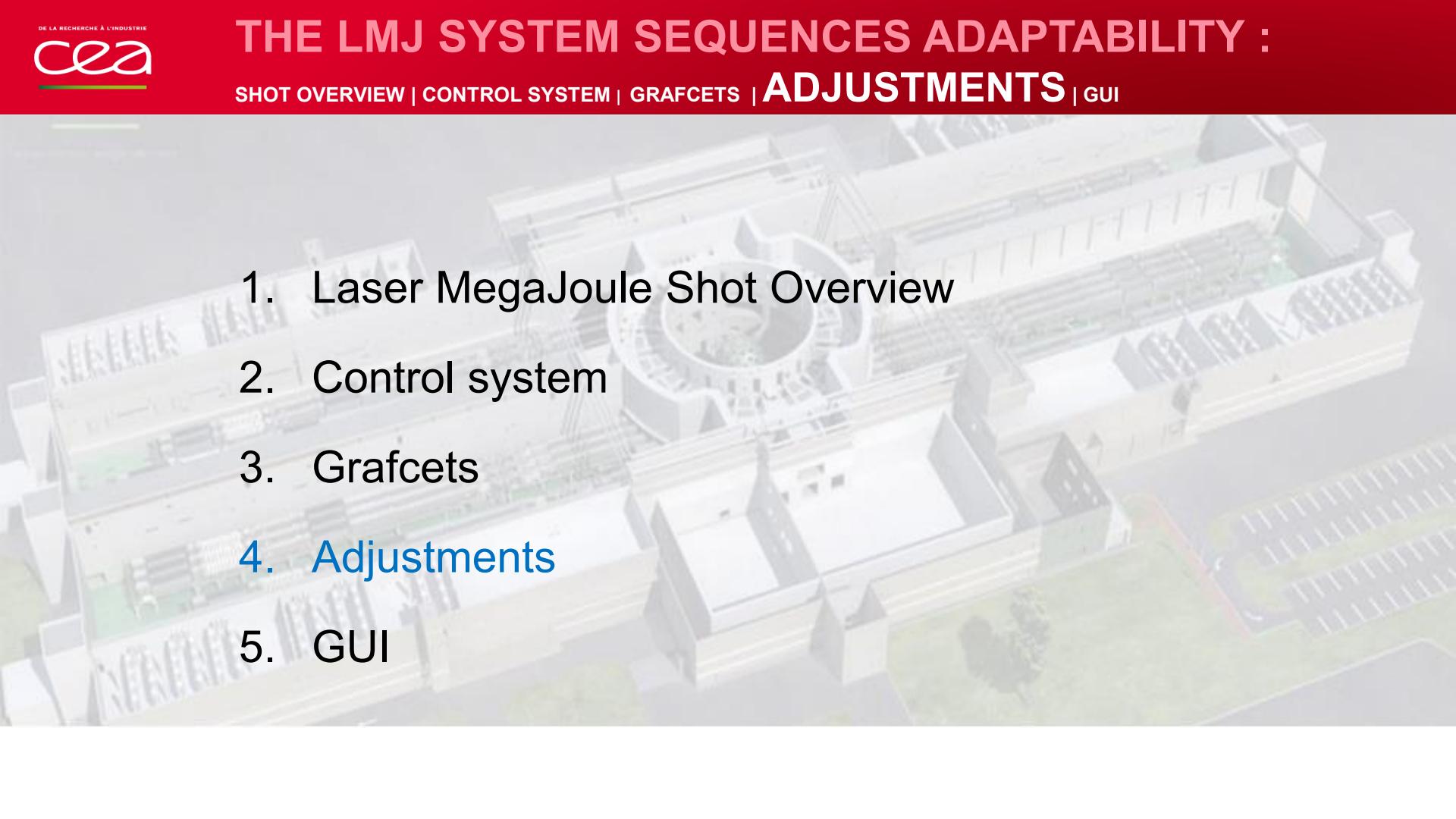
SHOT OVERVIEW | CONTROL SYSTEM | **GRAFCETS** | ADJUSTMENTS | GUI



THE LMJ SYSTEM SEQUENCES ADAPTABLEITY :

SHOT OVERVIEW | CONTROL SYSTEM | **GRAFCETS** | ADJUSTMENTS | GUI



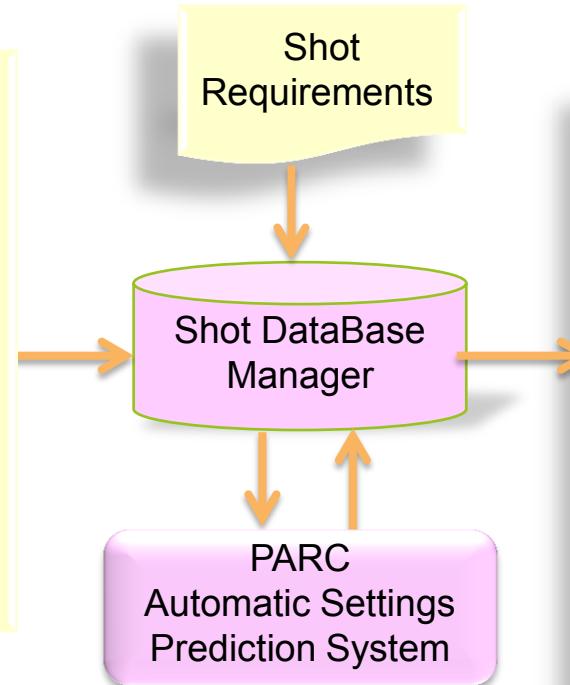
- 
1. Laser MegaJoule Shot Overview
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THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

SHOT OVERVIEW | CONTROL SYSTEM | GRAFCETS | **ADJUSTMENTS** | GUI

Shot Sequence model file

- ✓ Sequence program name
- ✓ Supervisories concerned by sequence
- ✓ Main resource class
- ✓ Excluded resource class
- ✓ Resource class priority
- ✓ Supervisory
 - ✓ Main step
 - ✓ Settings name : Function Class

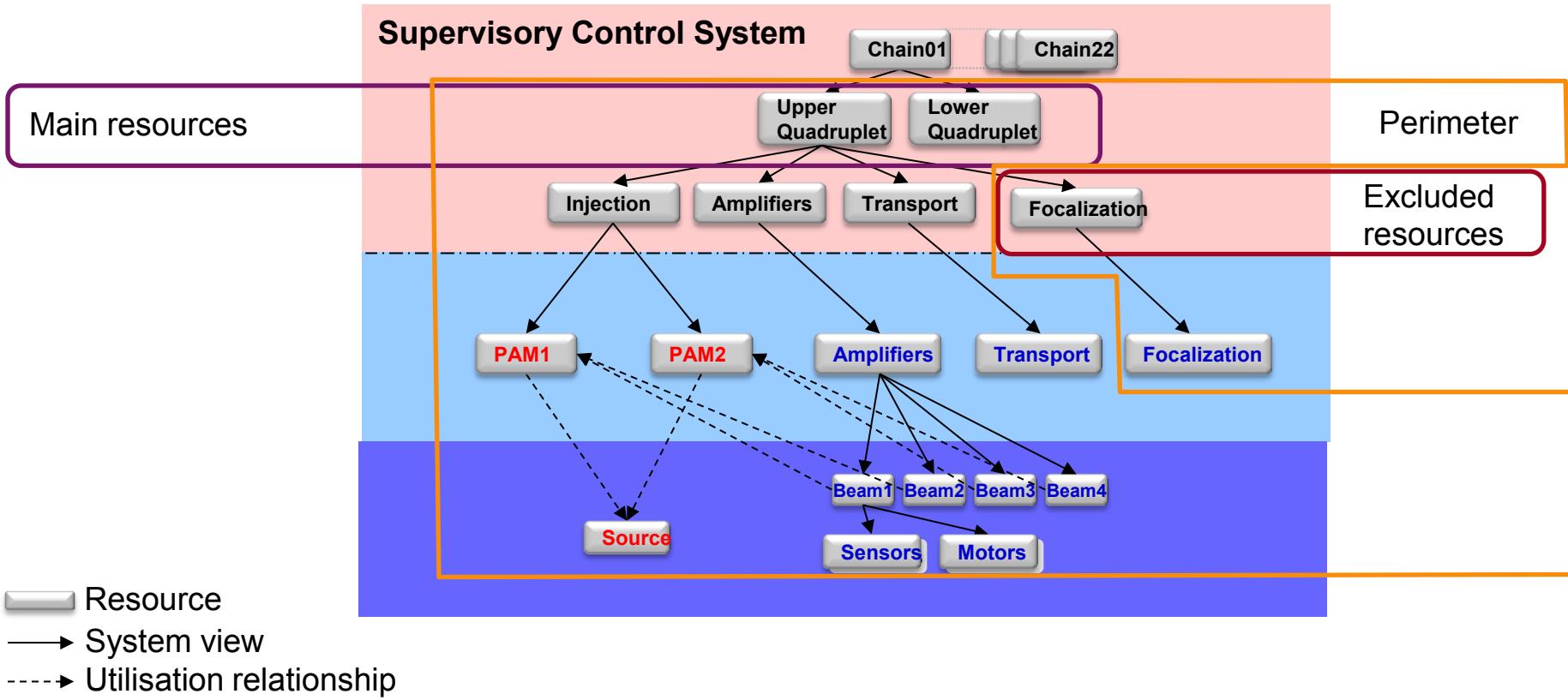


Adjustment file

- ✓ Sequence program name
- ✓ Supervisory
- ✓ Main resource
- ✓ Excluded resource
- ✓ Resource priority
- ✓ Supervisory
 - ✓ Main step
 - ✓ Settings value : Function

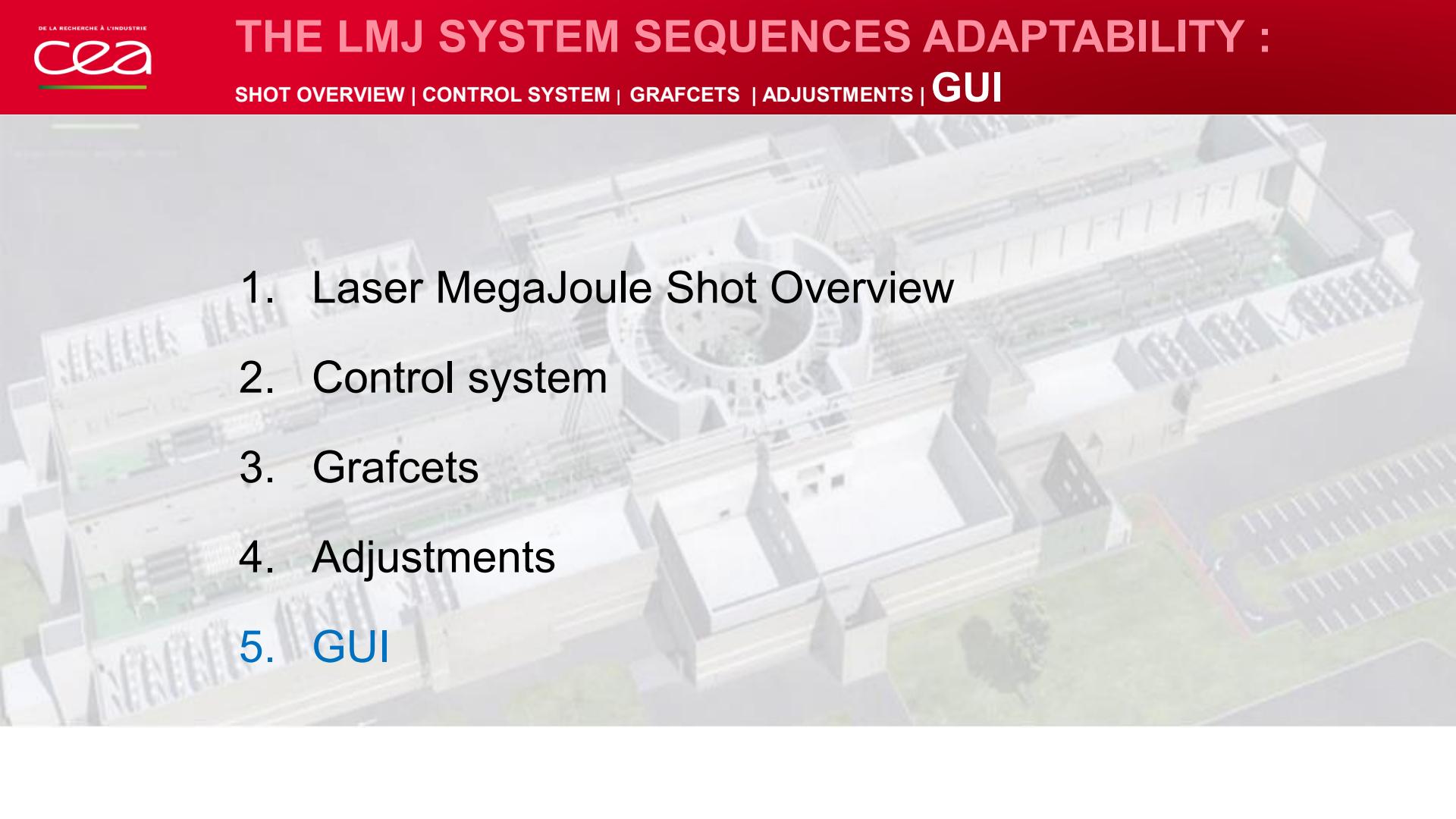
THE LMJ SYSTEM SEQUENCES ADAPTABLEITY :

SHOT OVERVIEW | CONTROL SYSTEM | GRAFCETS | **ADJUSTMENTS** | GUI



THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

[SHOT OVERVIEW](#) | [CONTROL SYSTEM](#) | [GRAFCETS](#) | [ADJUSTMENTS](#) | **GUI**

- 
1. Laser MegaJoule Shot Overview
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THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

SHOT OVERVIEW | CONTROL SYSTEM | GRAFCETS | ADJUSTMENTS | GUI

FDS : SQTB_RECETTEUSINE-LAU-20140910143218 SQTB : Séquence de Tir Puissance Centre-Chambre

Préparation Installation 25%

Début de la séquence Initialisation de la séquence Préparation de l'installation Réglage Tir de validation Tir de puissance Finalisation Séquence Fin

Synthèse de l'étape : Préparation Installation

Sous-séquences de l'étape

Init	Configuration	Résultats
Configuration Chaîne Laser	Configurations des Trombones Optiques	OK
	Retrait REA	OK
	Regler le Pilote	OK
	Mise En Attente Thermalisée	OK
Retrait REC	Reculer SCF	
	Retirer REC	
	Positionner SCF	
	Positionner Point Focal SCF	OK
Configuration Hall d'Expérience	Charger réglages DP pour SID	OK
	IHM Retrait DPMS et Téléc. DP sur SID	OK
	Retrait SID non utilisé	OK
	Insérer SID	
	IHM Demande Insertion DPMS utilisés	
	Remplacer PONC par PR	OK
	IHM Déploiement des télescopes DP utilisés	
	Attente fin relaxation inserteurs	
	Positionner RC	
	Déplacer RC dans RTR	
	Déplacer SID dans RTR	
	IHM Demande de mesure Flèche	

Détails de la séquence

Synthèse HE

SOPAC

SID1 ◊ RP
RC
PR
PCNC

Diagramme montrant les positions des télescopes DP (SID) et les étapes d'insertion correspondantes.

SID	Etape	Statut	Progression (%)
1	Sid02	Inserer	en cours 10%
2	Sid03	Inserer	en cours 10%
3	Sid04		
4	Sid05		
5	Sid06	Inserer	en cours 10%
6	Sid07	Inserer	en cours 10%
7	Sid08	Inserer	en cours 10%
8	Sid09	Inserer	en cours 10%
9	Sid10		
10	Sid11		
11	Sid12		
12	Sid13		
13	Sid14		
14	Sid15		
15	Sid16		

ACTIONS

Gestion Frontal DP

Vérification de l'insertion des DPMS utilisés par la séquence

Poursuite

Abandonner

Rapport d'erreurs

Heure	Acquit	Nom Etape Élémentaire	Compte Rendu	Fonction PCN	Code d'erreur	Information

THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

SHOT OVERVIEW | CONTROL SYSTEM | GRAFCETS | ADJUSTMENTS | GUI

FDS : SQTB_RECETTEUSINE-LAU-20140910143218 SQTB : Séquence de Tir Puissance Centre-Chambre

Préparation Installation 25%

Début de la séquence Initialisation de la séquence Préparation de l'installation Réglage Tir de validation Tir de puissance Finalisation Séquence Fin

Synthèse de l'étape : Préparation Installation

- SSD retirés
- 64 %

Sous-séquences de l'étape

- Init
- Configuration
- Résultats

Détails de la séquence

Synthèse HE

SOPAC

SID1 RP

Actions

Gestion Frontal DP

Vérification de l'insertion des

Retrait REC

- Reculer SCF
- Retirer REC
- Positionner SCF
- Positionner Point Focal SCF

Configuration Hall d'Expérience

- Charger réglages DP pour SID
- IHM Retrait DPM5 et Télésc. DP pour SID
- Retirer SID non utilisés
- Inserer SID
- IHM Demande insertion DPM5 utilisés
- Remplacer PCNC par PR
- IHM Déploiement des télescopes DP utilisés
- Attente fin relaxation inserteurs
- Positionner RC
- Déplacer RC dans RTR
- Déplacer SID dans RTR
- IHM Demande de mesure Flèche

Sid01

2	Inserer
3	Inserer
4	
5	
6	Inserer
7	Inserer
8	Inserer
9	Inserer
10	
11	
12	
13	
14	

Sid02

Sid03

Sid04

Sid05

Sid06

Sid07

Sid08

Sid09

Sid10

Sid11

Sid12

Sid13

Sid14

Panorama

THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

SHOT OVERVIEW | CONTROL SYSTEM | GRAFCETS | ADJUSTMENTS | GUI | **SUMMARY**

- Grafcet successful executions : 100th achieved power shots
- Adjustment File : Easiness to drive new bundles.
- GUI synthesis philosophy applies in 8 beams or 176 beams bundles.
- System sequences are ready for the coming LMJ beams integration.