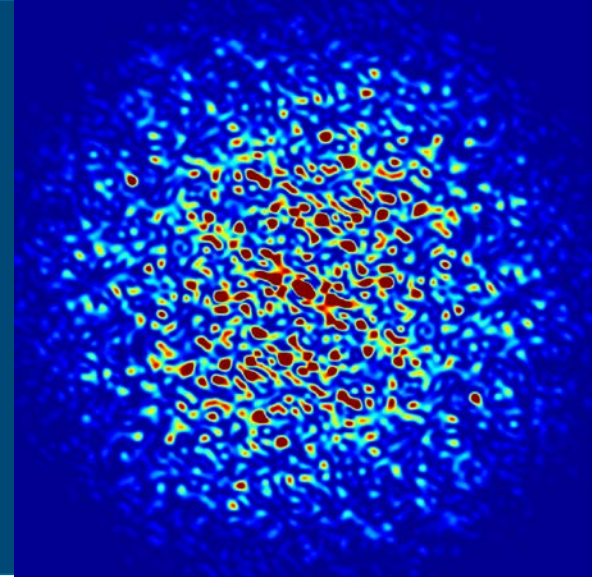


Space and Installation Planning



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Installation Coordinator
APS Upgrade

December 14, 2017

Background



**EUROPEAN
SPALLATION
SOURCE**

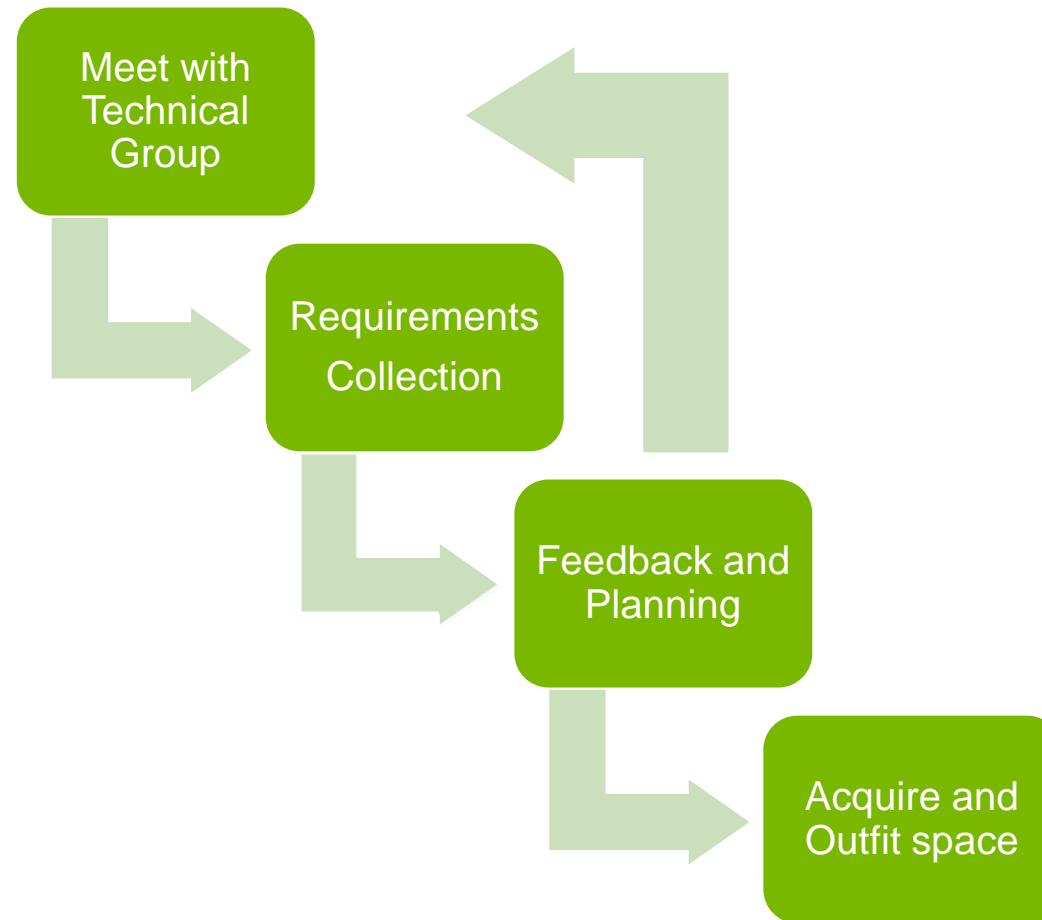


**Canadian
Light
Source**

**Centre canadien
de rayonnement
synchrotron**

SPACE REQUIREMENTS

Space Planning Requirements Collection



Pre-Installation Activities

- Assembly and Test Space for:
 - Magnet Measurement & Characterization
 - Diagnostics Equipment
 - Vacuum Component
 - Power Supplies
 - Controls
 - Plinths
 - Front Ends
 - Insertion Devices
 - Beamlines


Extends into the Removal
and Installation Phase



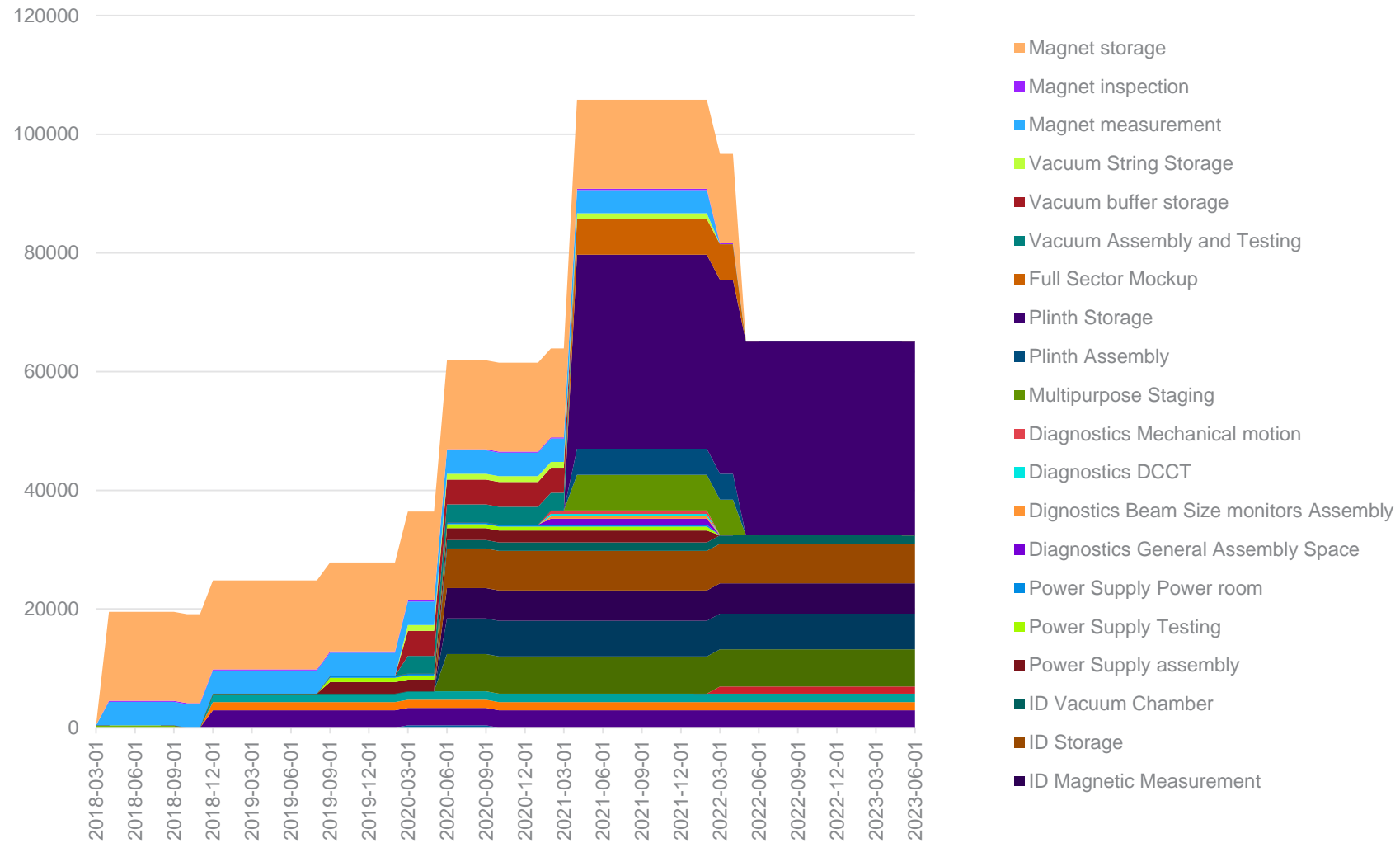
Pre-Installation Activities

- Storage Space for:
 - Magnets
 - Vacuum
 - Assembled Plinths
 - Power Supplies
 - Front End Assemblies
 - Insertion Devices
 - Installation tools and supplies
 - Beamlines?

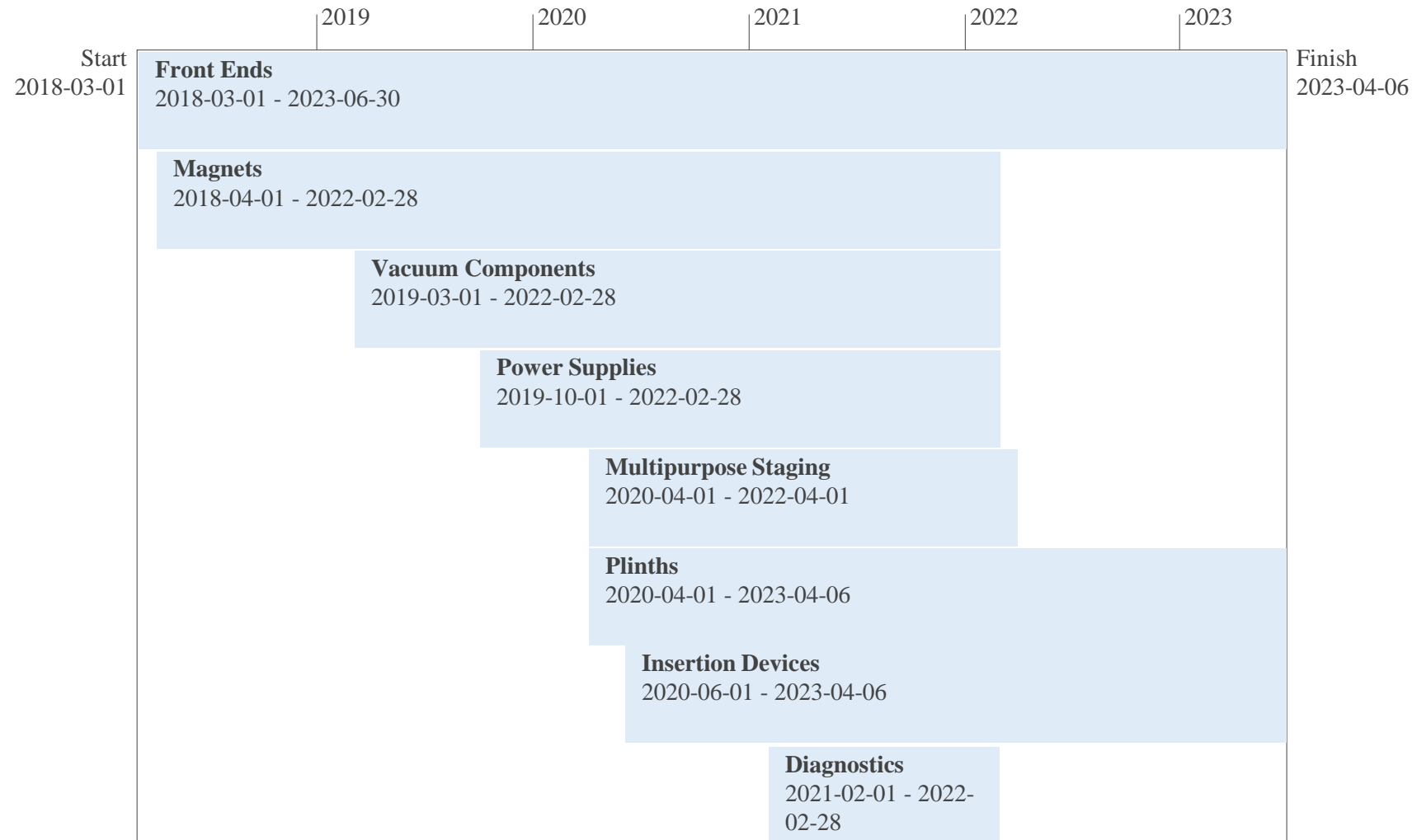
Transient storage through
plinth assembly

A diagram consisting of a light green rectangular box on the right containing the text "Transient storage through plinth assembly". Two horizontal arrows point from the left side of this box to the words "Magnets" and "Vacuum" in the list above. The arrows are light green and have small arrowheads pointing left.

APS Upgrade Space Requirements



Space Timeline



Actions

- Work with ANL Infrastructure Services to identify candidates
- Get concurrence with Technical Groups on site selection
- Modify and adapt selected areas for APS-U needs

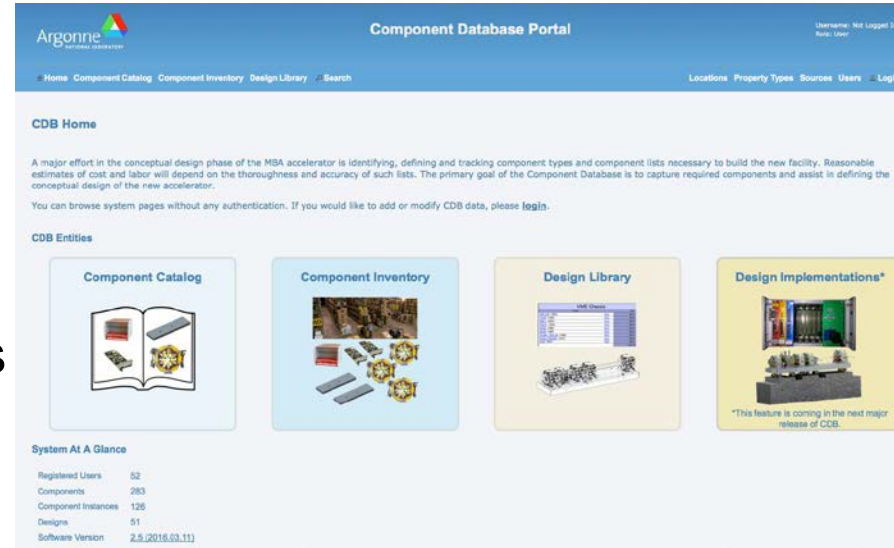
REMOVAL AND INSTALLATION PLANNING

Component Database

- Developed by Controls
 - Library of standard components
 - Create “instances” of actual components
 - Create “Assemblies” of instances into larger structures (FODO, DLM, etc.)
 - Utilizing QR codes for easy access to database information



APS-U / CDB
000 000 013



The screenshot shows the 'Component Database Portal' website. The header includes the Argonne logo and navigation links: Home, Component Catalog, Component Inventory, Design Library, and Search. A 'System At A Glance' section displays the following statistics:

Category	Value
Registered Users	82
Components	283
Component Instances	126
Designs	51
Software Version	2.5 (2016.03.11)

Below the statistics, there are four main sections: Component Catalog, Component Inventory, Design Library, and Design Implementations*. The Design Implementations* section includes a note: '*This feature is coming in the next major release of CDB.'

- Components and designs
- Reference documents, drawings and manuals
- Procurement information
- QA and procedure travelers
- Test and measurement data
- Future maintenance data

Inventory Requirements Identification

- Identification of significant storage requirements
 - Maximum storage space of near 35,000 sqft
- Significant quantities of equipment
 - 1,300 Magnets
 - 18,000 cables (total lengths TBD)
 - 120 assembled plinths
 - 2,200 power supplies
 - 400 power supply controllers
 - Installation supplies (grout, tools, etc.)

Identified need for additional support in:
Receiving
Acceptance
Logistics

Installation Cable List

Next Steps

- Further refine the information, in terms of numbers, cable type
- Develop specifics for length, terminations, and locations
- Develop specific installation plans

Systems	# of cables	multiplier	total
Power Supplies	187	40	7480
Power Supplies for Canted ID	13	13	169
Power Supplies for straight ID	5	22	110
Injection/Extraction	61	1	61
BM FE	62	21	1302
Canted FE	63	13	819
High Heat Load FE	63	22	1386
2-Motor ID	10	10	100
4-Motor ID	14	40	560
Revolver ID	21	9	189
IEX ID	21	1	21
CPU ID	12	1	12
SCU ID	23	10	230
Diagnostics	116	20	2320
Controls	2	20	40
Controls:MCR	42	1	42
Controls:Vacuum	12	40	480
Controls:Top Up Monitor	18	1	18
Vacuum Group	45	20	900
Longitudinal Feedback System	51	1	51
Bunch Lengthening System	88	1	88
Transverse Feedback System	0	1	0
Booster to SR Sync	50	1	50
Diagnostics/Fast Orbit Feedback	10	20	200
Diagnostics/Current Monitors	2	2	4
Diagnostics/Beam Size Monitors	12	3	36
Diagnostics/X-Ray BPM Electronics	0	0	0
Diagnostics/Mechanical Motion	24	40	960
			17628

Issues

Removal and Installation

- Need for accurate data on what is present
 - APS has abandoned cables in place
 - Lack of drawings and certainty of knowledge
- Cable trays are not well organized
 - Labelling issues
 - Some segregation, but little confidence
- LOTO
- Cable manufacturing

Electrical Engineer for Installation

Responsibilities

- Maintain APS-U cable list
- Define what the status is of all cable trays in the tunnel, including contents.
- Determine what work will be necessary, with respect to cable trays, on the mezzanine.
- Become familiar with the LOTO process at APS and the various technical groups with electrical responsibilities.
- Utilize this familiarity and their personal experience to work with these groups to lead the effort of creating a specific electrical LOTO process for the removal and installation.
- Manage cable manufacturing and labelling for the Upgrade, ensuring quality.
- Create specific plans for the removal and installation of every electrical/cable system for the upgrade.
- Ensure work is planned and executed according to APS-U, ANL, and DOE safety standards

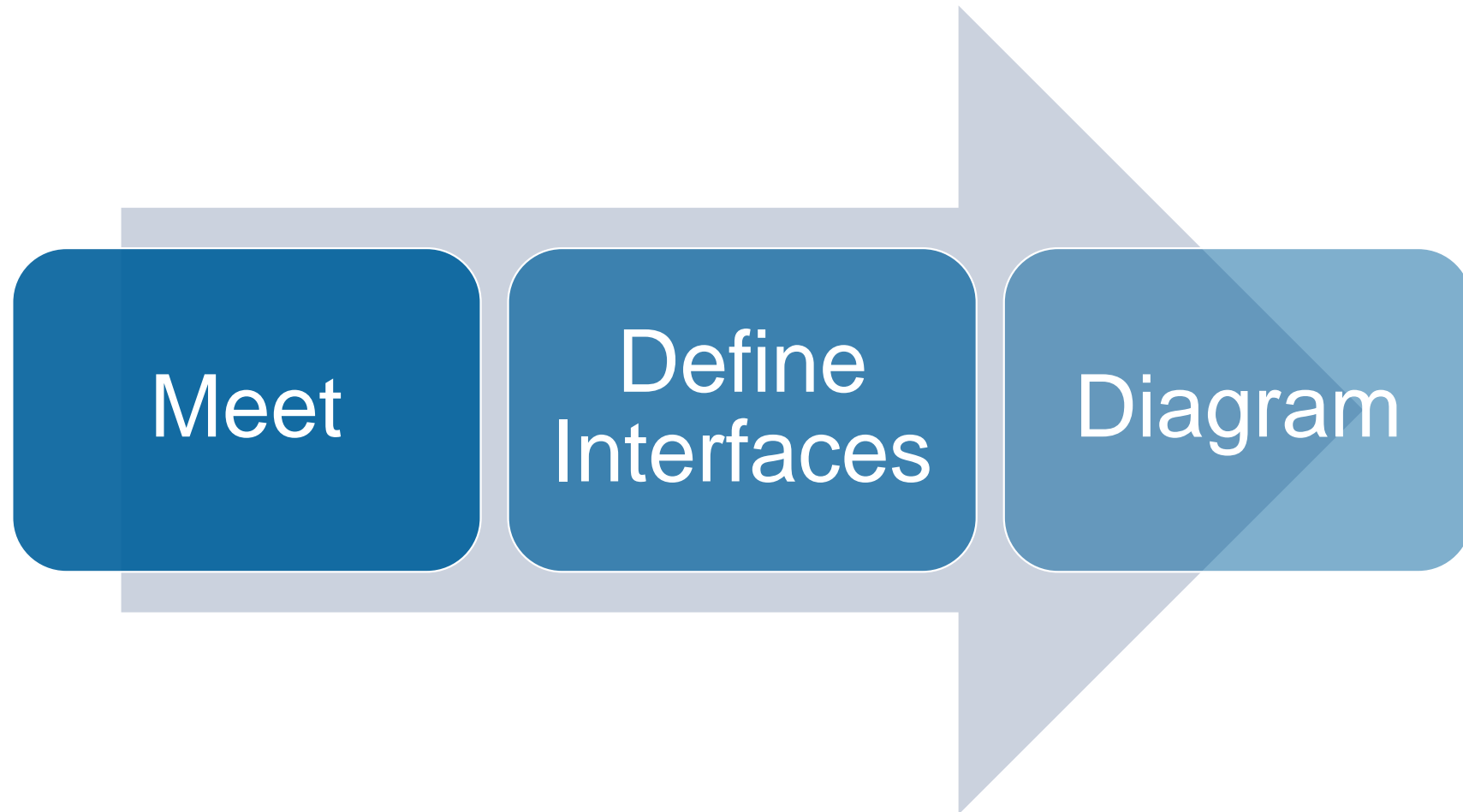
PROPOSED

Interface Control

- Removal and Installation has interfaces with all technical and operational groups
 - Remove the old
 - Install the new
- Assembly and Installation mediate the interface between many technical groups
- Interface control document to be revised to include:
 - Scope responsibilities
 - List of all systems/components to be installed
 - Block diagrams with in/out flows and labels indicating responsibilities
 - List of drawings and instructions required

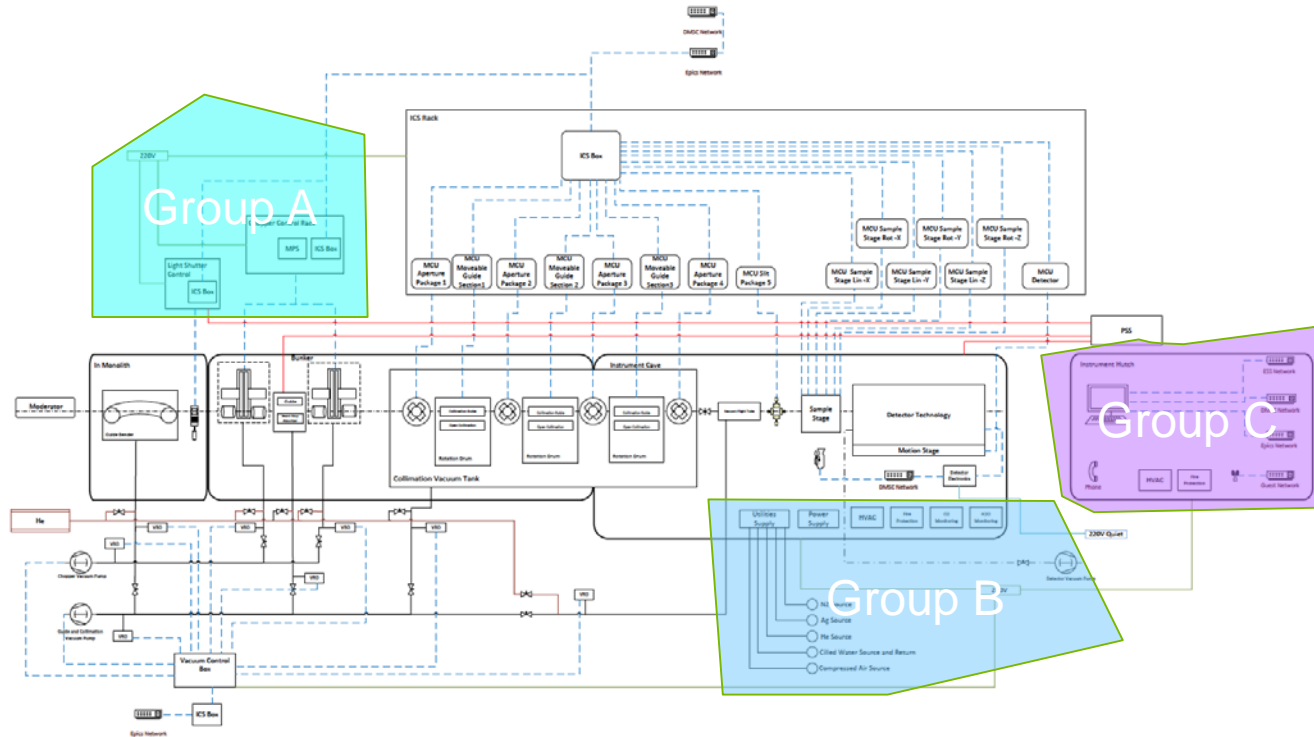
Installation Planning Processes

Interface Management



Installation Planning Processes

Block Diagram



- Works with Interface Control Documents
- Shows electrical, data, mechanical (gas/water/vacuum) connections between components and to outside systems

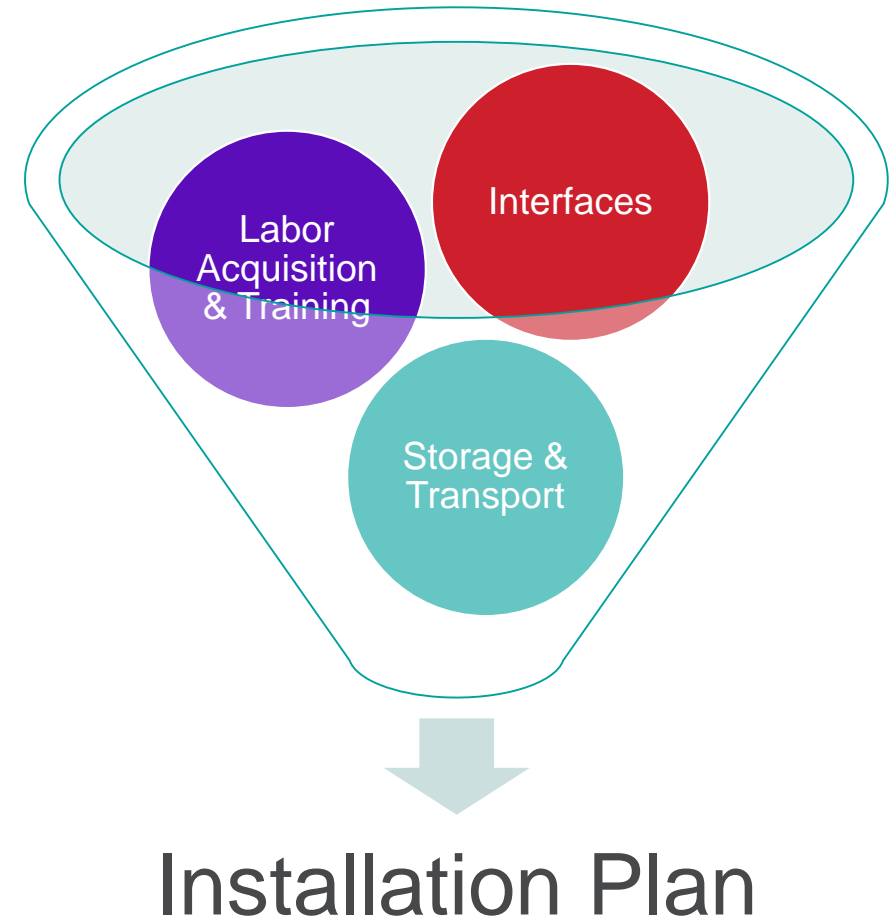
Also can be used to identify owners and responsibilities.

Physical Models

- Space issues in the tunnel need to be addressed
 - Informs the amount of work to be performed in the removal and installation
 - Where are interferences?
 - Is there more to remove or move?
- Actions:
 - Build a physical model of the BLS chamber (largest device) and to do fit tests.
 - Develop 1/10th scale 3D model of tunnel for installation planning and validation

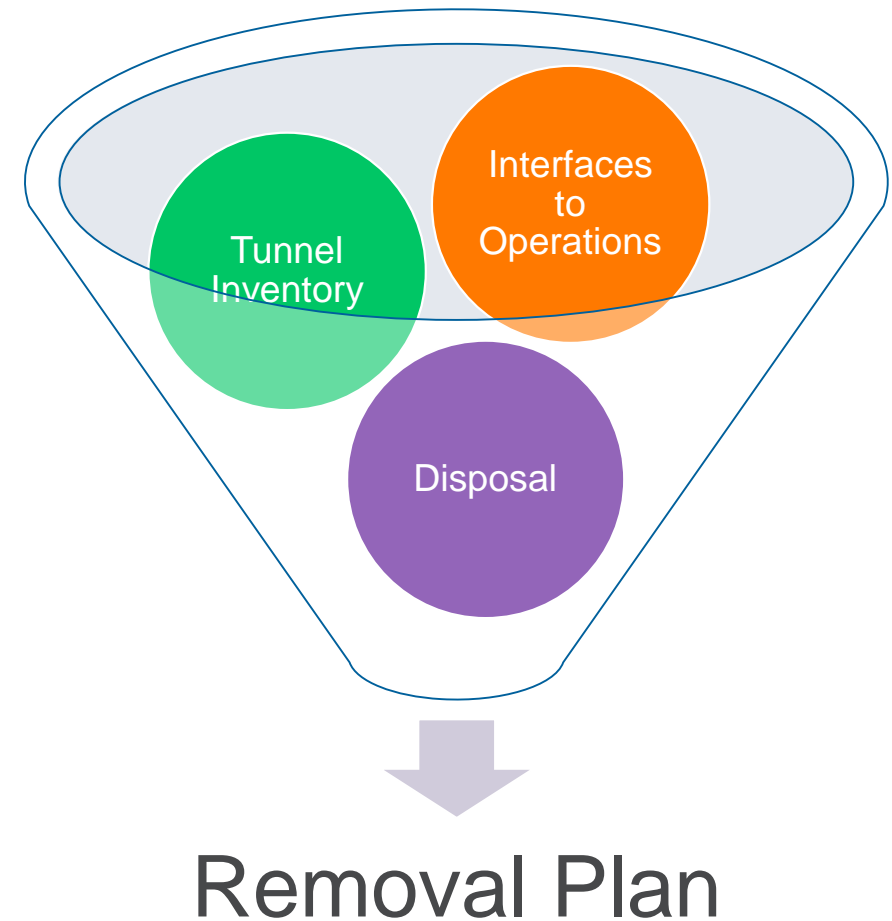
Installation

- Coordination and Plan development with technical groups
 - Assist in developing tools and methods
 - Feedback and input into installation plans
- Workforce acquisition and training
- Finalize Transport, Storage, and Staging plans
- Integrated Installation Plan Development
 - Compare and contrast against current plan
 - Evaluate timeline and effort



Removal

- Coordination with Operational groups
- Tunnel and Mezzanine Inventory
- Review and Finalize Removal and Disposal plans



QUESTIONS?