



Wright
Laboratory

APA production site @ Yale's Wright Laboratory
Dr. Domenico Franco
UK APA Factory Review Workshop – Jan 22-23, 2020

Wright Laboratory

- The laboratory's unique combination of on-site state-of-the-art research facilities, and technical infrastructure
- Largest experimental facility of Yale Physics ~86,000 sf of lab and office space > 150 personnel (16 faculty, > 40 graduate students)
- Experimental research in fundamental physics nuclear, particle astrophysics/cosmology quantum physics
- Core campus facilities machine shops, cleanrooms, high bay



J.W. Gibbs Professional Shop

Staffed by professional machinists
Precision machining
CNC capability



Advanced Prototyping Center

Coherent Meta2C laser cutter
Flow NanoJet Abrasive water jet cutter
Formlabs Form2 SLA and
Dremel 3D20 FDM 3D printers



Clean Rooms

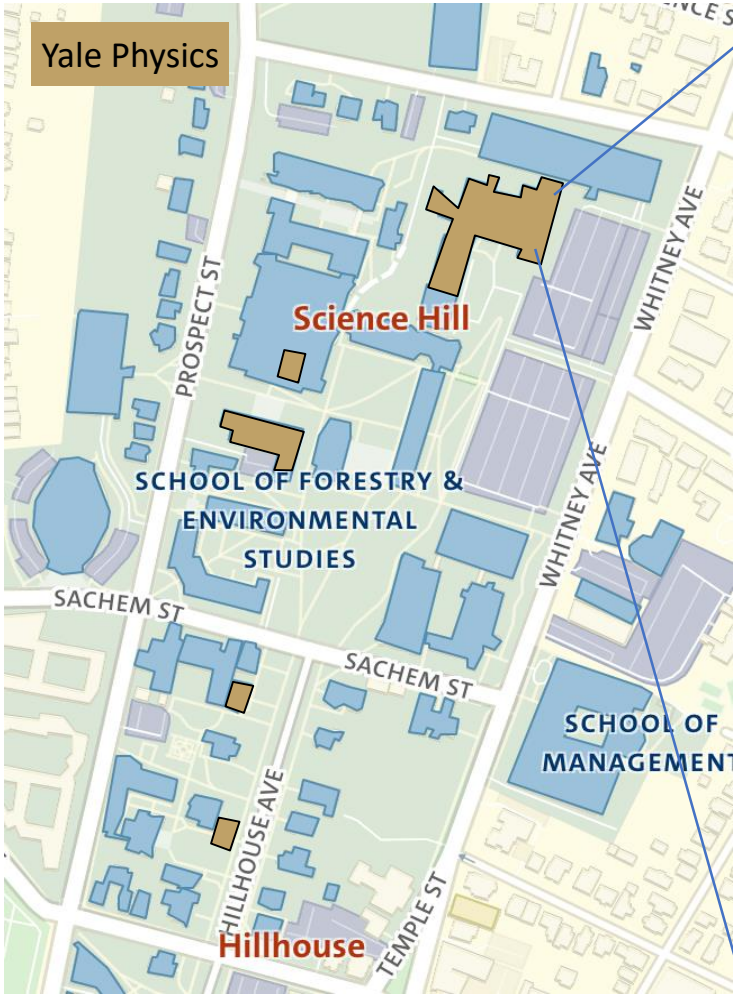
Permanent class 1,000 clean rooms
Customizable soft wall clean rooms
for high bay
Fume hoods and liquid handling



Research Support Shop

For use by students and
researchers with professional
supervision





Yale Physics

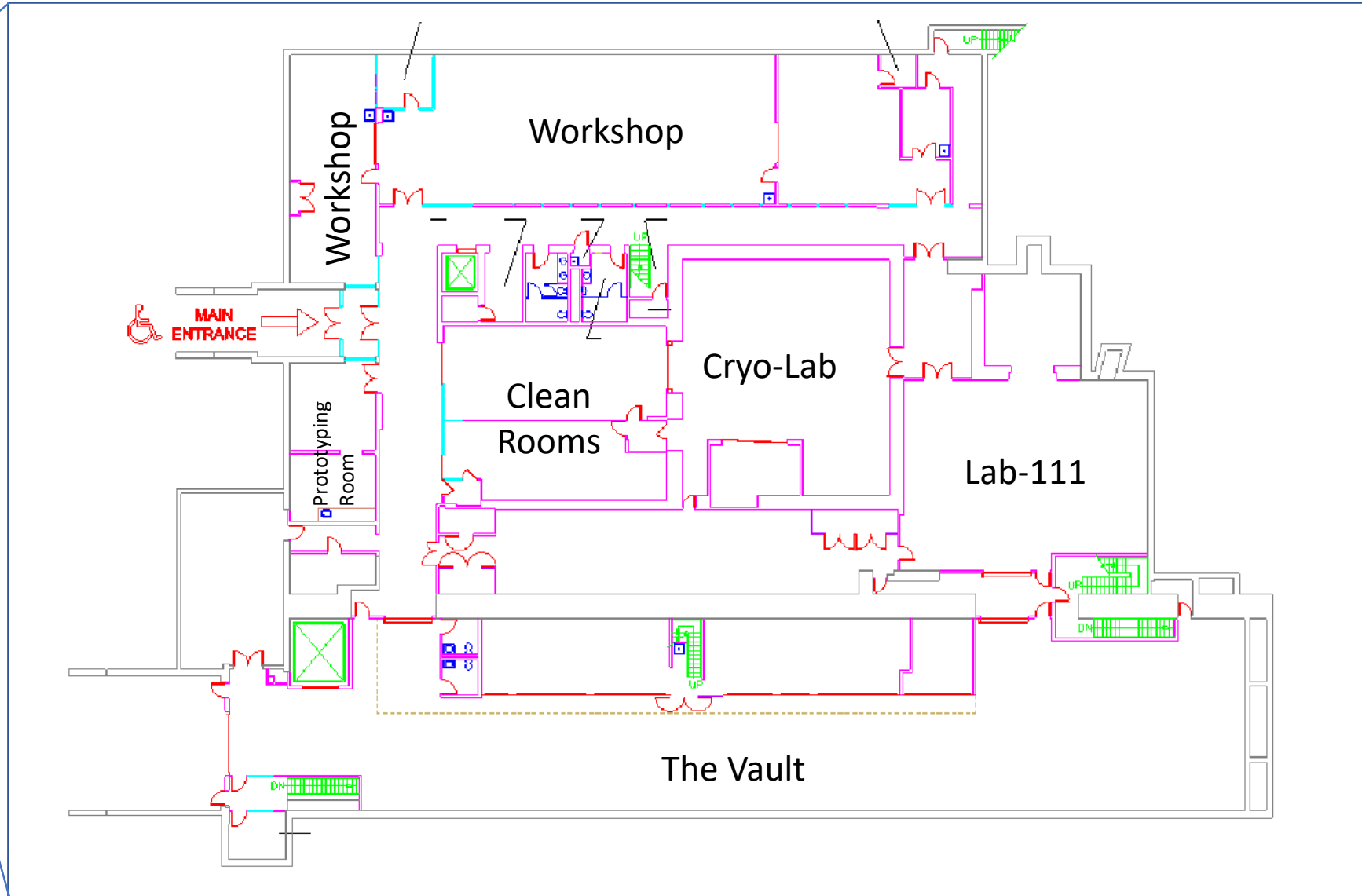
Science Hill

SCHOOL OF FORESTRY &
ENVIRONMENTAL
STUDIES

SCHOOL OF
MANAGEMENT

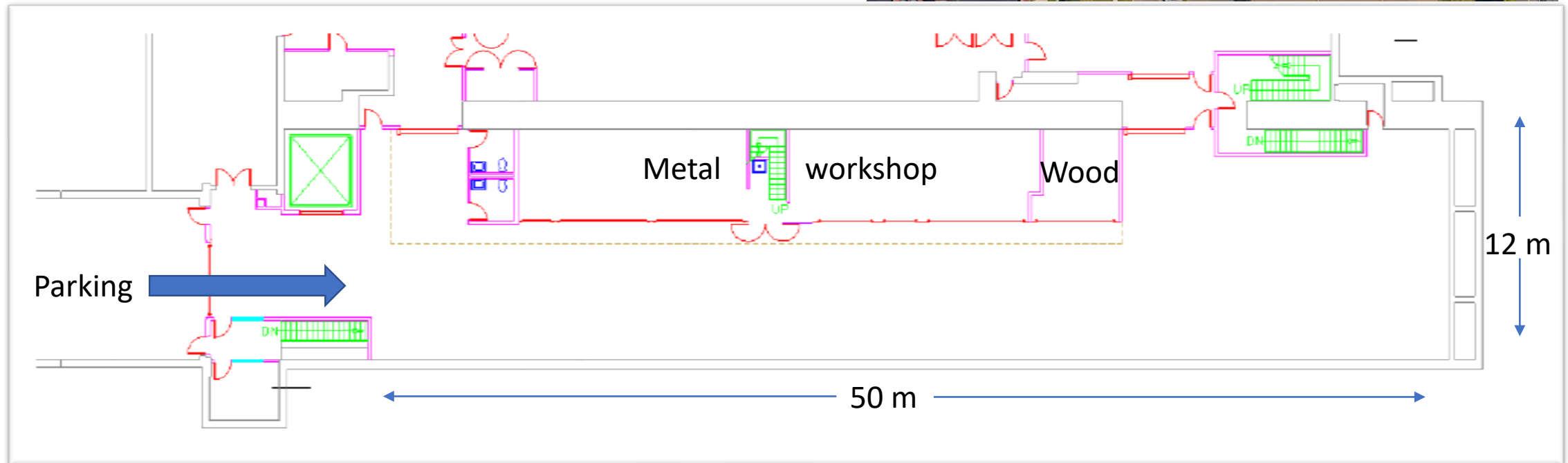
Hillhouse

Serving Physics, Science Hill, and
campus community



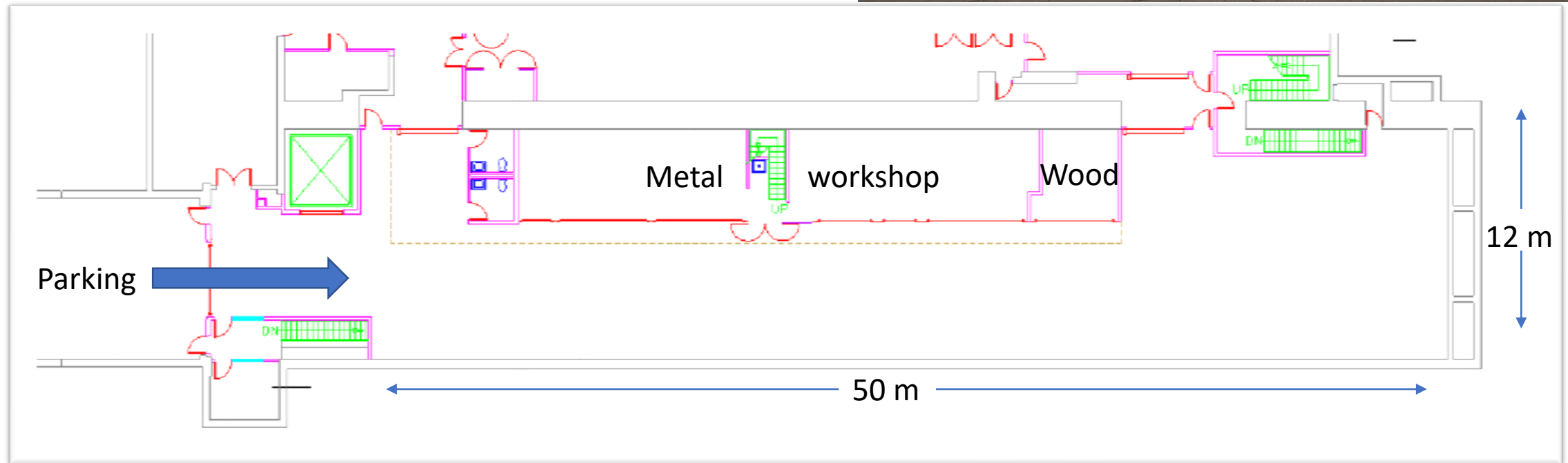
High-bay area “The Vault”

- Very long area of ~600 m²
- Ground level: direct connection with parking area and main street
- Wide access main gate
- 10 Ton crane already present



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Unique characteristic: full access!

SBND APAs
and FC Modules



The Vault as is today

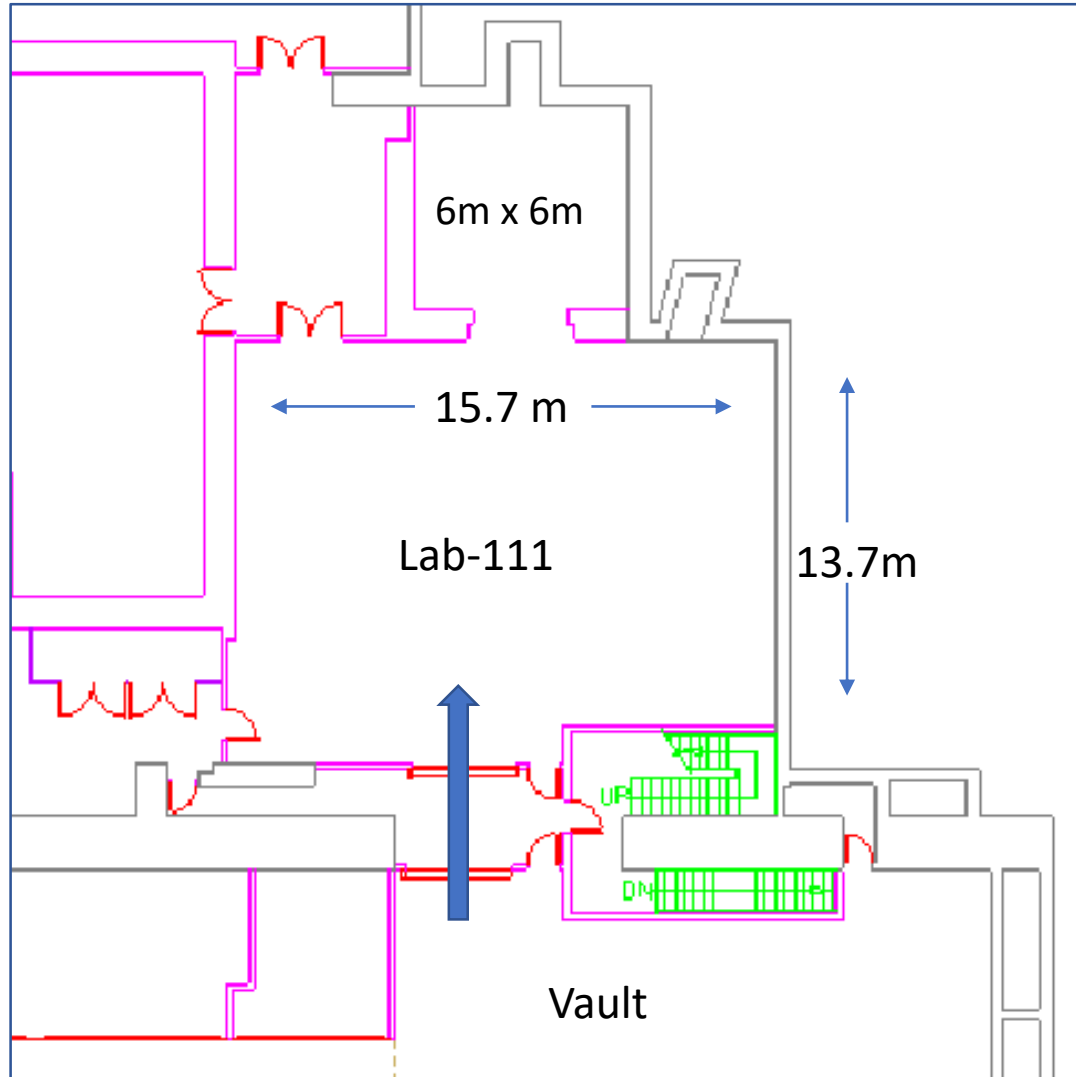


In the last 2 years Wright Lab hosted in the Vault and Lab-111 important scientific projects.

- Prospect detector construction
- SBND APAs winding
- SBND Field Cage's modules assembling

All these projects required clean tents

Lab-111



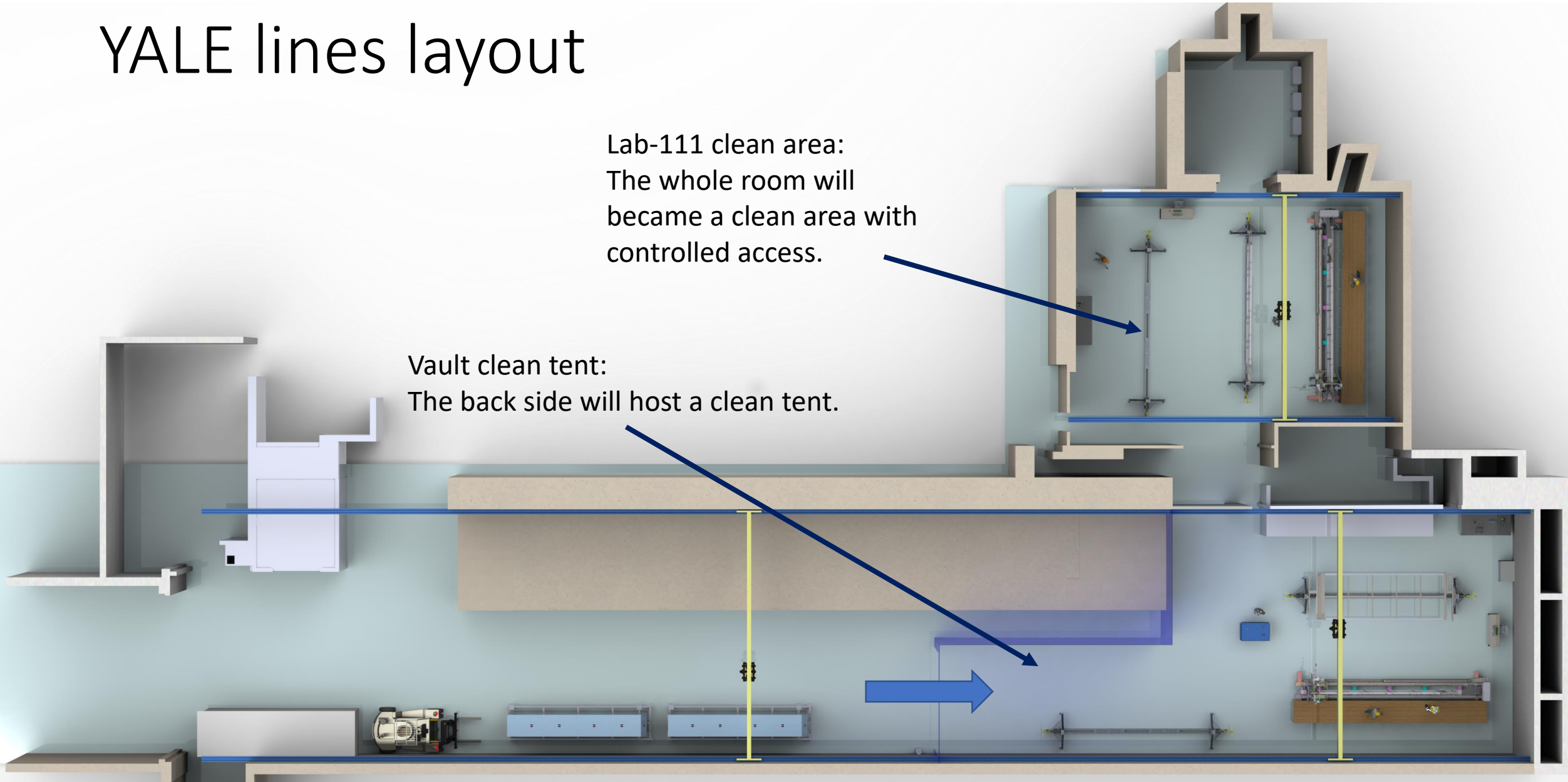
Multipurpose area of 215 m² :

- Prospect detector
- SBND Field Cage Modules
- Atlas
- Direct access to a 36 m² storage area
- Direct access from the Vault through a roll-up door

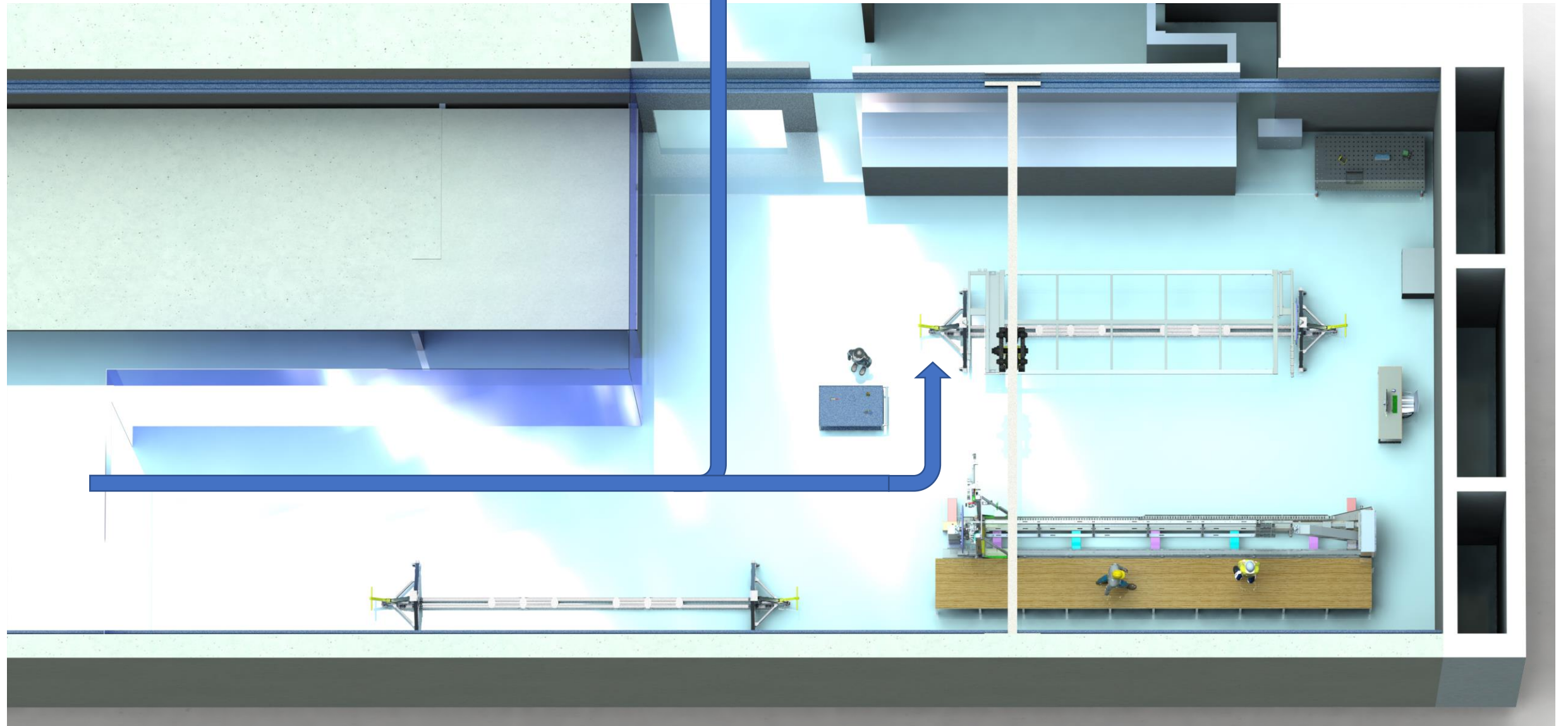
YALE lines layout

Lab-111 clean area:
The whole room will
become a clean area with
controlled access.

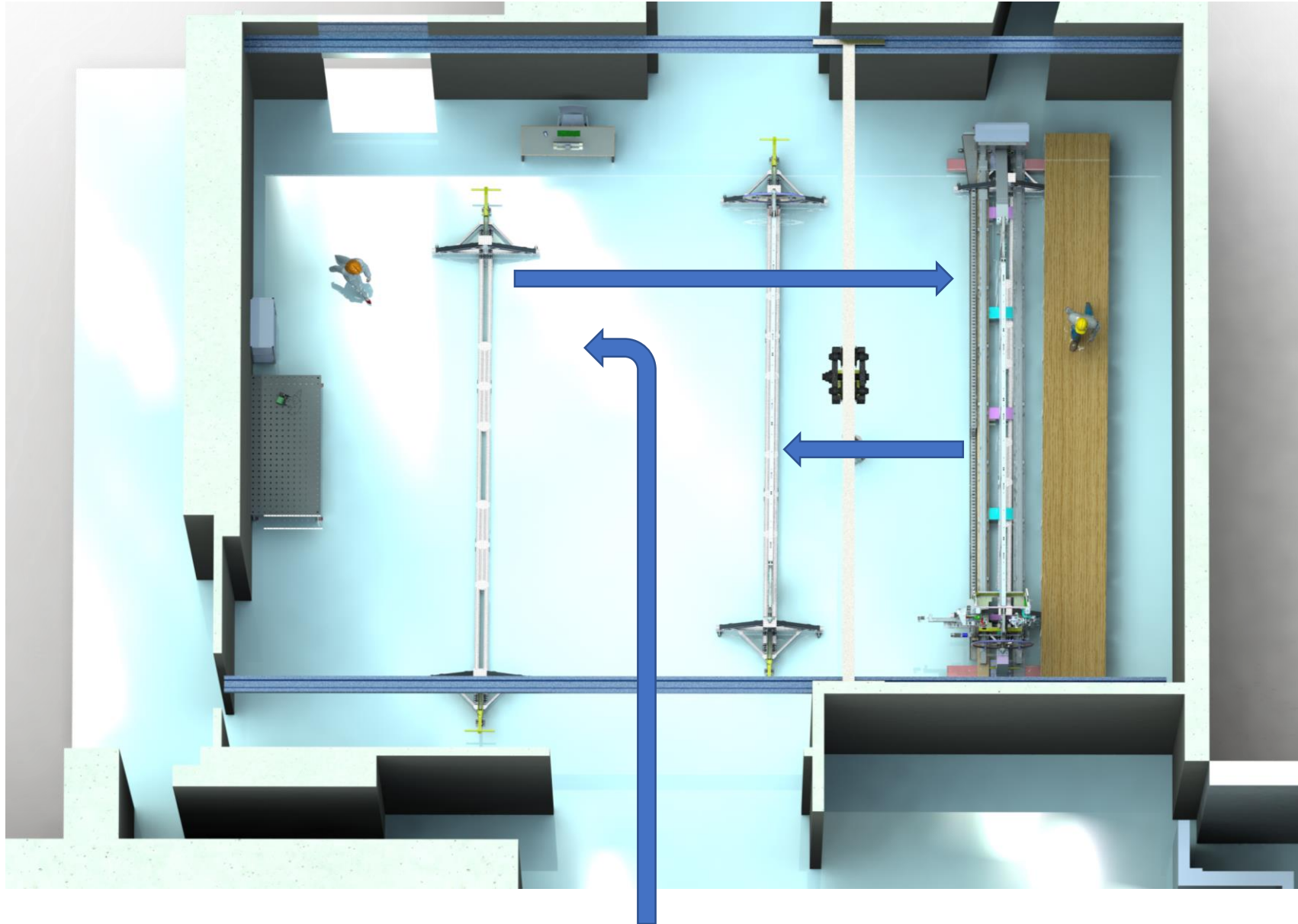
Vault clean tent:
The back side will host a clean tent.

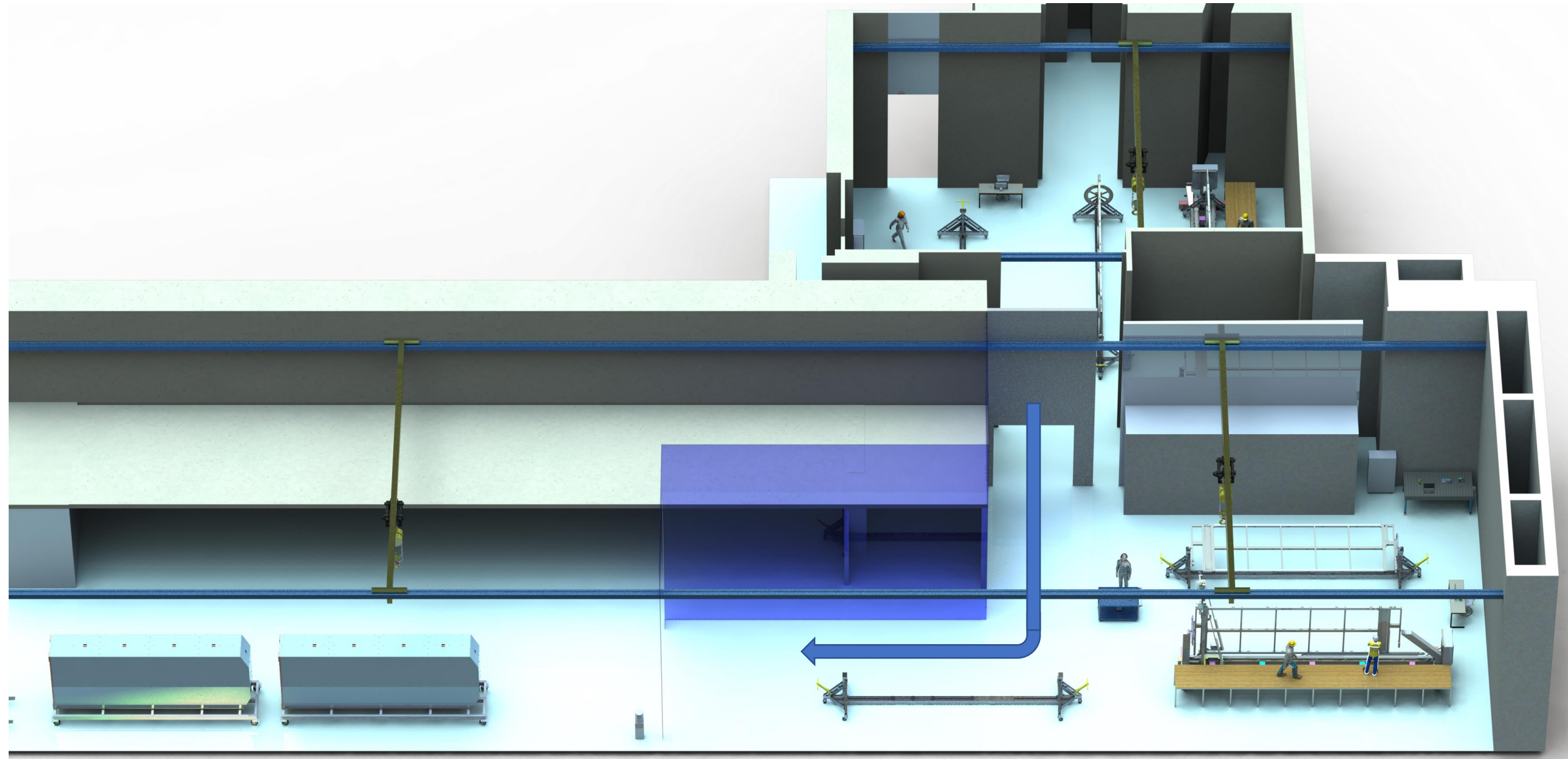


Vault line layout



Lab-111 line layout





Yale West Campus

- Wide Area located 15 mins from WL
- Six core facility for innovative research in Health, Environment, Energy, Biology
- Large space for storage with monitored humidity and temperature

APA team @ YALE (so far...)

- Bonnie Fleming, Karsten Heeger: Pls.
- Domenico Franco: production manager.
- Tom Langford: facility manager, plans and coordinates activities at Wright Lab.
- James Wilhelmi: Engineer.
- Jeff Ashenfelter: Associate Director of Operations local EHS liaison, conducts all WL training.
- Others are coming soon!

Costs

- Clean areas: floor refurbishing, crane, clean tent frame, assembling, electrical work, filters and lights.
 - Lab-111 ~ 150
 - Vault line ~ 210k\$
- Tools and equipment: shelves, tables, computers, cabinets, workbenches, soldering stations, etc...
 - 60k\$
- Storage and shipping: integrate over the full production ~ 310K\$
 - Shipping to SURF ~ 125k\$
 - **Moving to local warehouse ~ 125K\$**

Timeline

Spring Deep cleaning of both the areas. Footprints mark on the floor and preliminary works

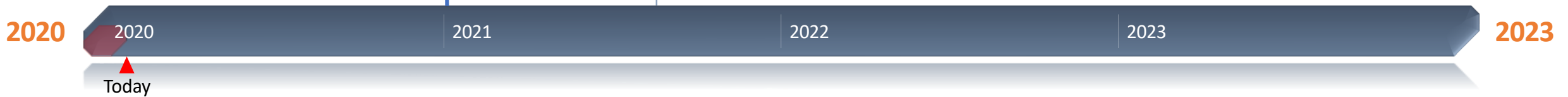
End 2020 Clean tent in the Vault

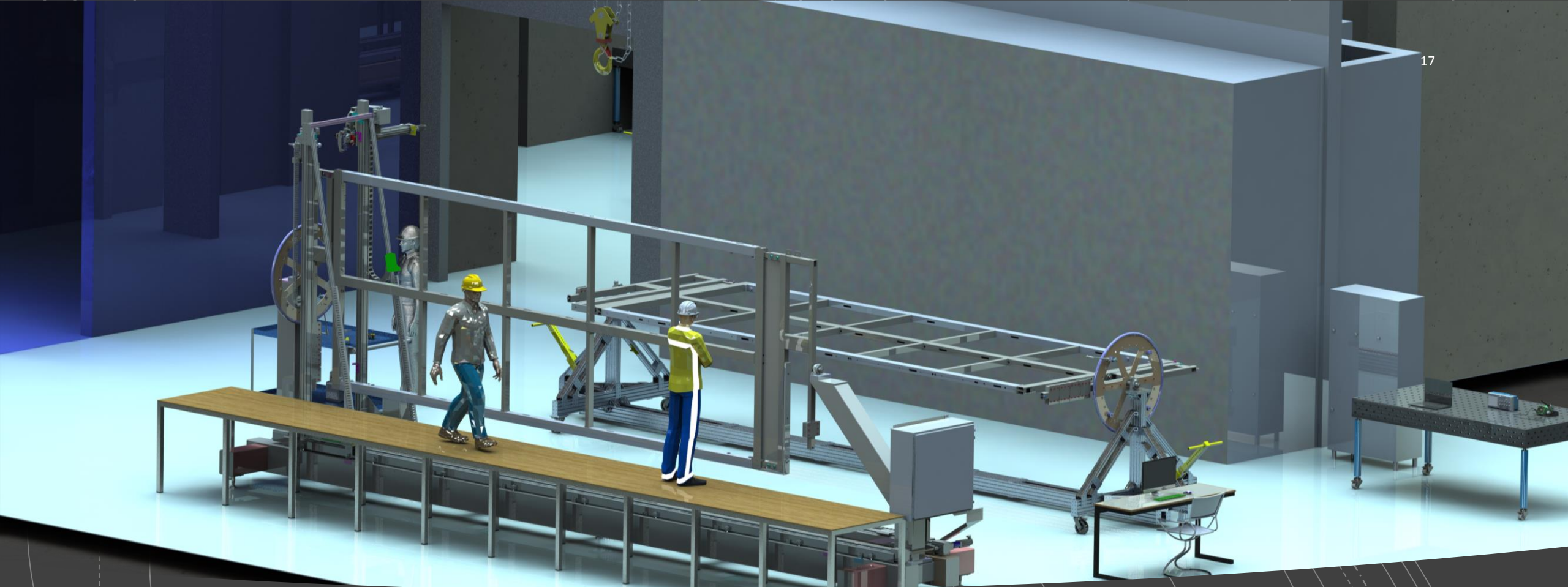
Clean area in Lab-111

Production line assembling in the Vault

Spring Production line assembling in Lab-111

Start winding Aug 2021





Summary

- Space defined
- Project and schedule specific to WL ready
- Cost of the project understood (cost book)
- Team is growing up and hiring process for FTEs needed at WL over time is ongoing
- Reorganization of the space will start in the next months
- Possibility of storage space in West Campus

Milestones

- Phase 0: deep cleaning and finishing of the Vault area and Lab-111. Footprint marks for the position of the winders (Spring –Summer 2020).
- Phase 1: Clean tent in the back side of the Vault for winders assembling (End 2020)
- Phase 2: Clean area in Lab-111 and start winder construction (Beginning 2021)
- Phase 3: Production lines ready (Within summer 2021)
- Phase 4 Start winding