

# The Bunker Project

## Overview

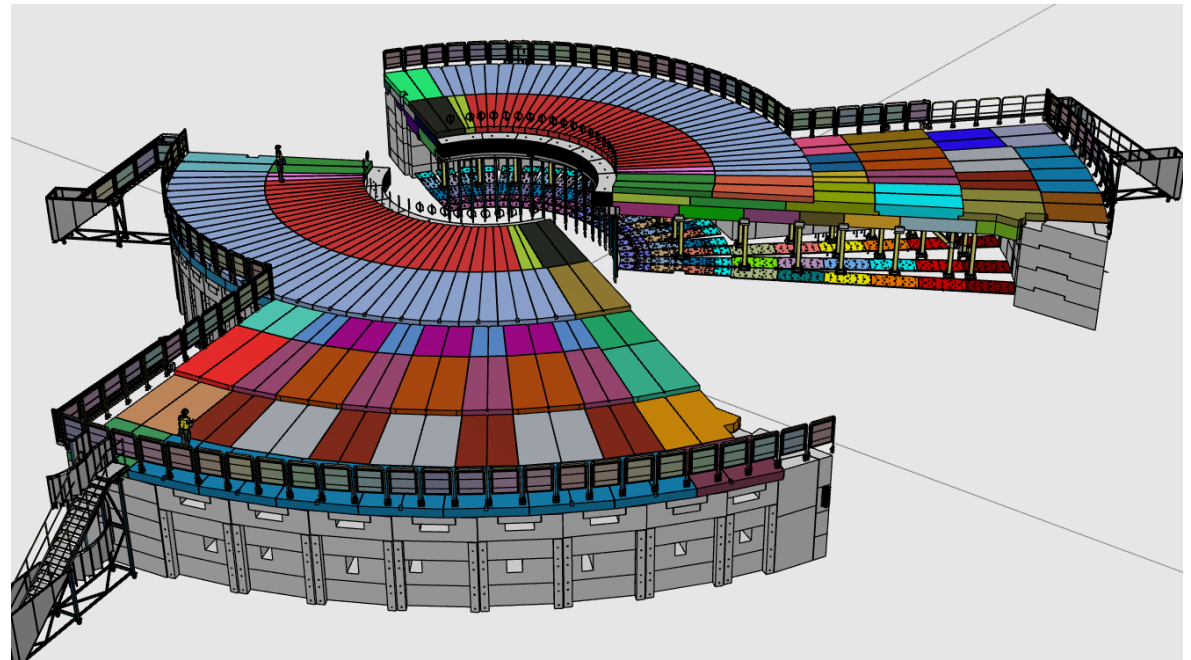
Zvonko Lazic

[www.europeanspallationsource.se](http://www.europeanspallationsource.se)

10 September 2018

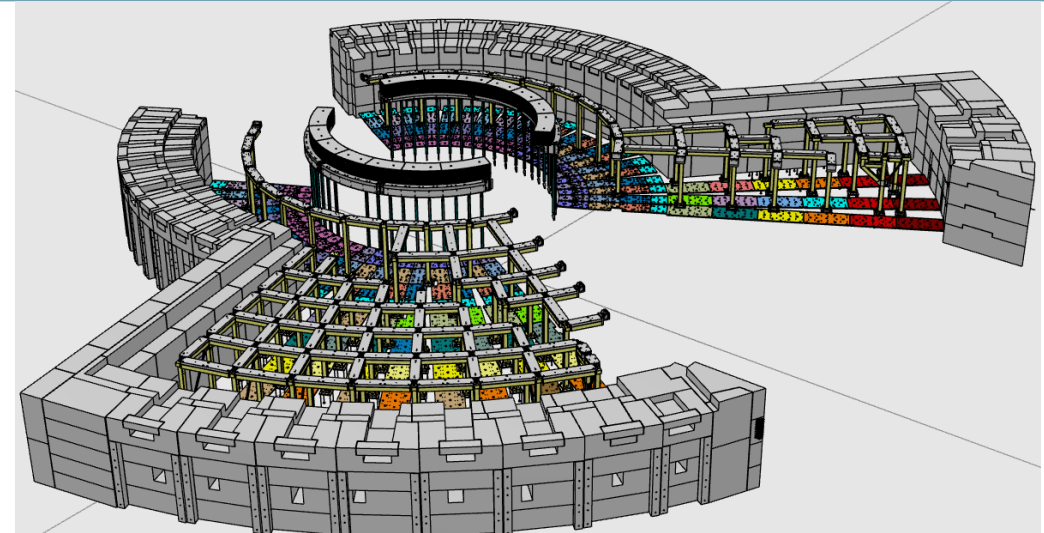
# The bunker - content

- Project overview
- Design status
- Instrument interfaces
- Neutronics status (Luca Z.)



# The Bunker - Overview

- Tender published July '18
- CDR 2.0 sep.'18
- Estimated contract signature  
Dec '18- Jan.'19

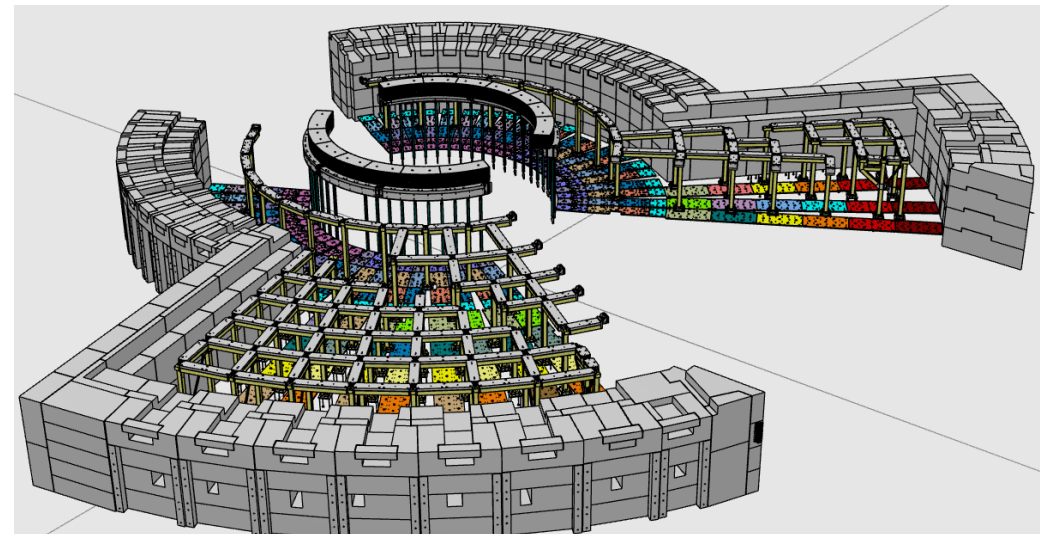


**Documentation** is being updated  
Reports, Requirements, System documentation,...

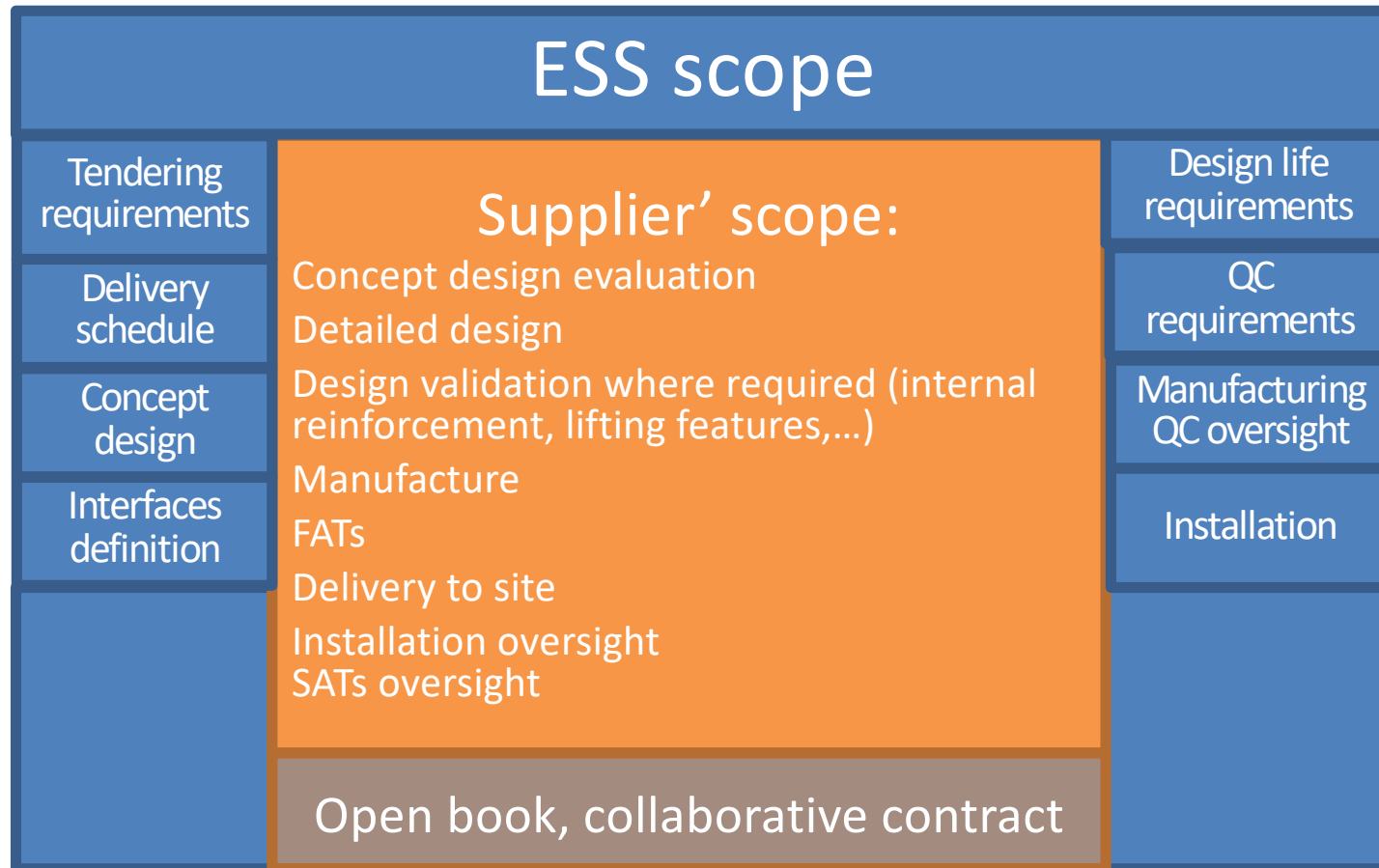
# The Bunker - Overview

## CDR 1.0 (2017)

- Bulk material changed from steel/HDPE laminate to heavy concrete
- Zoning requirements changed
- Seismic requirement changed
- Fire safety issues mitigated by the bulk shielding material change

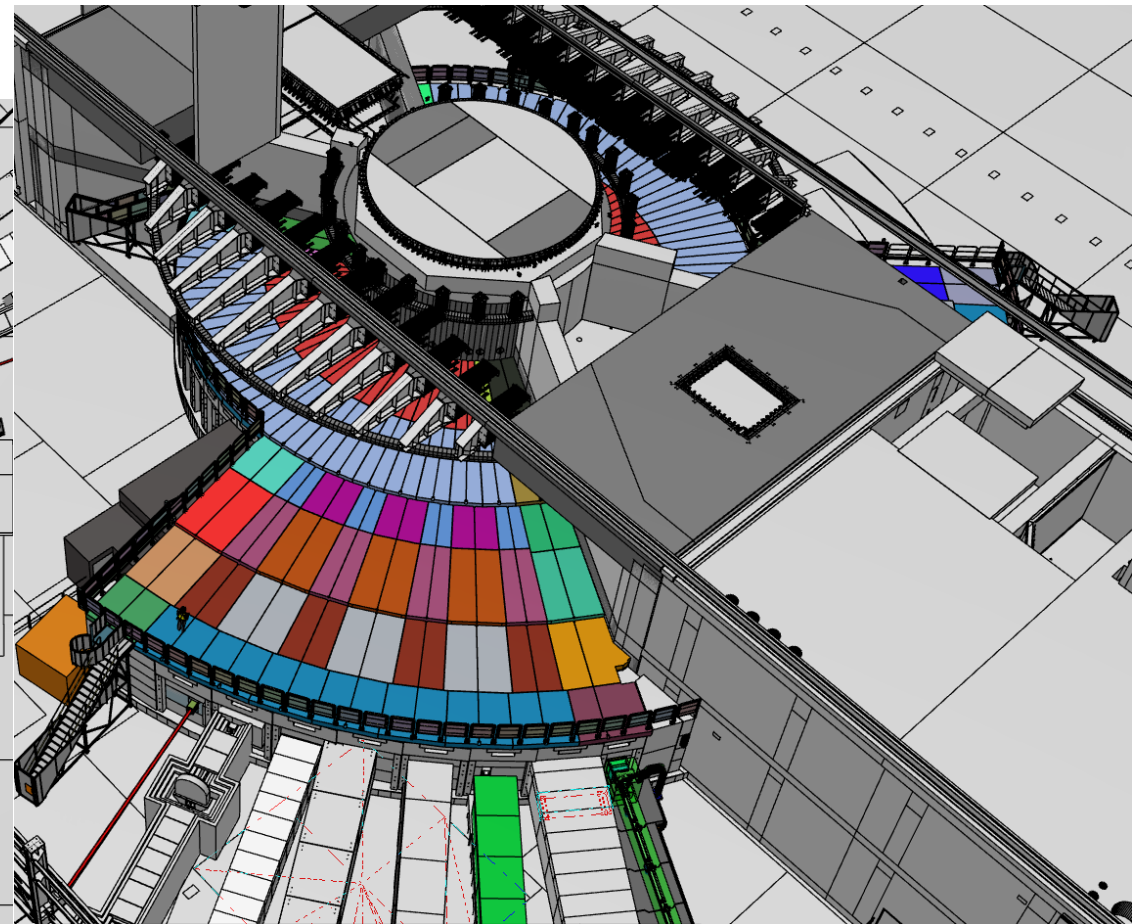
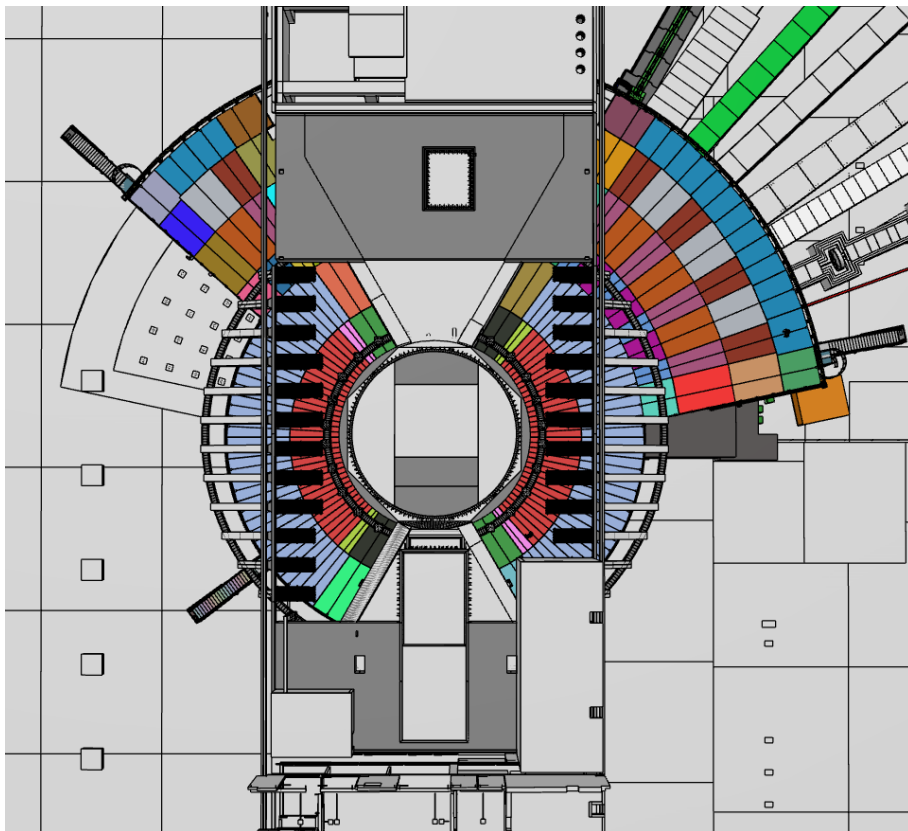


# The Bunker - Tender



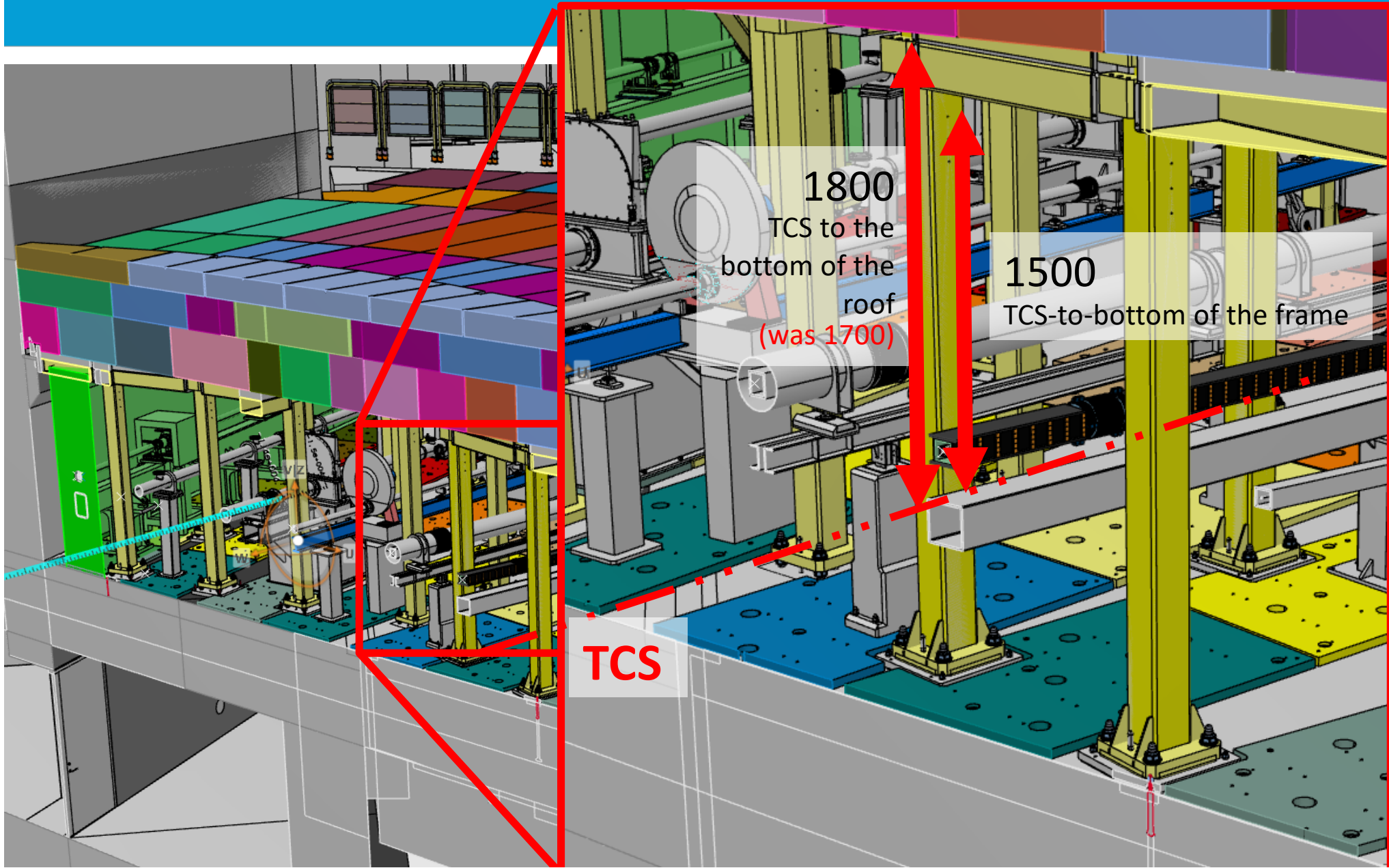
# The bunker – Design status

- *~3 400t of heavy concrete in the roof*
- *~4 500t of heavy concrete in the wall*
- *~200t of construction steel*
- *~400 roof blocks*
- *~600 wall blocks*



# The bunker – Design status

Frame and roof position

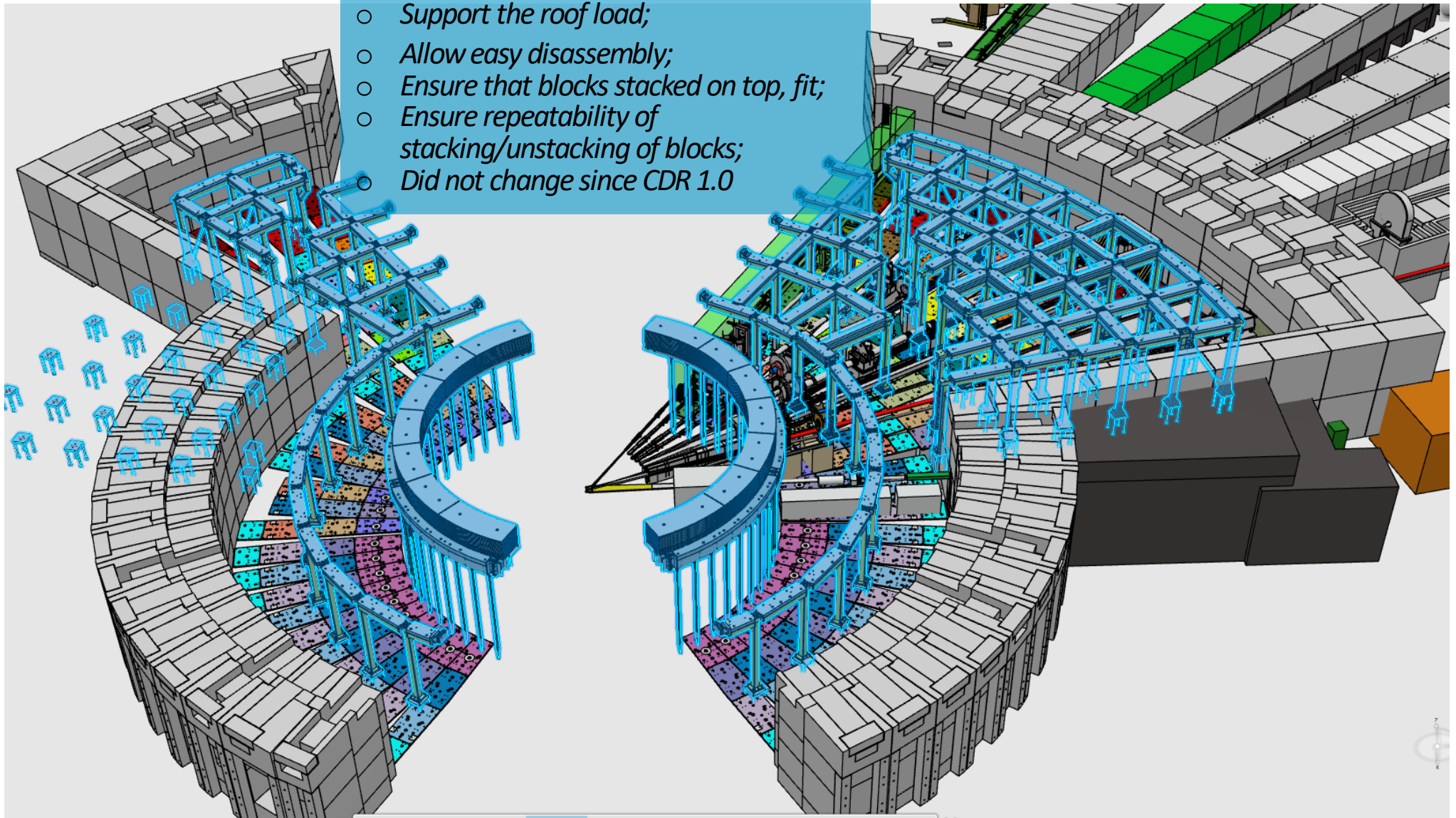


# The bunker – Design status

## SUPPORT FRAME

The bunker frame has to:

- *Support the roof load;*
- *Allow easy disassembly;*
- *Ensure that blocks stacked on top, fit;*
- *Ensure repeatability of stacking/unstacking of blocks;*
- *Did not change since CDR 1.0*



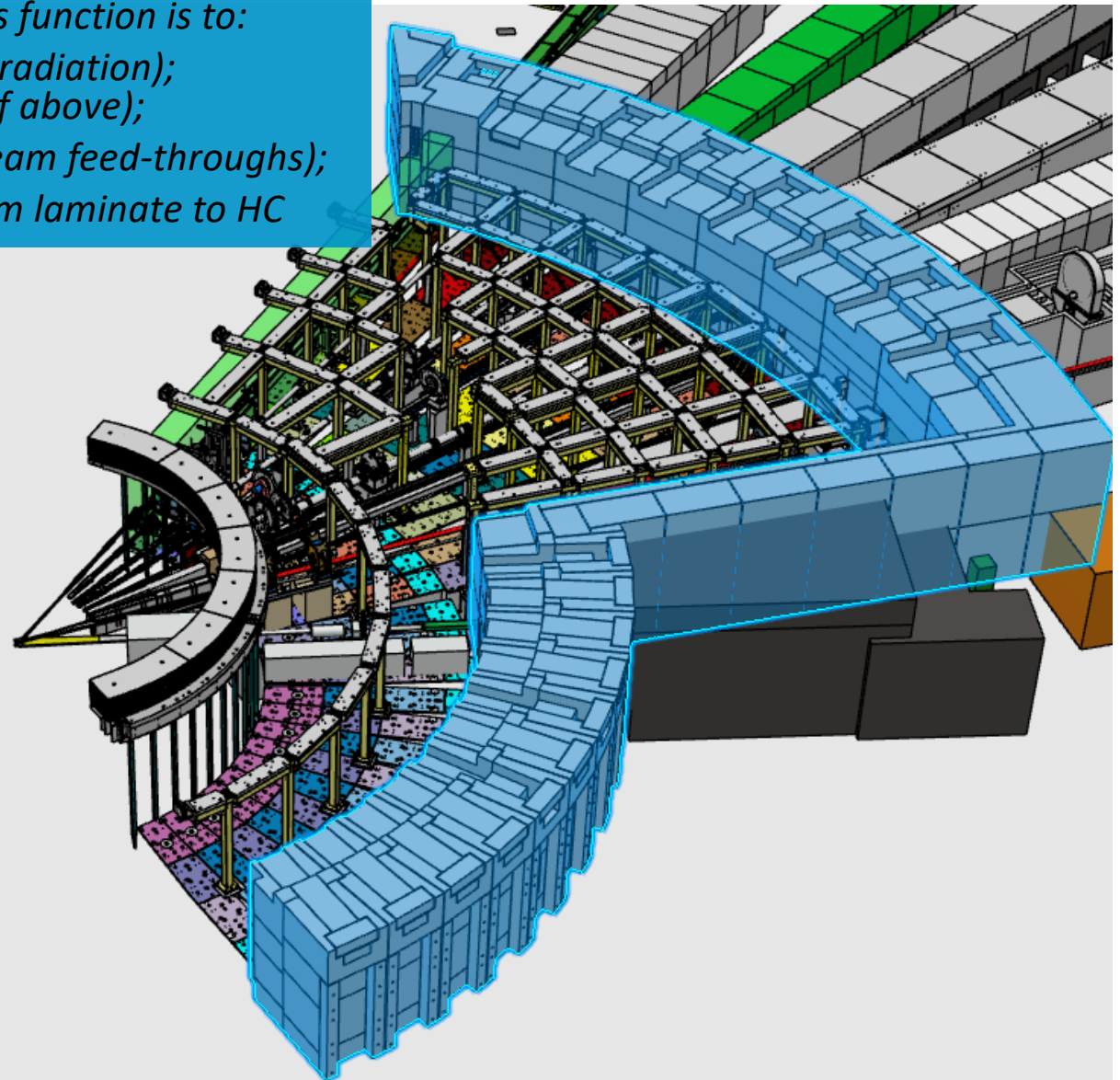
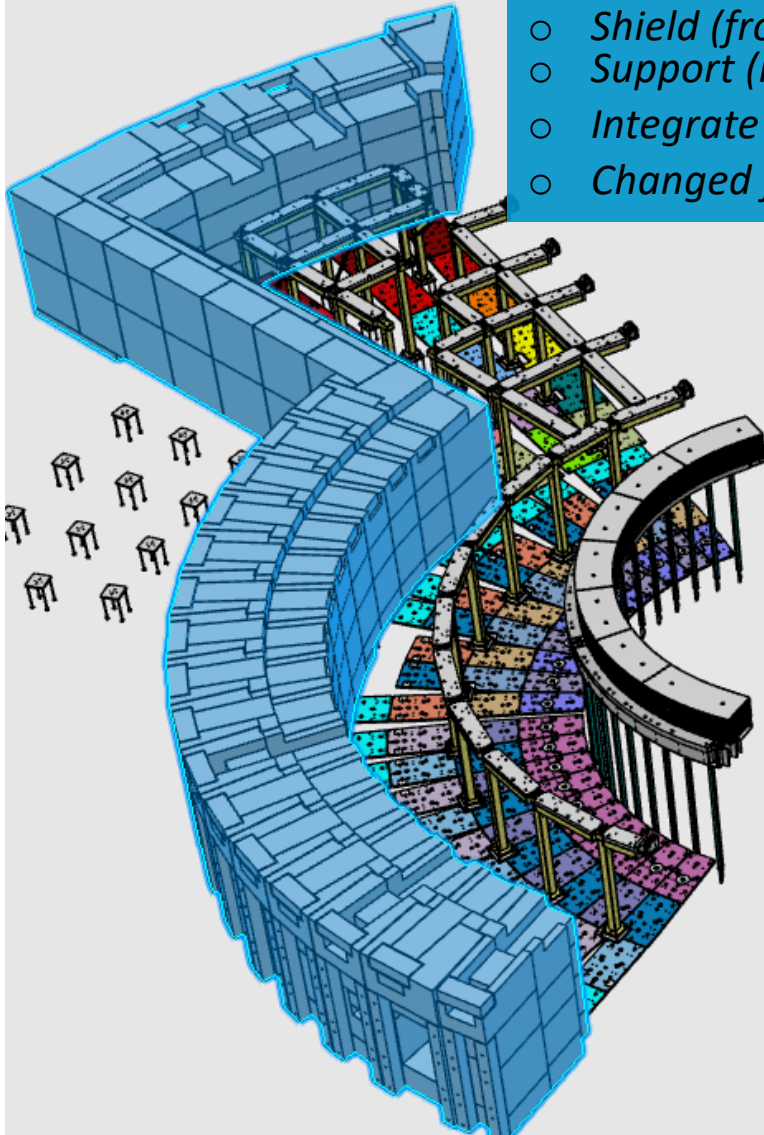


# The bunker – Design status

## WALLS

*The bunker walls function is to:*

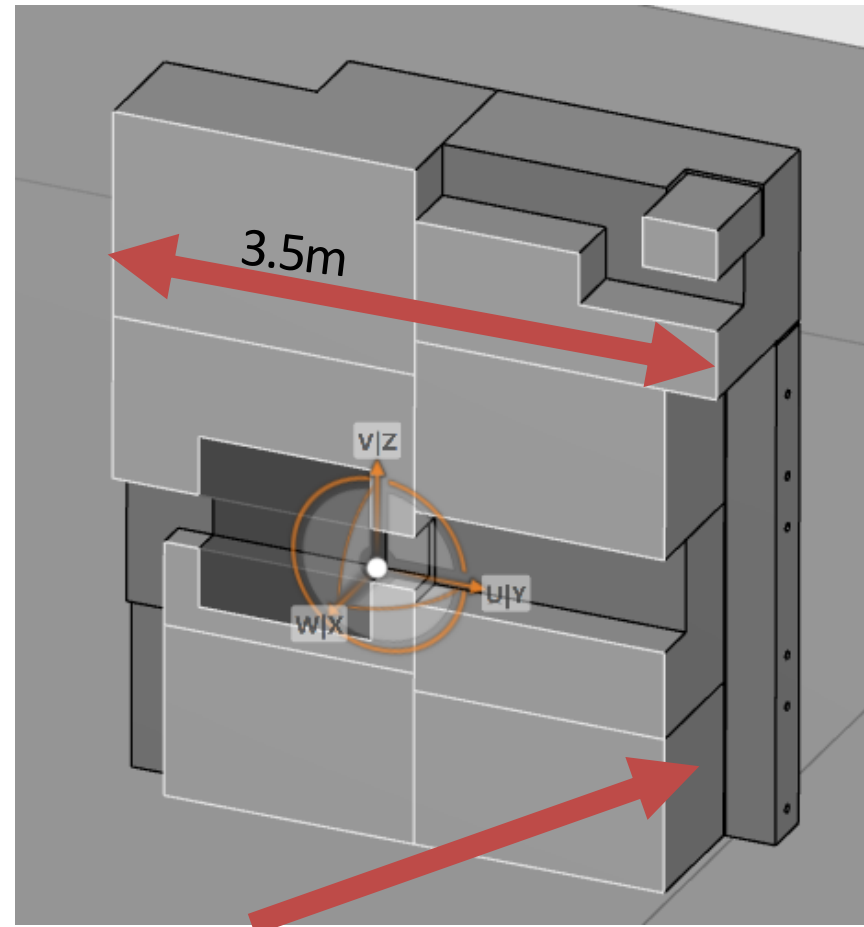
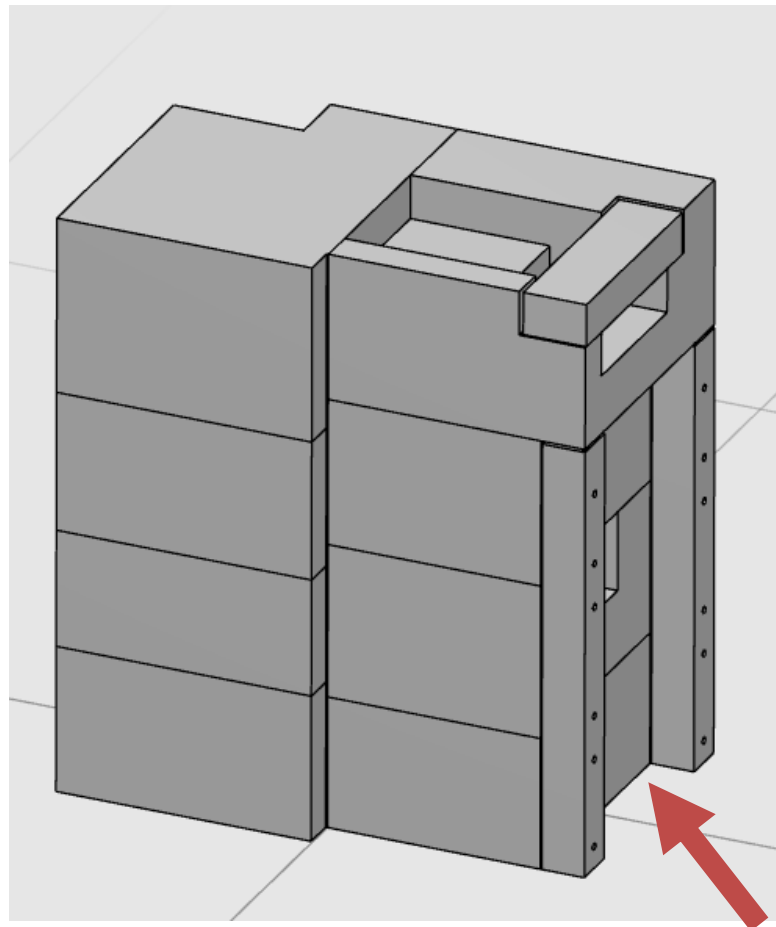
- *Shield (from radiation);*
- *Support (roof above);*
- *Integrate (beam feed-throughs);*
- *Changed from laminate to HC*



# The bunker – Design status

## WALLS

- *All heavy concrete construction*
- *Total wall thickness is 3.5m*



Interface to guides shielding (chicane)

# The bunker – Design status

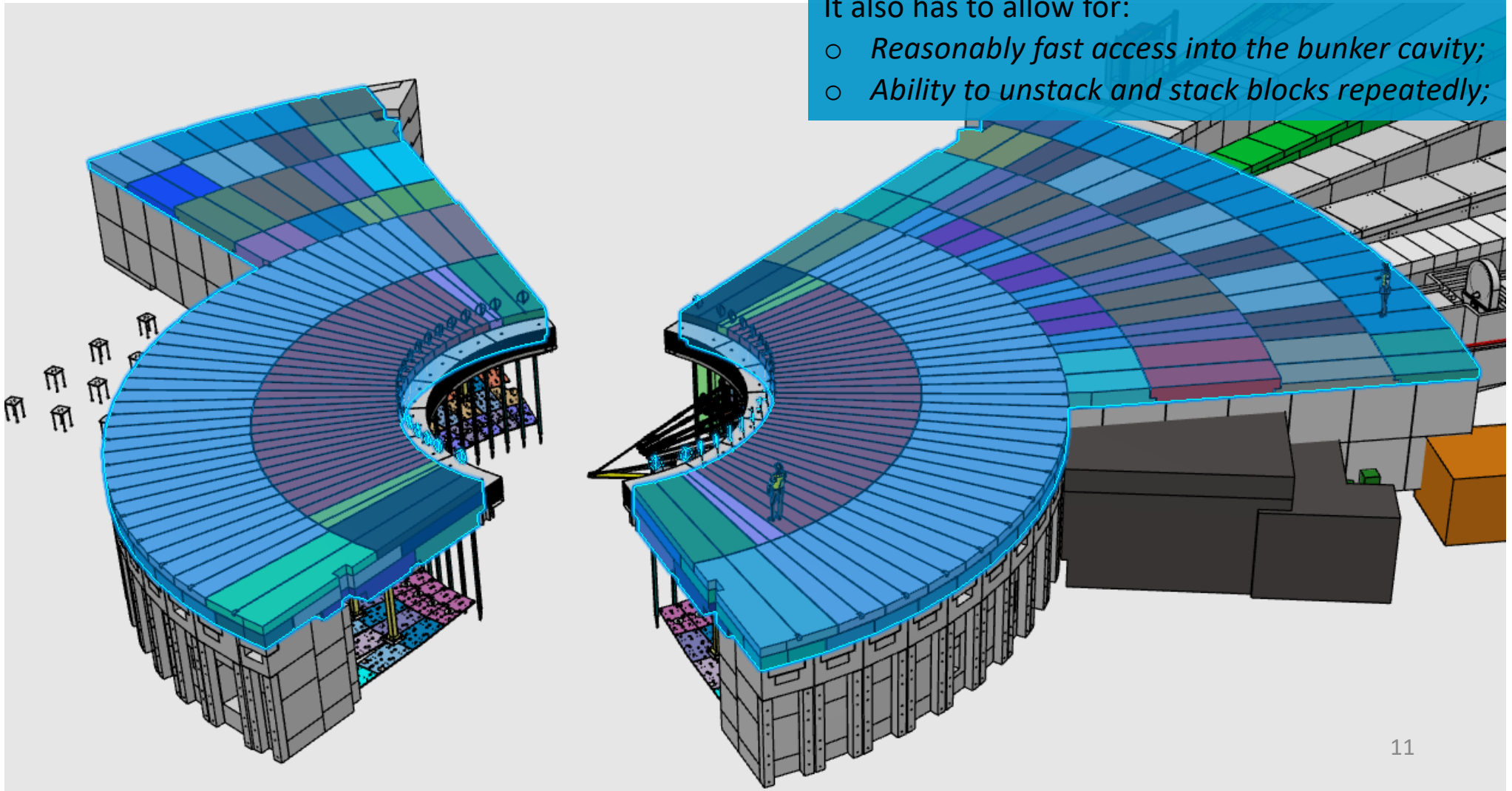
## ROOF

*The bunker roof function is to:*

- *Shield (from radiation);*

*It also has to allow for:*

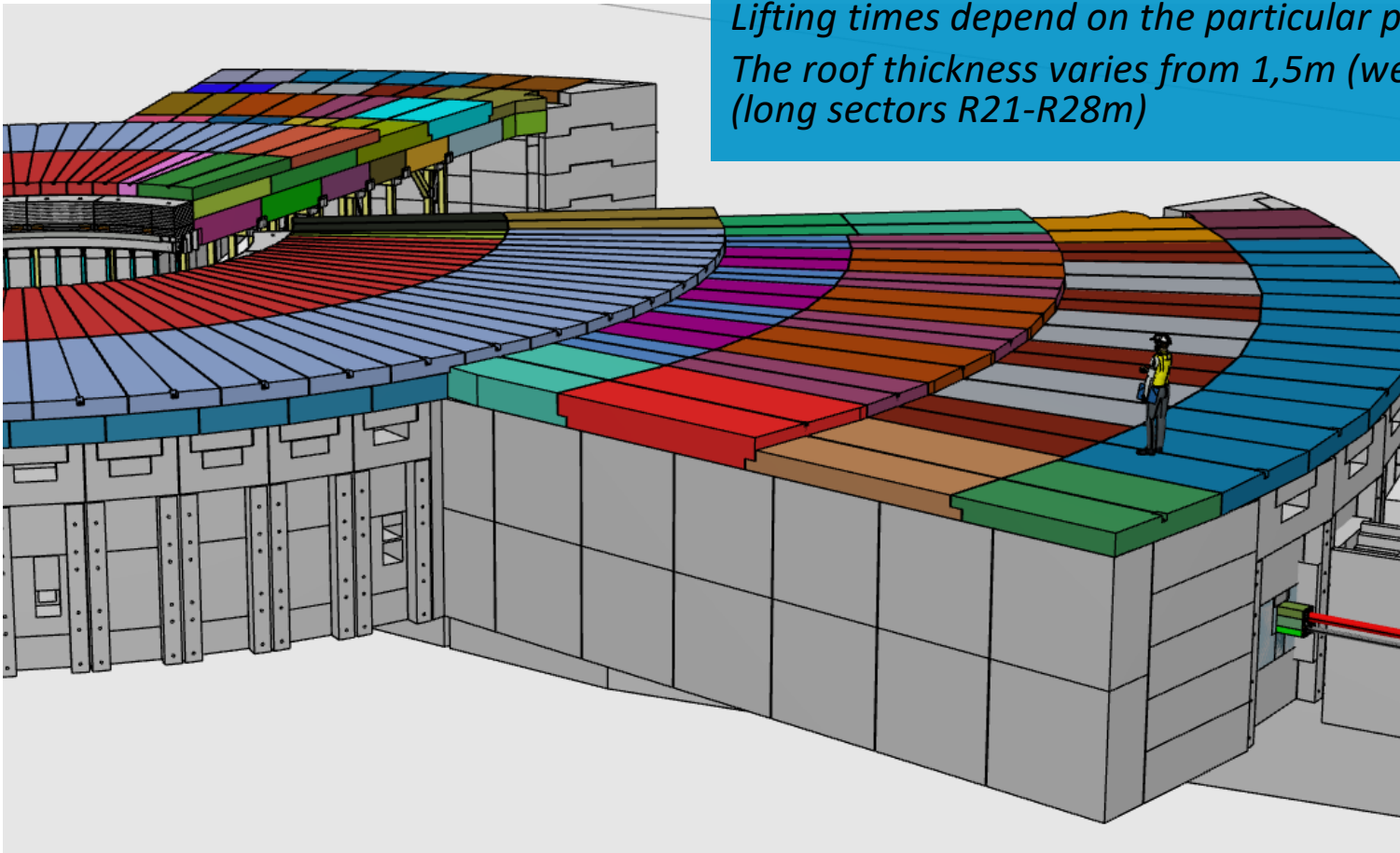
- *Reasonably fast access into the bunker cavity;*
- *Ability to unstack and stack blocks repeatedly;*



# The bunker – Design status

## ROOF

*The bunker roof is made out of blocks;  
The overall roof thickness changes adapting to required levels of shielding;  
The blocks are arranged in 3 overlapping levels up to R15m, and two overlapping levels with integrated chicanes R15-R28m;  
Lifting times depend on the particular point of entry;  
The roof thickness varies from 1,5m (west sector R6-R15) to 1m (long sectors R21-R28m)*



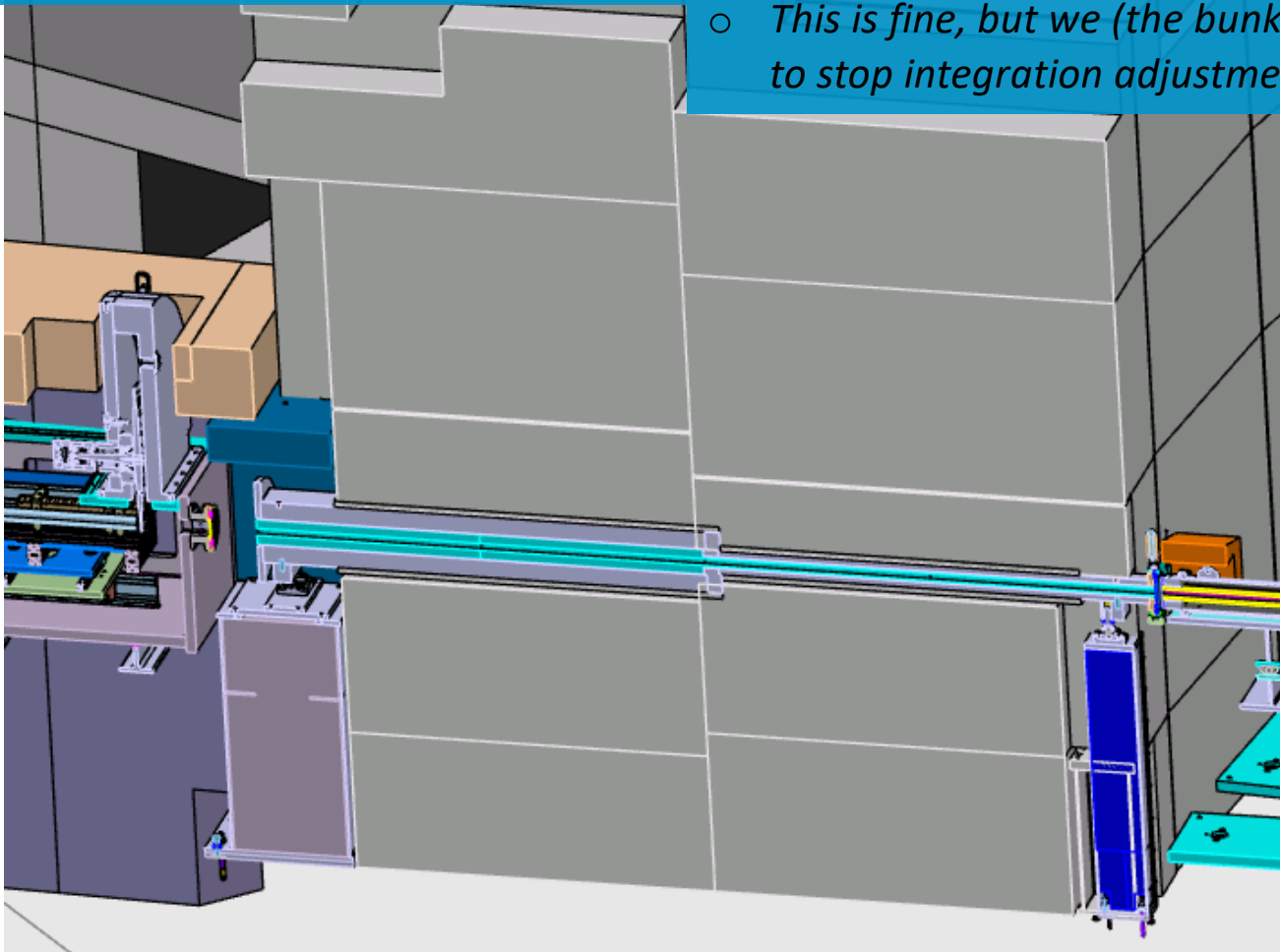
# The bunker – Instruments integration

The strategy for the beamline feedthrough through the bunker wall:

- Support feedthrough element before and after the wall;

Integration effort is working well but;

- *I don't see consistency in the flow of information;*
- *Some instrument teams have set wall feedthrough geometry, some haven't;*
- *This is fine, but we (the bunker design team) have to stop integration adjustments;*



VESPA

# Integrated Schedule

## 3. Bunker construction



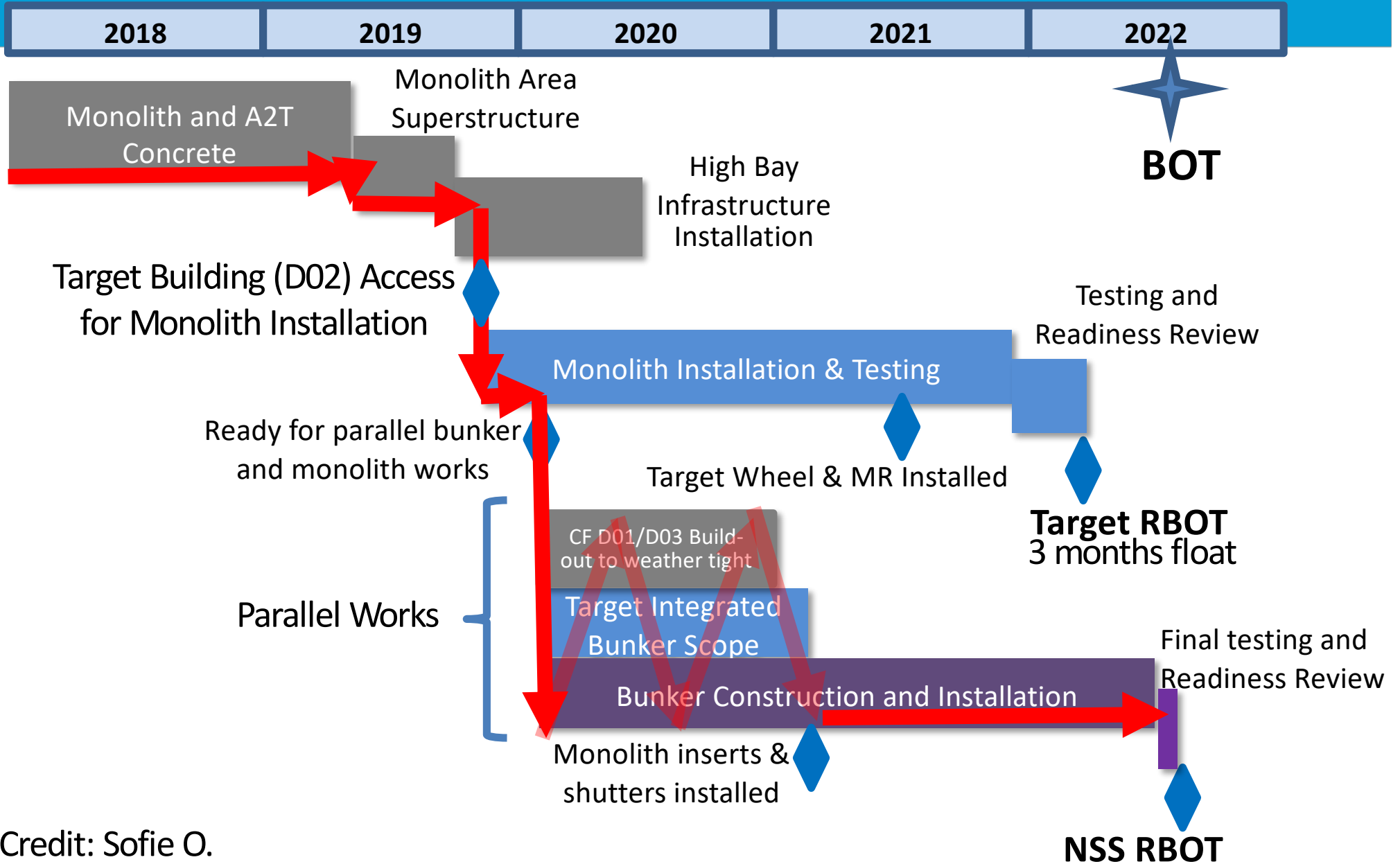
### Rebaselining of Bunker Project Schedule

Bunker construction on near critical path

Milestone	Date
Document fire safety requirements	March 2018 ✓
Agree & document seismic requirements	February 2018 ✓
Complete requirements	March 2018 ✓
Complete Value Engineering	August 2018 ✓
Release manufacturing tender*	July 2018 ✓
Complete mechanical design	September 2018
Critical Design Review	October 2018
Award manufacturing contract	December 2018
Ready to start assembly of bunker (R6)	October 2019

*\*Tendering before CDR to maintain schedule*

# Critical Path to Beam on Target (BOT) Milestone Goes Through Target Building, Monolith, and Bunker Construction

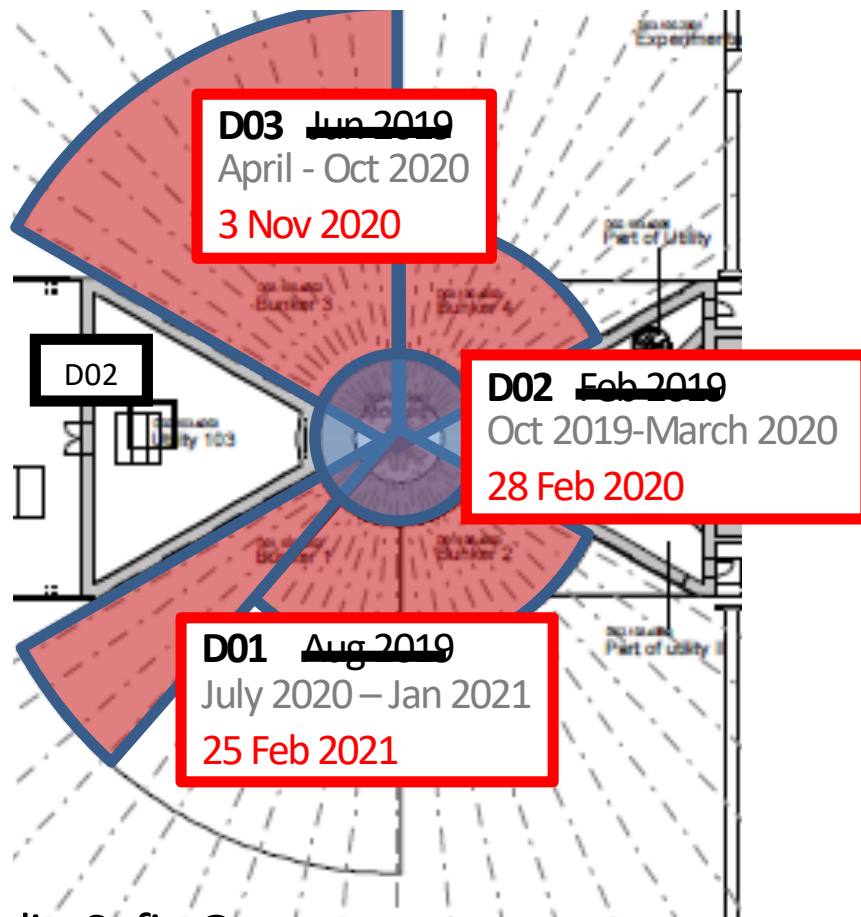


Credit: Sofie O.

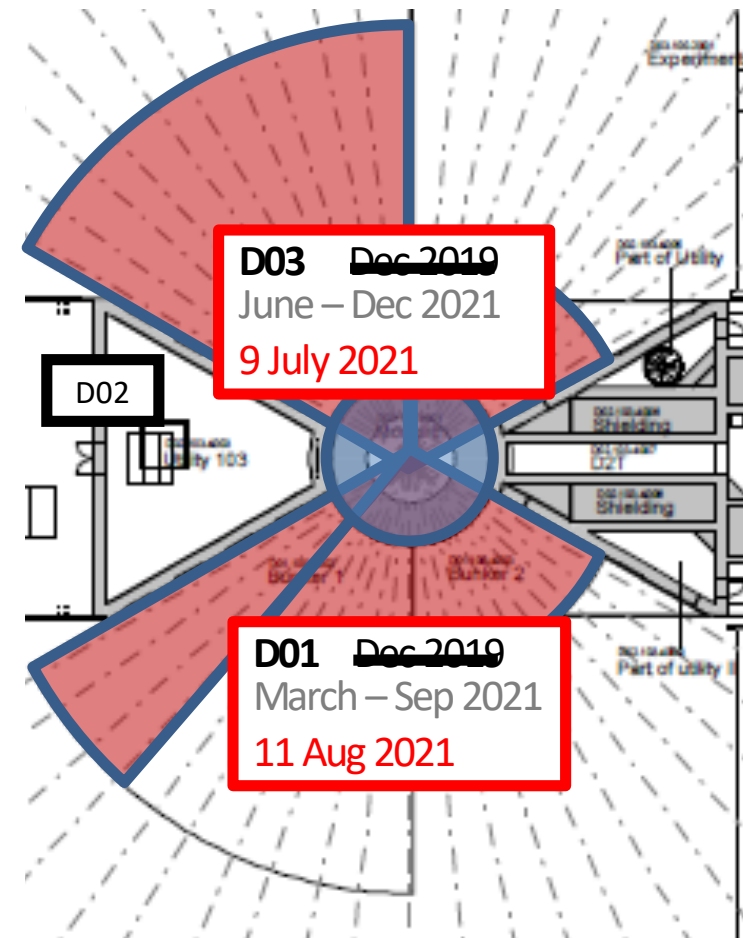
# First *in-bunker* access dates for Instrument Installation

- **Black** = baseline dates from 2016
- **Grey** = estimation 30<sup>th</sup> Jan 2018 (shown at IKON14)
- **RED** = fixed dates 12<sup>th</sup> April 2018

1. Start of joint work with Target in D02 (R6, NBOA & LS etc.)  
Start of bunker work in D01 & D03



2. Start of first in-bunker access for Neutron Instrument construction





# Integrated Schedule

## 3. Bunker construction

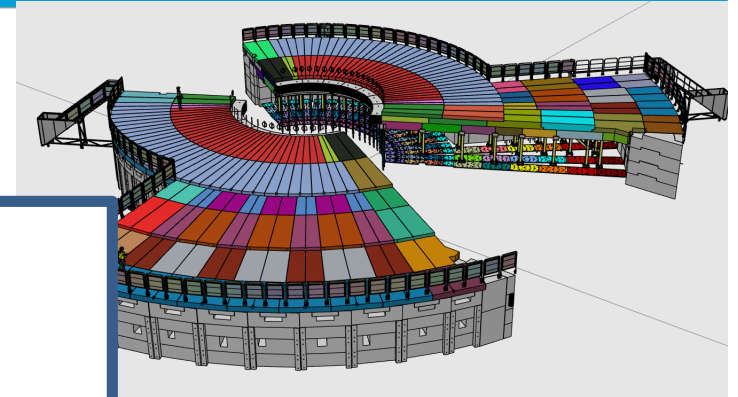


*Bunker team working closely with TD, NSS instruments and CF.*

- Building up bunker following access dates, in order to mitigate delays and to make the best of access dates => build it "from outside and in"
- Working in parallel with "TD& NSS joint monolith schedule"
- 6 months 'open-bunker' for in-bunker instrument installation – more intense on D03 (west), likely to need multiple teams
- Still uncertainty in Bunker design (until successful bunker CDR), required some assumptions on tasks and times

# The Bunker Overview

## Outlook



**Mechanical Design** – Conceptual design being finalized, following completion of neutronics work.

**Physics** – Change in the bunker material composition meant a fresh (updated) battery of analyses needed to be done. All neutronics work is done, reports in review.

**Documentation** – In approval stage

**Purchasing/schedule** – Tender published, contract signing expected dec. '18 –Jan. '19.

**Budget** - Current cost estimates are on budget.

# The Bunker Overview

Q/A

End of presentation

Q/A

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