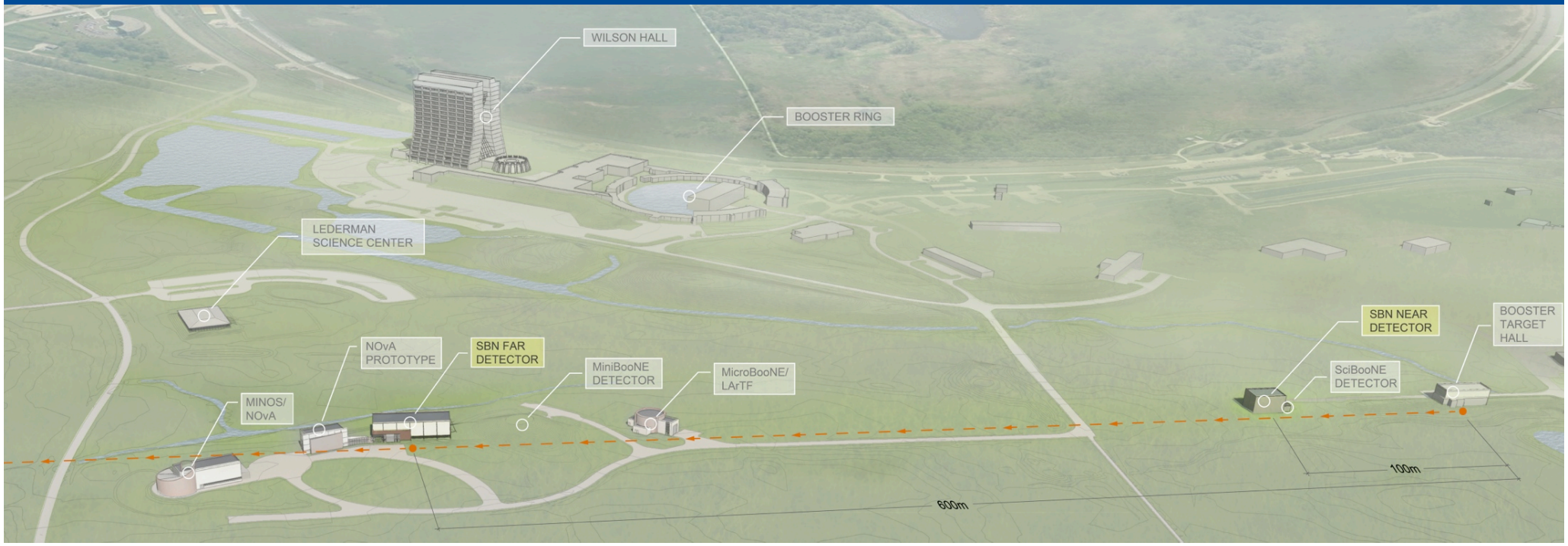


SBN Program Status

Peter Wilson – SBN Program Coordinator

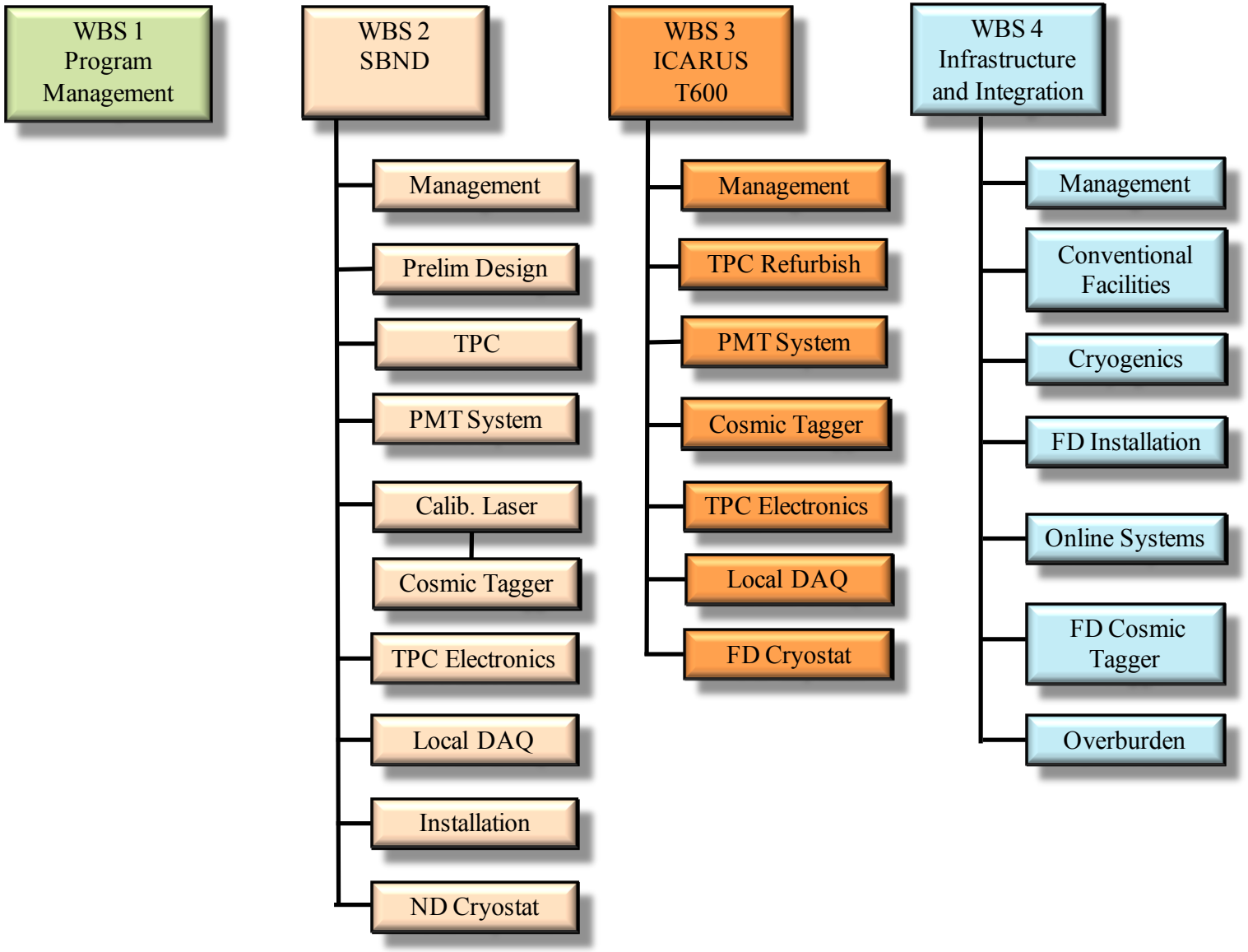
SBN Oversight Board

21 September 2018

Outline

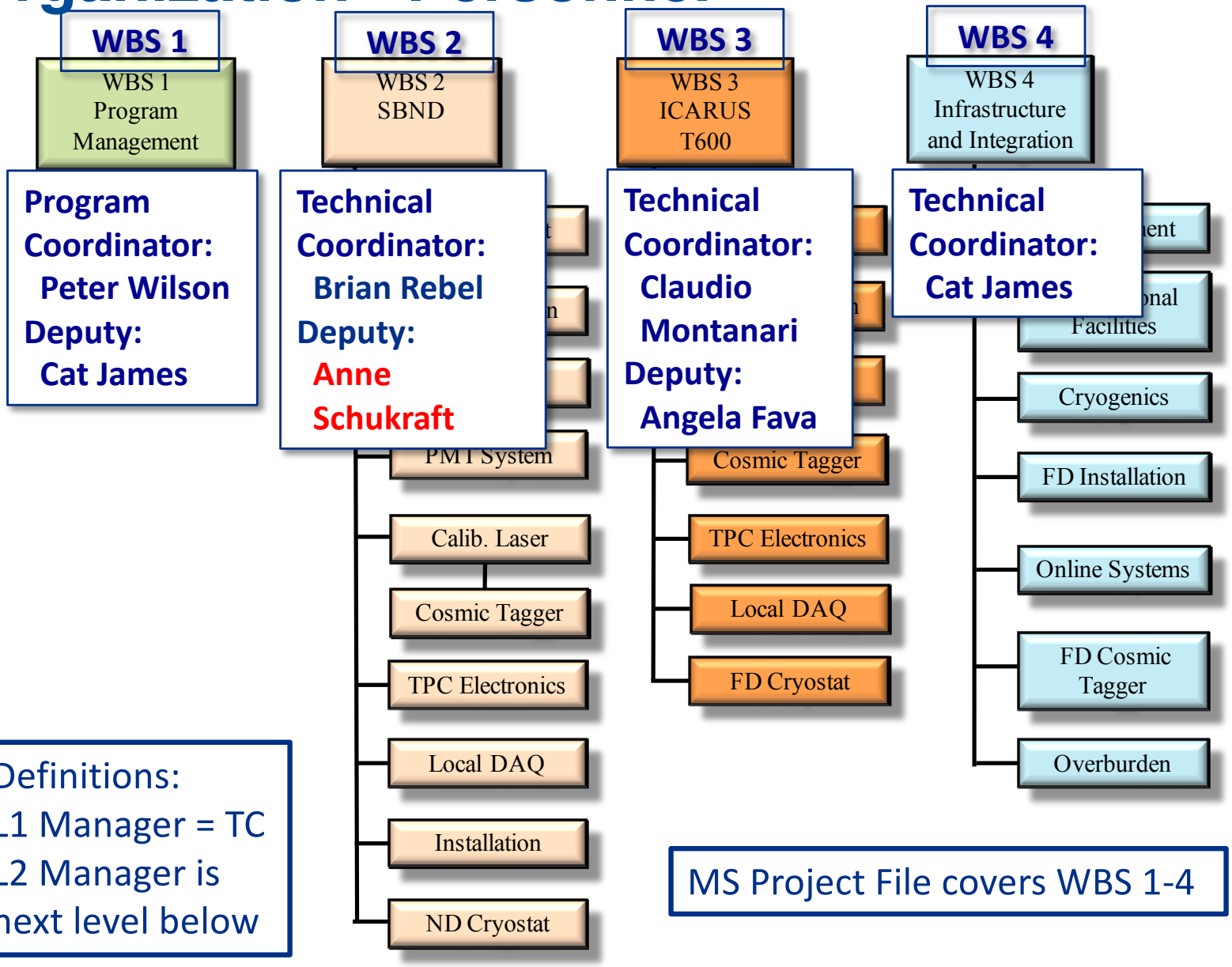
- Personnel changes
- Directors review summary
- Technical Progress on SBN Detectors
  - ICARUS Status (brief – details this afternoon from Claudio)
  - ICARUS Milestones
  - SBND Status (brief – details this afternoon from Brian)
  - SBND Milestones

Organization



Short Baseline Neutrino

Organization - Personnel



Definitions:
L1 Manager = TC
L2 Manager is next level below

MS Project File covers WBS 1-4

Short Baseline Neutrino

SBN Director's Review – June 2018

- A Director's Review for SBN was held June 26-28 2018
  - Review web page

- The charge and format were very different from the three previous reviews:
  - Focus on schedule elements and integrated schedule
  - Not a review of technical choices or cost
  - Small breakout sessions discussing deliverable tasks with respect to schedule

- In future we are considering moving to a model where the review is charged and overseen by the international stakeholders

Director's Review Summary

- From the executive summary of the Review Final Report
  - "The main conclusion of the review was that while an overall integrated schedule for completion of each detector was not available, the information needed to create these schedules does exist."
  - "The committee also reviewed outstanding risks, that if realized would impact the ability of the program to keep on schedule. The committee felt that the sub-system teams had a good handle on their risks and are working towards mitigating outstanding risks."
  - "The committee notes that to date the schedule for the installation of the far detector cold vessels has encountered a number of serious delays, however, the near term schedule for getting the vessels installed will be a significant achievement and careful planning of all the tasks going forward will be needed to try and accelerate the achievements of key milestones I-1 and I-2."
  - "Finally, it is extremely important that the agreements needed to begin the final design of the near detector cryostat be put into place as soon as possible, so that the schedule for the construction of the cryostat does not significantly delay achieving the milestones S-2 and S-3"

SBN Director's Review Response

- Intermediate milestones created for both far and near detectors

- Far detector Installation Coordinator (IC), Aria Soha, has implemented a detailed work planning process:
  - Each installation activity must be reviewed for resource needs, durations, engineering, predecessor tasks, safety etc
  - Approval required by Aria (IC) and Claudio (TC) before work can proceed
  - Feeds into a day-by-day working schedule posted online and reviewed every week
  - Updated master schedule for these tasks through end of December 2018
  - Master schedule update in progress for tasks up to the LAr fill (eg cryo and electronics installation) [Key Milestone I-1]

- Near detector deputy IC, Joseph Zennamo, and deputy TC, Anne Schukraft, initiated complete overhaul of detector assembly and installation schedule
  - Mini-workshops in early September
  - Update of master schedule in two weeks for tasks up to the LAr fill [Key milestones S-1 and S-2]
  - Will adopt work planning process developed by Aria for FD

SBN Director's Review Response

- Significant progress on multi-institutional MOU (see Steve's talk) as crucial component to agreement on final deliverables

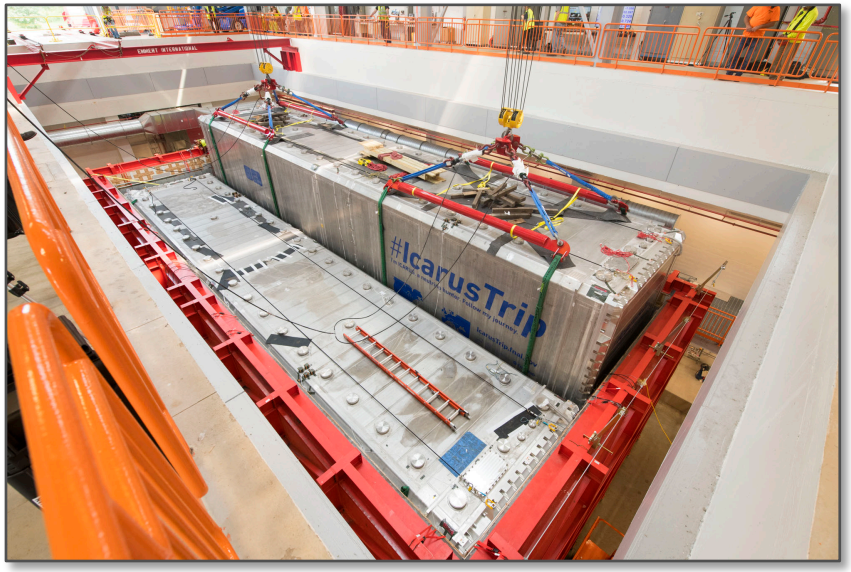
- Outline of agreement on several outstanding deliverables between CERN, INFN, Fermilab developed by Steve B, Marzio N and Peter W in September
  - Addresses ND cryostat (design contract) and warm piping for cryogenics
  - Working out details now, expect to complete in October

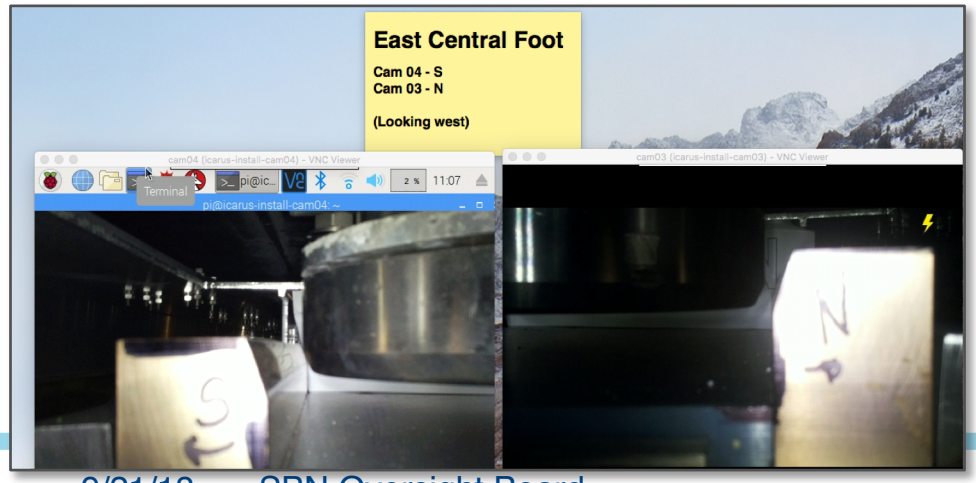
- Working to improve system for visitors coming to work on SBN detectors at FNAL
  - Single contact in Neutrino Division to help interface with Users Office, Visa Office…
  - Rolling out within a few weeks
  - Provide input to lab

- Next Director's review planned for end of November or December
  - Follow-up on all recommendations from June
  - Review of updated schedule and DOE costs
  - Crucial to securing remaining DOE funds

ICARUS Installation Progress

- Installation staying on schedule since delivery of cold shield components in April
- Vessel rigging completed on schedule :
  - ✓ July 23 remove building north wall panel
  - ✓ Aug 2–8 move vessel 1 (done Aug 9)
  - ✓ Aug 9–16 move vessel 2 (done Aug 14)
  - ✓ Aug 16 demobilization completed
- Vessels Positioned to specification:
  - +/- 3mm in horizontal
  - +/- 0.5mm vertical
  - Clearance of 30mm on sides (for slings)
- No injuries or equipment damage

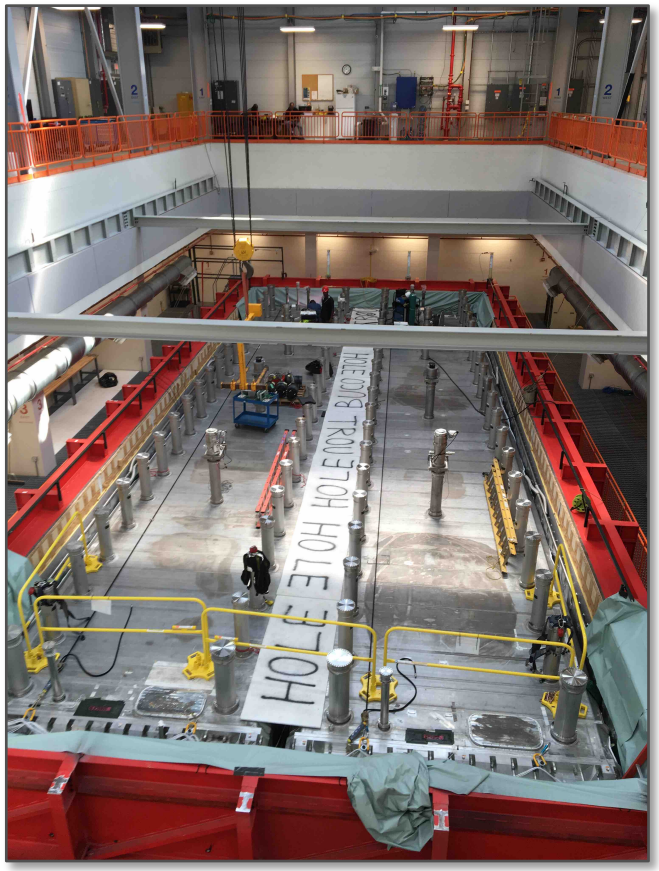


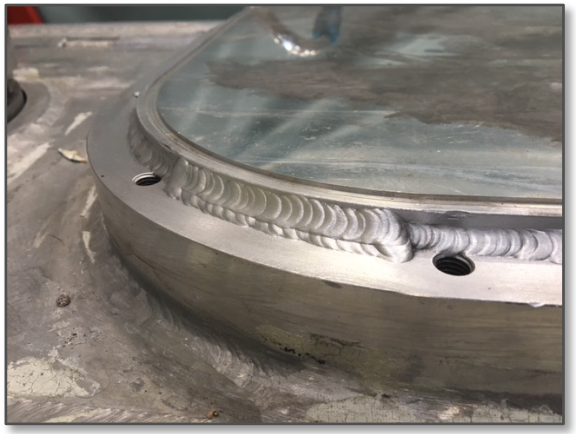


Short Baseline Neutrino

ICARUS Installation Progress

- Post rigging installation on schedule:
  - ✓ Feedthrough chimneys installed and tested
  - ✓ Field cage resistors installed and tested
  - ✓ Personnel access ports closed and welded
  - – Ready to start the vacuum test
  - – Installation of steel structures in progress:
    - CRT top steel, cryogenic platform and stairs
    - Guardrails
  - – Top cold shield being readied (install start 10/1)
  - – Preparing for warm vessel roof (install start 10/14)
    - Test fit of warm vessel roof piece 9/14
  - – Installation of crosses on chimneys start in mid-November
  - – Demaco (CERN contractor) scheduled to start proximity cryogenics installation in January





Short Baseline Neutrino

ICARUS Key Milestones

Milestone	Description	Baseline Date
I-1	ICARUS detectors are ready to fill with liquid argon	May 2019
I-2	ICARUS detectors are filled with liquid argon and ready for detector commissioning (LAr purity adequate for physics has been achieved)	Nov 2019
I-3a	ICARUS detectors are ready for physics data - *CRT is operational*	Jan 2020
I-3b	ICARUS detectors are ready for physics data - *Shielding in place*	Feb 2020

Baseline dates set in March 2018

ICARUS Milestones

Intermediate milestones leading to Key Milestone I-1 *ICARUS Ready to Fill*

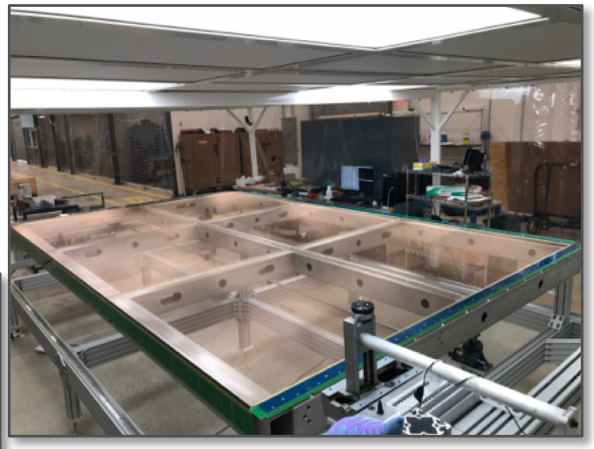
Intermediate Milestone	Owner	Forecast Date	Baseline Date	
Vessels rigged into building	P. Wilson	16-Aug-2018	16-Aug-2018	✓
Manholes welded and vacuum test successful	C. Montanari	29-Sep-2018	10-Oct-2018	
Warm Vessel roof complete	C. James	9-Nov-2018	15-Nov-2018	
Cryo Platform complete	C. James	12-Oct-2018	15-Dec-2018	
Proximity cryogenics installation begins	B. Norris	13-Dec-2018	15-Jan-2019	
DBB & flanges installation complete and tested	A. Fava	01-Feb-2019	15-Feb-2019	
Cold proximity cryogenics installation complete	B. Norris	03-Mar-2019	15-Apr-2019	
1st T300 readout installation complete	A. Fava	01-Mar-2019	15-Mar-2019	
All detector readout installed	A. Fava	15-Apr-2019	1-May-2019	
Begin vacuum pumping	C. Montanari	15-May-2019	15-Jul-2019	
Cryogenic operation approved	B. Norris	15-Jun-2019	15-Jul-2019	

Forecast Date Based on SBN Schedule after August Dates CR and August Milestones CR

Grey text dates – not expected to change but still cross-checking details in the schedule

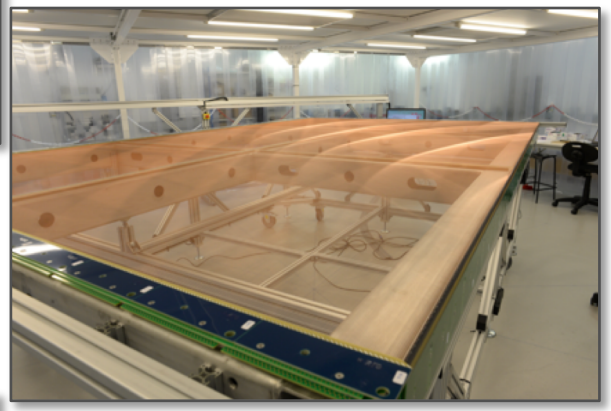
SBND Progress

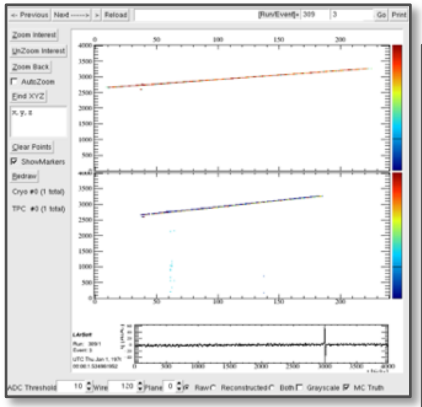
- TPC subsystem fabrication in final stage:
  - Two (of 4) anode planes completed and ready to ship (one each in Daresbury and Yale)
  - Cathode (Liverpool) delivered to FNAL
  - Field cage (Yale) completed, ready to ship
- TPC assembly facility setup at FNAL Dzero building and tested with mock APA frames
  - TPC assembly will start this fall
- TPC electronics Vertical Slice Test (VST) with LArIAT TPC
  - Two runs: Beam (June), cosmics (Sept)
  - Excellent noise performance
  - Shakedown DAQ hardware and software
  - Some issues likely related to LArIAT TPC configuration
  - Production Readiness Review in October
- PMT system components near complete



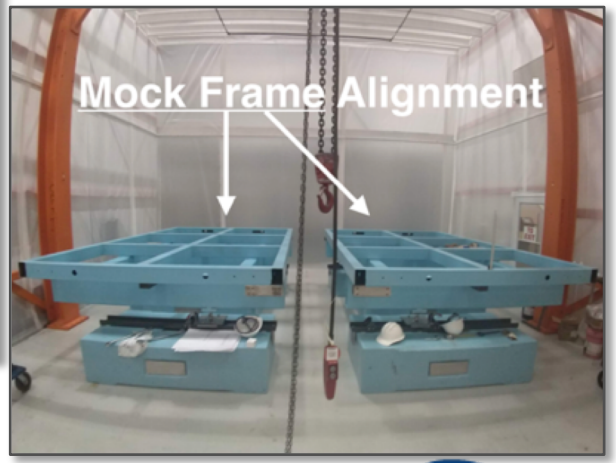
2 of 4 APAs Wired

CPA@FNAL





VST cosmic track



SBND Milestones on DOE schedule

Milestone	Description	Baseline Date
S-1	SBND is ready for transport from Dzero Assembly Building to the SBN ND hall	Aug 2019
S-2	SBND detector is ready to fill with liquid argon	June 2020
S-3	SBND detector is filled with liquid argon and ready for detector commissioning (LAr purity adequate for physics has been achieved)	Oct 2020
S-4a	SBND detectors are ready for physics data - *CRT is operational*	Nov 2020
S-4b	SBND detectors are ready for physics data - *Shielding in place*	Dec 2020

Baseline dates set in March 2018

SBND Milestones

Intermediate milestones leading to
Key Milestone S-1 SBND ready to move

Milestone	Owner	Baseline	Forecast	Completed
First set of APAs shipped to Fermilab	K. Mavrokoridis	24 Sep 2018	22 Oct 2018	
PO for COTS ADCs placed	H. Chen	31 Oct 2018	15 Nov 2018	
All TPC components at Fermilab	K. Mavrokoridis	29 Nov 2018	20 Dec 2018	
Complete atf assembly at DAB	J. Zennamo	1 Feb 2019	1 Mar 2019	
APAs and CPAs installed in atf	J. Zennamo	1 Mar 2019	22 Mar 2019	
50% of motherboards at Fermilab	H. Chen	15 Mar 2019	15 Apr 2019	
Field Cage assembly complete	J. Zennamo	15 Apr 2019	15 May 2019	
Cold electronics installed and tested	H. Chen	16 Aug 2019	30 Sep 2019	
S1: TPC ready to move to SBN ND	A. Schukraft	30 Aug 2019	30 Oct 2019	

SBND Milestones

Intermediate milestones leading to
Key Milestone S-2 SBND ready to fill w/LAr

Milestone	Owner	Baseline	Forecast	Completed
FNAL/CERN/INFN Agree to Division of Responsibilities	B. Rebel	T0	T0	
GTT Design Study Begins	M. Nessi	T0 + 1 Month		
Membrane Cryostat Completed	M. Kim	T0 + 12 Months		
TPC Plug Assembly Mounted in Cryostat	M. Kim, J. Zennamo	T0 + 13 Months		
Plug Welded to Cryostat	M. Kim, J. Zennamo	T0 + 14 Months		
S2: SBND Ready To Fill	A. Schukraft	T0 + 16 Months		

Summary

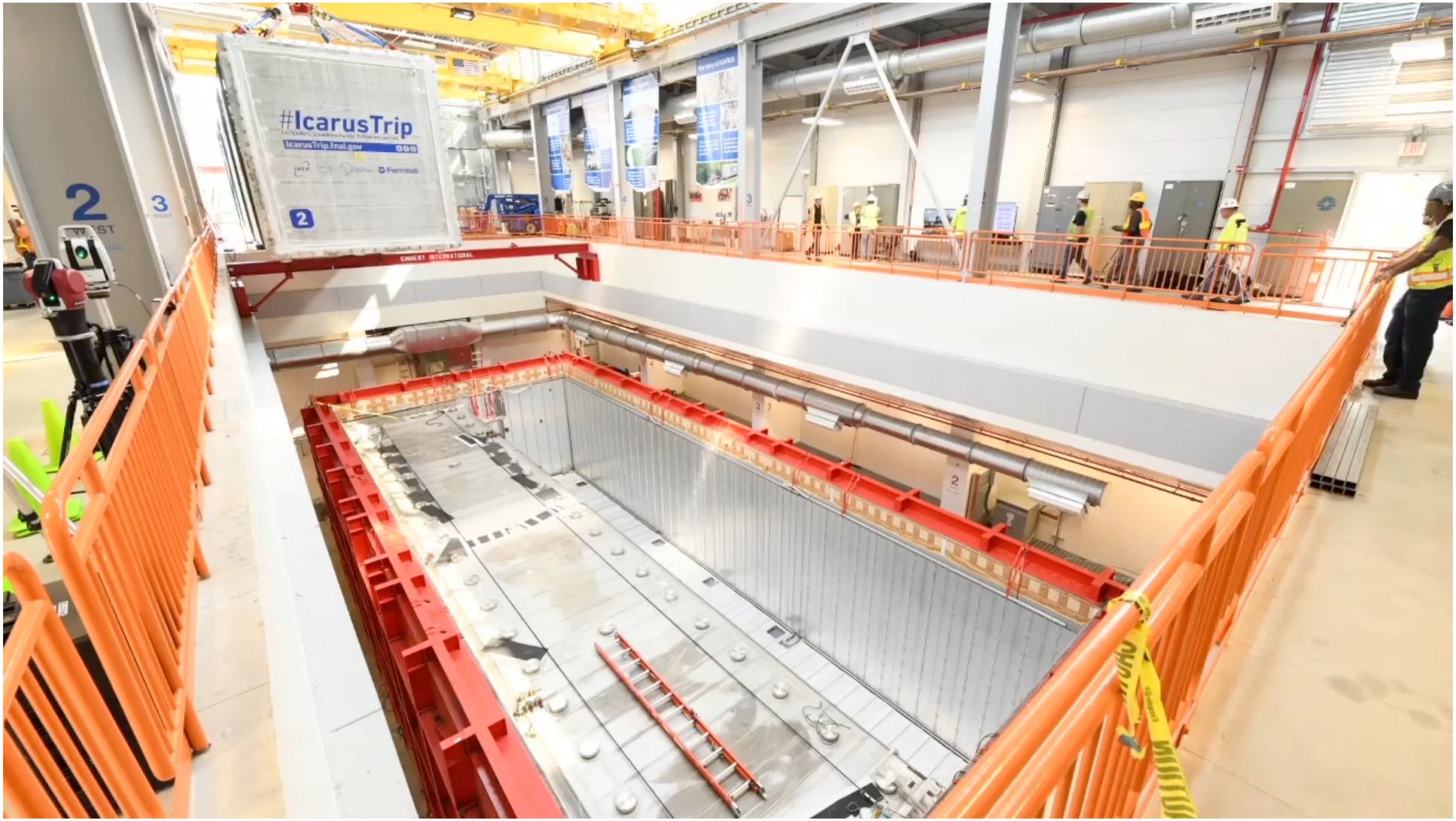
- ICARUS installation progressing well
  - Staying on schedule since arrival of cold shields at Fermilab
  - Joint effort between Italian collaborators, U.S. collaborators, Fermilab and CERN

- SBND construction progressing well
  - Center of activity moving to Fermilab as TPC fabrication nears completion
  - Near completion of agreement on cryostat

- Nearly finished responding to last Director's Review, starting planning for next review

Backup

ICARUS Rigging – 2nd Vessel Insertion



Short Baseline Neutrino