

FNAL Facility Space Needs of MicroBooNE



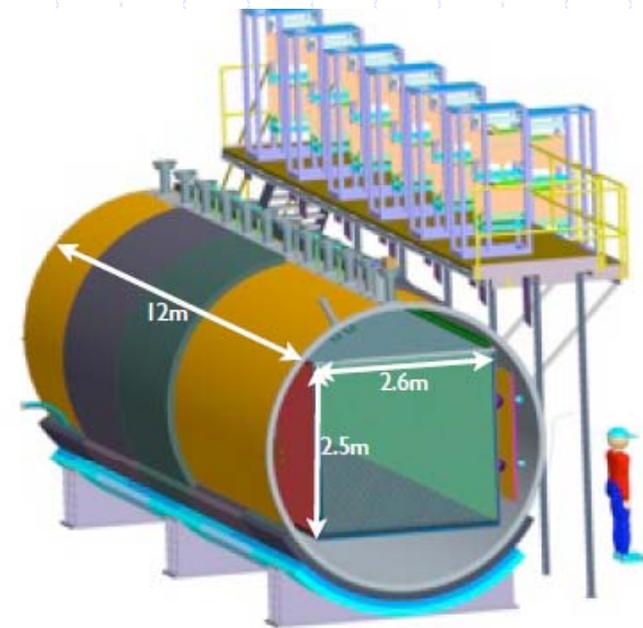
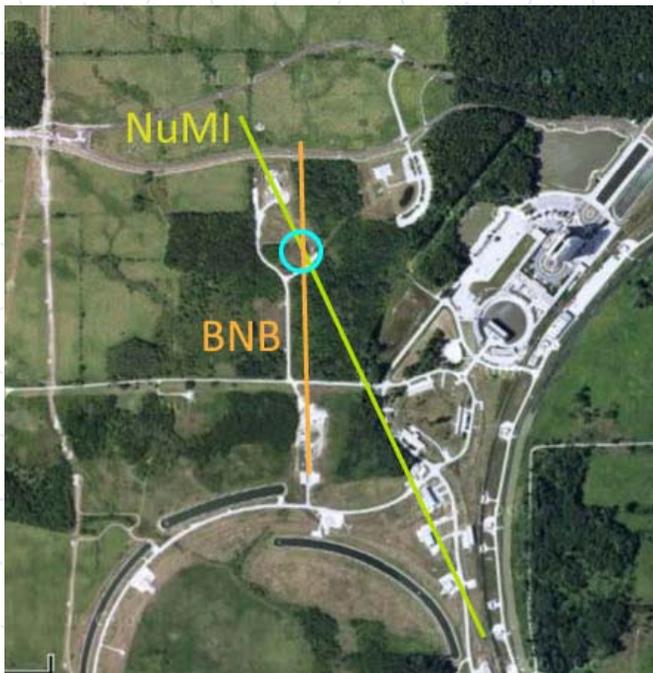
Presented to Master Planning Task Force

16 August 2010

The MicroBooNE Detector

A Liquid Argon Time Projection Chamber LArTPC

- ~200 ton cryostat vessel
 - 3-m D, 12-m long



- Located on the Booster Neutrino Beam

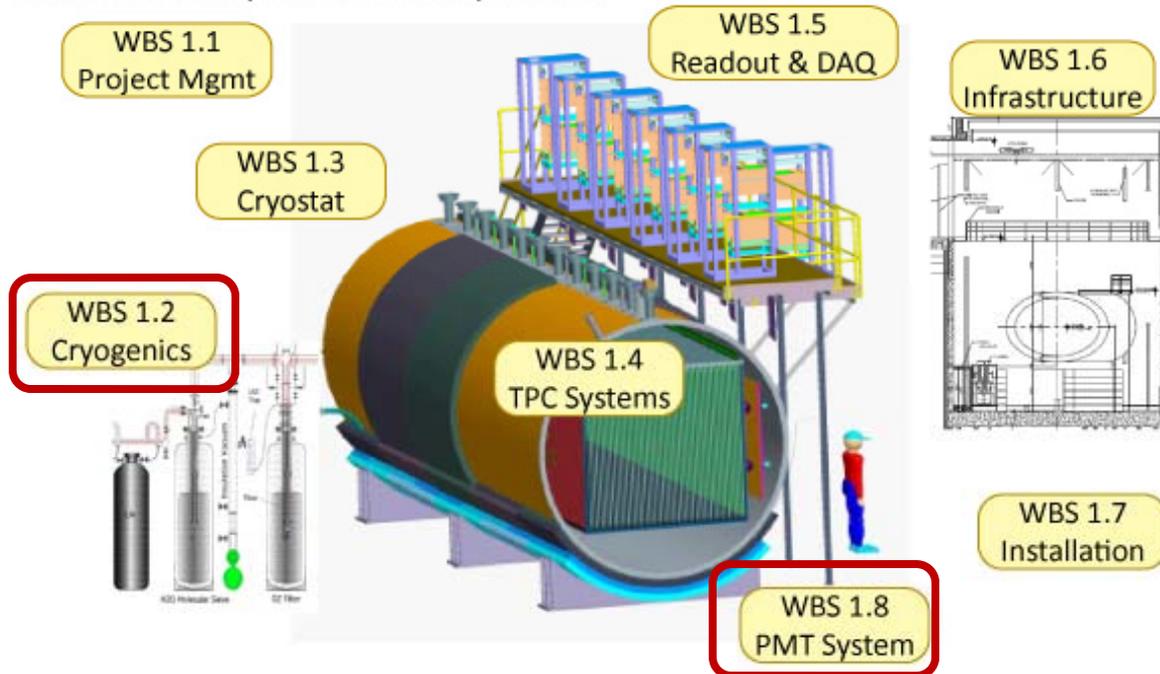
Outline

- Space Needs in R&D phase (present through 2011)
 - Space Needs in Fabrication and Construction phase (2011 - 2012)
 - Space Needs in Installation phase (2012)
 - Operating needs (2013+)
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- No office space needs discussed today

R&D Phase

- Highlighted areas hold R&D activities at FNAL
 - Cryogenics
 - PMT System

The WBS Dictionary describes the scope of each



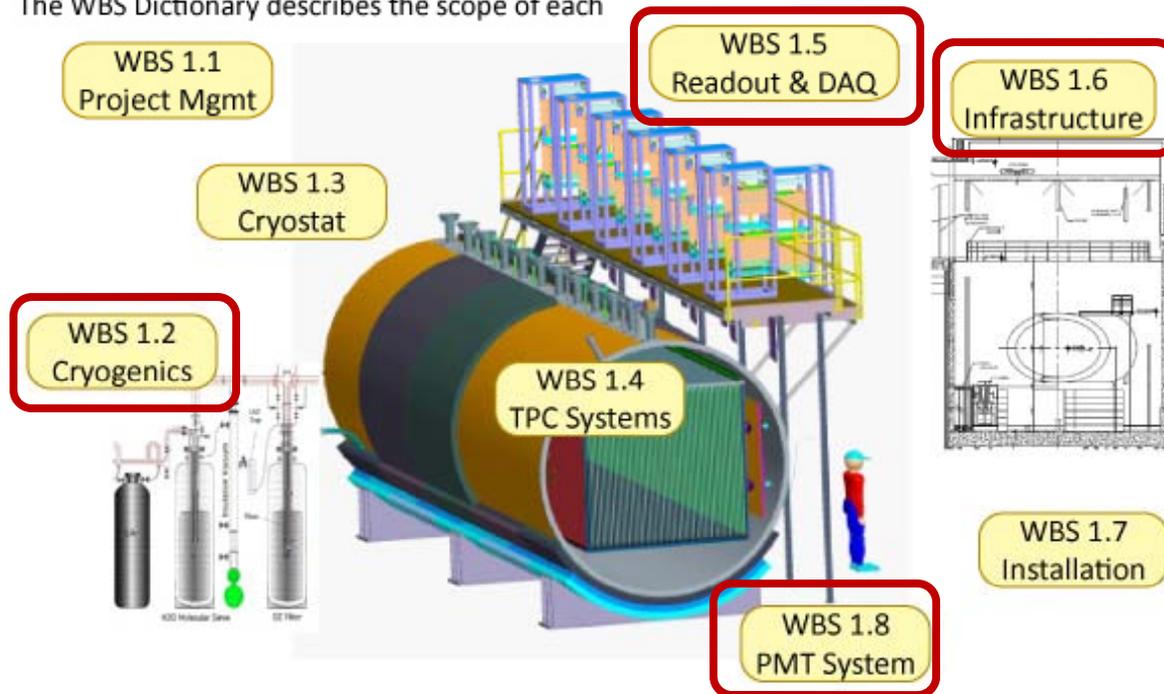
R&D Phase

- Cryogenics R&D activities are conducted within existing facilities
 - Some R&D is folded up within the Liquid Argon Purity Demonstration test (LAPD), located at PC4
 - LAr Materials Test Stand, located at PAB, is used as needed and scheduled by other WBS (wire chamber, electronics, pmt) to test proposed materials
- PMT R&D activities
 - An area at Lab 5/6 has been set up for PMT R&D
 - Coating of WLS material onto plates; shielding tests; cold tests
 - ODH review of area was conducted and cleared for cold tests

Fabrication & Construction Phase

- Highlighted areas hold R&D activities at FNAL
 - Cryogenics
 - Readout & DAQ
 - PMT System
 - Infrastructure

The WBS Dictionary describes the scope of each



Fabrication & Construction Phase

- Cryogenics
 - Lab E/F for storage
 - Primarily for storage of purchased parts; much of the cryo plant is being designed as vendor-fabricated modules, with final assembly performed in-situ at the Enclosure during Installation Phase
- Readout & DAQ
 - Readout racks will be assembled at FNAL
 - Space not yet determined - might be Lab E/F, or D-Zero
 - 12-15 racks, space for outfitting (cooling systems, cable harnesses, monitoring systems with sensors)
- PMT
 - Continued use of Lab 5/6 areas
 - Assembly-lines for WLS plate coating and making installation-ready PMT mounting fixtures
 - Storage of installation-ready PMTs, until needed

Fabrication & Construction Phase

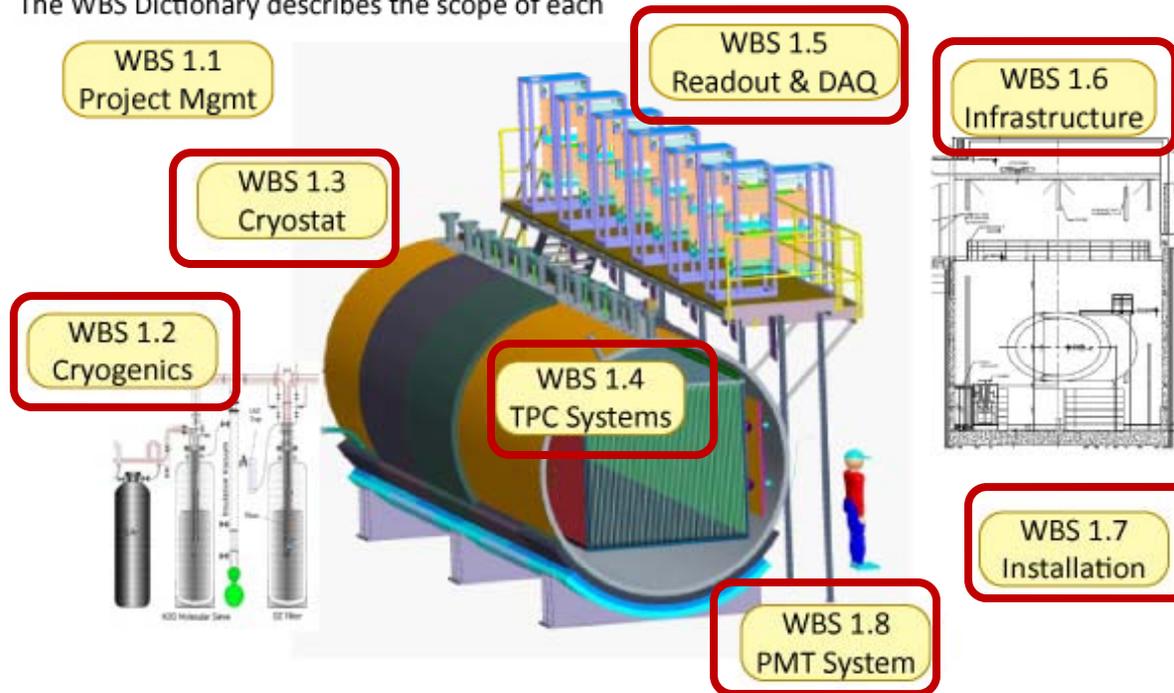
- Infrastructure

- The experiment enclosure will be constructed 2012
 - Conversion of existing enclosure preferred
 - New enclosure being considered
- History of MicroBooNE Enclosure planning
 - Collected in slides by Ed Crumpley
 - A good summary of how we got to where we are
- The process of planning the enclosure went hand-in-hand with the safety and other requirements for the operation of a large volume cryogenic detector
- Enclosure specifications are in the CDR (morphing into the TDR)

Installation Phase

- Highlighted areas hold Installation activities taking place at FNAL
 - Installation phase is initiated when the Cryostat Vessel arrives on-site
 - Involves everything

The WBS Dictionary describes the scope of each



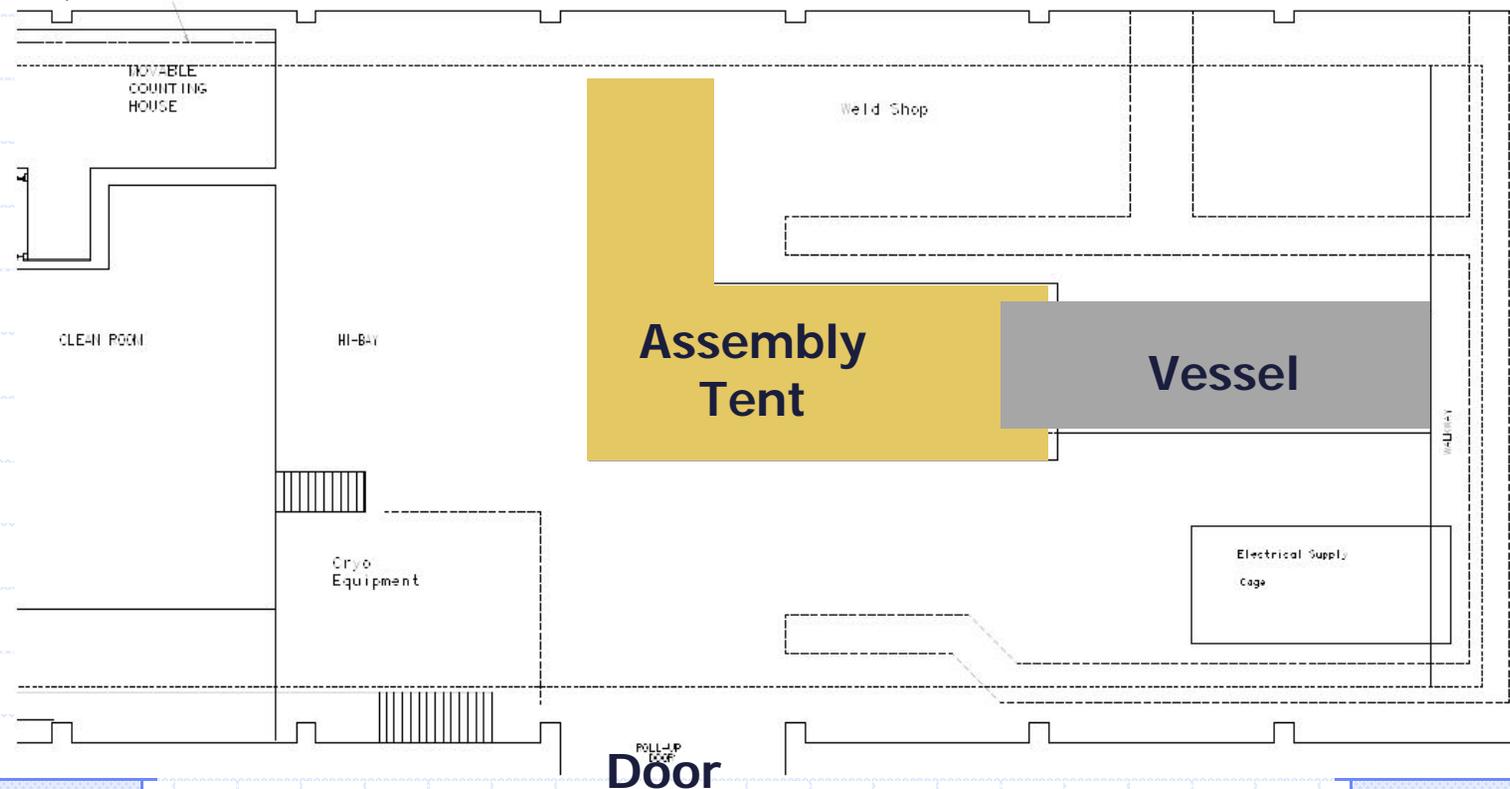
Installation Phase

- Need a location large enough to hold the cryostat vessel *in its final state*
 - Current acquisition plan for the vessel is to have the vendor deliver a partially completed vessel, then finish it here
 - Extended length "nozzles", long enough to stick out through 16-inches of insulation, will be welded on by the vendor after the vessel is delivered to FNAL to mitigate risk of damage in shipping
 - One endcap is not attached at delivery, so that detectors can be installed inside. The vendor welds on this endcap, at FNAL, after the detectors are installed
 - Pressure test of this code-stamped vessel to be performed by the vendor, on site at FNAL, after the endcap is welded on
 - Need a space with a door large enough to truck the vessel in/out; space long enough to hold vessel plus a "tent" around the front to provide a "clean area" for detector assembly; where welding can occur; with a crane able to lift the endcap

Installation Phase

• Assembly Area

- Lab 6 considered - barely meets criteria; getting the vessel in and out would not be easy
- D-Zero is preferred. Request has been made to PPD & D-Zero Dept.



Installation Phase

Proposed Clean Room tent (carport)



Approximate scale
of vessel



Operations Phase

Installation requirements at D-Zero end when the assembled vessel + detectors is moved from D-Zero to the experiment enclosure. A few more months of installation takes place at the enclosure before the experiment is ready for operations.

- Operations requires

- space at the experiment enclosure
 - Space for Nitrogen delivery and storage is part of the enclosure design criteria
- Control Room
 - Assume we will located in the existing Neutrino Experiments joint Control Room
- Space for maintenance of cryogenic plant equipment
 - Pump seals will require work 3-4 times per year; Lab E/F ?
 - The ability to remove/replace this equipment relatively easily, and without disruption to detector data-taking, is part of the enclosure design criteria and the cryo plant design criteria