

Summary of 1st DUNE TDR Planning Meeting

Bob Wilson

DUNE Single-Phase Photon Detector Consortium Meeting

November 7, 2017



DUNE TDR Planning Meeting

- **First TDR meeting of collaboration management with consortium leadership and TDR coordinators/editors**
 - Discussion led by Mark Thomson
 - <https://indico.fnal.gov/event/15615/contribution/0/material/slides/0.pdf>
- Present from PDS: D. Warner, R. Wilson (J. Urheim for Physics, others?)
- Focus on TDR – Technical Proposal discussed towards the end
- Mark went through each volume/section – I will focus on parts most relevant to PDS
- Most of the slides are cut-and-paste from Mark's talk (boxed areas), my comments are the bullet point text

TDR Plans

- **Structure**

- The TDR will consist of multiple volumes. Each volume is expected to be between 150 – 200 pages, may be some exceptions
- Detector volumes (single-phase and dual-phase) divided into:
 - Overview volume
 - Sub-system volumes

- **Volumes**

- Volume 1: Executive Summary
- Volume 2: Physics
- Volume 3: Single-Phase Far Detector: Overview
 - + sub-system volumes
- Volume 4: Dual-Phase Far Detector: Overview
 - + sub-system volumes
- CDRs: Computing and Near Detector

- Computing and Near Detector at **Conceptual Design** Level – TDR ~2 years later

Volumes 1 & 2

Volume 1: DUNE

- **Volume 1: Executive Summary**

- Introduction
- LBNF and Far Site Facilities
- DUNE Physics
- DUNE Far Detectors
- DUNE Near Detector
- Project Strategy
- Project Management
- Cost and Schedule (content TBD)

Intended as a high-level overview of overall project

Volume 2: Physics

- **Volume 2: Physics**

- DUNE Physics goals (primary, secondary, ancillary)
- Far Detector Reconstruction
- Long-Baseline Neutrino Oscillations
- Supernova Neutrinos
- Nucleon Decay
- Beyond the SM Physics
- Other Topics
- Near Detector Physics

Similar to CDR content, but more realism in studies

Volume 3: FD-SP

- **Volume 3: Single-Phase Far Detector: Overview**
 - Design Motivation
 - Cryostat and cryogenics
 - Overview of the Single-Phase Far Detector
 - ProtoDUNE-SP
 - Detector Performance
- **Volume 3A: APAs**
- **Volume 3B: High Voltage System**
- **Volume 3C: TPC Electronics**
- **Volume 3D: Photon Detection System**
- **Volume 3E: DAQ**
- **Volume 3F: Slow Controls and Cryogenic Instrum.**
- **Volume 3G: Installation and Integration**

Each volume expected to be 150-200 pages

- Target: 150-200 pages per volume

Volume 3 and 4: Comments

- **Structure follows consortium structure**
 - But we have put in place three joint SP/DP consortia
- **There will be some common content/overlap**
 - High-Voltage System
 - Feedthroughs, cathodes, field cage
 - DAQ
 - Slow controls and cryogenic instrumentation
- **But, there will be some specifics to SP / DP**
 - even though developed in a single consortium
- **For common systems decided to have separate SP/DP volumes**
 - Simpler to put together, easier to read/review
 - Could be repeated sections, e.g. backend DAQ, field cage bars

2. Detector System Volumes

- Each volume will follow a common overall structure
- **Volume 3A: Anode Plane Assemblies** (150-200 pages)
 - **Chapter 1: Overview** (10 pages)
 - Introduction
 - Design Considerations
 - Scope
 - **Chapter 2: APA Design** (50 pages)
 - Frames
 - Boards
 - Wires
 - QA
 - Feedthroughs (where appropriate, not for APA)
 - **Chapter 3: Production and Assembly** (40 pages)
 - Wire Winding Machine
 - Tooling
 - Assembly Procedures

- APA used as an example format

- 
- **Chapter 4: Interfaces** (10 pages)
 - LBNF Cryostat/Detector Support Structure
 - Photon Detection system
 - TPC electronics
 - **Chapter 5: Installation, Integration and Commissioning** (30 pages)
 - Transport/Handling
 - Integration with PDS and TPC electronics
 - Calibration?
 - **Chapter 6: Quality Control** (10 pages)
 - Production and Assembly (Local)
 - Post-factory Installation (Remote)
 - **Chapter 7: Safety** (5 pages)
 - **Chapter 8: Organization** (20 pages)
 - Consortium organization
 - Planning Assumptions
 - WBS and responsibilities
 - High-level Cost and Schedule

- PDS explicit chapter 4 section
- Overlap of other items that appear in PDS chapter not discussed

2.1 Additional Documentation

- Needs to be agreed with LBNC/Cost Group
- We believe the following are essential:
 - Cost book (in agreed format);
 - DUNE Management Plan;
 - Risk Register for the international DUNE project;
 - Interface documentation;
 - Project schedule (MS project);
 - Change-control process documentation;
 - QA/QC Management Plan;
 - Safety Management Plan;
 - WBS Dictionary;
 - Engineering Management Plan (Standards etc.).

3. TDR Organization

- **Co-Spokespersons Intend to appoint a central editorial team consisting of (at least) two Overall Editors supported by a Technical Editor**
 - coordinate the TDR activities
 - ensure a uniform high standard across the volumes of the TDR.
- **Each volume will have one or more responsible editor(s):**
 - Volume 1 (Executive Summary): **Co-Spokespersons**
 - Volume 2 (Physics): **Physics TDR Editors**
 - Volume 3 (SP Far Detector): **One of the Overall Editors**
 - Volume 3A-3F (SP Systems): **Nominated by the consortia**
 - Volume 3G (Installation and Integration): **Nominated by the TC**
 - Volume 4 (DP Far Detector): **One of the Overall Editors**
 - Volume 4A-4F (DP Systems): **Nominated by the consortia**
 - Volume 4G (Installation and Integration): **Nominated by the TC**
 - CDR (Computing): **DUNE Computing Coordinators**

- Anne Heavey – technical editor
- Tim Bolton + 1 other – overall coordinators
- PDS recognized for being the first to nominate an editor (which was accepted by co-spokes + TC) – other asked to do so within 2 weeks

4. Technical Proposal

- **TP** needs to be written in approximately 6 months
 - November 2017 – April 2018
- Leaves 12 months for **TDR**
 - May 2018 – April 2019
- It is essential that **TP** is on the path to the **TDR** and not a detour
 - The technical proposal will broadly follow the structure of the TDR, with almost identical chapter/section headings, but the information will be in a compressed form. Plan for that TP sections will be approximately five times shorter than the corresponding TDR section.

- TP sections ~ 5X shorter than TDR – 30-40 pages
- PDS discussed as “special”

Technical Proposal Structure

- **Volume 1: Executive Summary**
 - LBNF and Far Site Facilities
 - DUNE Far Detectors
 - DUNE Near Detector
 - DUNE Physics
- **Volume 2: Single-Phase DUNE Far Detector**
 - Design Motivation (~5 pages)
 - Overview of the Single-Phase Far Detector (~10 pages)
 - APAs (~30 pages)
 - HV System (~30 pages)
 - TPC Electronics (~30 pages)
 - Photon Detection System (~30 pages)
 - DAQ (~30 pages)
 - Slow Controls and Beam Instrumentation (~20 pages)
 - Detector Performance (~10 pages)
 - Responsibilities (~10 pages)

- Closely follows TDR with volumes -> chapters

5. Timeline/Milestones

Planning milestones:

- **Nov-17:** Editors of TDR volumes appointed
- **Nov-17:** First TP/TDR editors meeting – outline of contents
- **Dec-17:** Tables of contents of TDR and TP (section heading level)
- • **Apr-18:** Complete drafts of the TP volumes
- **May-18:** Final version of the TP submitted to the LBNC
- **Jul-18:** LBNC review of the TP
- • **Feb-19:** First drafts of all TDR volumes
- **Mar-19:** TDR internal review
- **Apr-19:** Final version of TDR submitted to the LBNC
- **May-19:** Cost appendix submitted to RRB Cost Scrutiny Group
- **Jun-19:** Finalize response to questions from LBNC
- **Jul-19:** LBNC review of TDR

Next Steps

- Establish SP-PD TDR/TP Team
 - Chair (RJW), Technical Lead (DWW)
 - One convener from each WG (WGC) responsible for that chapter
 - send name to RJW by 10 Nov. 2017; would like to meet late next week
 - Ex officio – Anne Heavey
- Feedback on Table of Contents (TOC) for TDR and TP
 - It was acknowledged that the PDS it may look different from systems that are further along. ES+DWW negotiation with Collaboration management.
This may be the hardest part!
 - Finalize TOC-level and draft subsub... headings in December
 - Need to discuss with AH policy on subsub...section headings
 - WGC responsible to get names next to each heading
- Will use GitHub for TDR and TP
 - Contributors will need GitHub accounts – I will distribute instructions when
 - TP not set up yet – AH is working on it
- It isn't too early to think about what you would like to include