

# TDR/TP Preparation

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# Introduction

- DP-electronics Consortium is responsible for TDR Volume 4C
  - Editors: Jaime Dawson (APC), VG (IPNL)
- Technical Proposal (TP) is basically the short version of TDR
  - Rescaling TDR to TP
    - Volume (150 – 200 page) → Chapter (30 – 40 pages)
    - Chapters → Sections
- TP should have the same structure in terms of sections as TDR
- The TeX source of the entire TP (also TDR) is publically available on DUNE github (<https://github.com/DUNE/Technical-Proposal>)

# Dates

From [TDR planning document](#)

## 4. Timeline and Milestones

There are number of assumed dates that frame the programme of work:

- Oct-17: Editors of TDR volumes appointed
- Nov-17: TP/TDR Kick-off meeting – outline of contents
- Dec-17: Complete tables of contents of TDR and TP (section heading level)
- Apr-18: Complete drafts of the TP volumes *Next milestone*
- 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 *Draft of TDR*
- 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

# Planning for Technical Proposal

Dates from T. Bolton and S. Zeller  
the overall editors of the TP volumes appointed by the spokespersons

- **January 12:** Finalize table of contents (section heading level)
- **February 23:** First rough draft of TP due
- **March 16:** Second rough draft of TP due
  - Drafts will be sent to external reviewers for comment
- **April 13:** Final version of TP due
- **May 11:** TP submitted to LBNC

Start filling sections as much as possible from the existing material

- DUNE CDR
- [Document prepared](#) for DAQ workshop
- [Interface document](#) for DP-Electronics – DAQ
- Material prepared for the LAr-Proto paper

# TP Outline

Total should  
be ~30 pages

<b>1</b>	<b>TPC Electronics</b>	<b>2</b>
1.1	TPC Electronics System Overview	2
1.1.1	Introduction	2
1.1.2	Design Considerations	2
1.1.3	Scope	3
1.2	TPC Electronics System Design	5
1.2.1	Cryogenic Analog FE Electronics	5
1.2.2	Signal Feedthrough Chimneys	5
1.2.3	Low-voltage Power Supplies for FE Electronics	5
1.2.4	Network-based uTCA Architecture	5
1.2.5	Digital AMC Electronics	5
1.2.6	Timing Distribution	5
1.2.7	Electronics for Light Readout	5
1.3	Production and Assembly	5
1.3.1	Cryogenic Analog FE Electronics	5
1.3.2	Signal Feedthrough Chimneys	5
1.3.3	Timing System and uTCA	5
1.3.4	Charge Readout Electronics	5
1.3.5	Light Readout Electronics	5
1.3.6	Quality Assurance	5
1.4	Interfaces	5
1.4.1	Cryostat and Cryogenics	5
1.4.2	Slow Control System	5
1.4.3	DAQ System	5
1.4.4	Photon Detection System	5
1.5	Installation, Integration and Commissioning	5
1.5.1	Transport and Handling	5
1.5.2	Signal Feedthrough Chimneys	5
1.5.3	uTCA crates	5
1.5.4	Integration within DAQ	5
1.5.5	Integration with Photon Detection System	5
1.5.6	Calibration	5
1.6	Quality Control	5
1.6.1	Protection and Assembly (Local)	5
1.6.2	Post-factory Installation (Remote)	5
1.7	Safety	5
1.8	Organization and Management	5
1.8.1	Dual-Phase TPC Electronics Consortium Organization	5
1.8.2	Planning Assumptions	5
1.8.3	WBS and Responsibilities	5
1.8.4	High-level Cost and Schedule	5

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Most of the material already exists in various documents

*Sections that require most new writing:*

- Production and Assembly
- Interfaces
  - There is a DAQ Interface document written already
- Installation, Integration and Commissioning

Most of the material also exists: [WBS document](#)

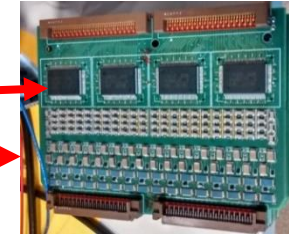
Basic numbers are well defined (caveat: number of ch for LRO)  
 → baseline cost model

## Components for a 10 kton dual-phase module

(list based on current 6x6x6 design, possible optimizations on channels density increase)

Total number of charge readout channels: 153600

- Cryogenic ASICs (16 ch): 9600
- Cryogenic FE cards (64 ch): 2400
- AMC cards (64 ch): 2400
- uTCA White-Rabbit cards: 240
- uTCA crates (including MCH,PU,FU): 240
- 10 Gbe optical links to backend: 240
- VHDCI cables (32 ch) 4800



White-Rabbit switches (18 ports): 16



# Conclusions

- Produce the first draft of the TP document by the end of Feb
- Final version of TP is to be submitted to LBNC in May
- Structure adopted for TP should be extendable to TDR