Status of the Technical Design Report (TDR) for SAND in the ND complex

Paolo Bernardini

SAND general meeting

May 7, 2024

Status of the TDR
6 May, 2024

Quantitative analysis of the TDR writeup

Observables: number (n) of pages

temporal incremental ratio $\boxed{\dfrac{\Delta n}{\Delta t}}$

Δn = page increase

Δt = 21 days

Section 1 – Overview $n = 4$ $\Delta n = 0$

Section 2 – ECAL $n = 11$ $\Delta n = 0$

Section 3 - Magnet $n = 1$ $\Delta n = 0$

A preliminary word document
(~ 5 pages) submitted yesterday

Section 4 – GRAIN $n = 14$ $\Delta n = 11$

Section 5 - Tracker $n = 2$ $\Delta n = 0$

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Section 6 – DAQ $\qquad$ $n = 1$ $\qquad$ $\Delta n = 0$

Section 7 – Det. Control Syst. $\qquad$ $n = 3$ $\qquad$ $\Delta n = 0$

Section 8 – Det. Safety Syst. $\qquad$ $n = 4$ $\qquad$ $\Delta n = 0$

Complete section

Section 9 – Softw. & Computing $\qquad$ $n = 2$ $\qquad$ $\Delta n = 0$

Section 10 – Event Reconstr. $\qquad$ $n = \mathbf{44}$ $\qquad$ $\Delta n = \mathbf{2}$

Section 11 – Analysis $\qquad$ $n = 1$ $\qquad$ $\Delta n = 0$

Section 12 – Installat. & Integr. $n = 2$ $\Delta n = 0$

Section 13 – Safety $n = 1$ $\Delta n = 0$

Section 14 – Organiz. & Manag. $n = 2$ $\Delta n = 0$

Section 15 – Time Schedule $n = 1$ $\Delta n = 0$

Section 16 – Possible Upgrades $n = 1$ $\Delta n = 0$

Glossary $n = 4$ $\Delta n = 0$

Bibliography $n = 3$ $\Delta n = 0$

Overall

Δn = 106 - 88 = 18 pages

Taking into account the word-document about the magnet

$$\frac{\Delta n}{\Delta t} < 1 \, \frac{page}{day}$$

Too slow !!!

Furthermore …
many corrections are needed
in order to fulfil the DUNE rules

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Instructions for the authors (1)

Possible errors copying from another document:

... $n = 1.358 \pm 0.003$ [72], while ... (see Fig. 4.7)...

[72] => \cite{bib:xxx}   update the bibliography

4.7 => \ref{fig:yyy}   check the presence of the figure in the latex
                                             and insert the figure file in the proper folder

Instructions for the authors (2)

Insert your name in your contributions:

\subsection{Requirements and \dshort{sand} Role}\label{sec:sand-over-requirements}
%% Paolo Bernardini

The overarching requirements for \dshort{sand} are to monitor on-axis spectrum and position information to detect representative changes in the neutrino beam (ND-05) ....

In this way you can get suggestions and corrections by other colleagues

Instructions for the authors (3)

Please, use the DUNE Words (check and update the glossary)

\dfirst{fnal}   first time   Fermi National Accelerator Laboratory (Fermilab)

\dword{fnal}   following times   Fermilab

\dfirst{nd}	near detector (ND)	*with link*
\dword{nd}	ND	*with link*
\dlong{nd}	near detector	*w/o link*
\dshort{nd}	ND	*w/o link*

Glossary instructions
https://ctan.mirror.garr.it/mirrors/ctan/macros/latex/contrib/glossaries/glossaries-user.pdf

\dword	singular	\dwords	lower case & plural
\Dword	capital	\Dwords	capital & plural

Instructions for the authors (4)

common/units.tex   to define commands for units

Examples

"m" is written `\si{\meter}`   **bare units**

"V" is written `\si{\volt}`.

"123.456" is written as `\num{123.456}`.   **bare numbers**

"1±2i" is written as `\num{1+-2i}`.

"3×10^{45}" is written as `\num{3e45}`.

"0.3×10^{45}" is written as `\num{.3e45}`

"120 GeV" is written as `\SI{120}{\GeV}`,   **numbers and units**

"4850 ft" is written as `\SI{4850}{\ft}`,

Conclusions

➢ Present TDR draft in the indico site of this meeting

➢ Improvements in : Magnet
        GRAIN
        Reconstruction

➢ The overall writeup rate is too slow

➢ Corrections are necessary to satisfy DUNE rules

➢ A strong commitment is needed

➢ Convenors must involve other people

March 5, 2024 P. Bernardini l Status of the TDR for SAND

OLD SLIDES

	Chapter Draft	Design Review	Ready for LBNC
Intro/Physics	Jun 24	N/A	Jul 24
ND-LAr (final)	Nov 24	Dec 24	Feb 25
TMS	Nov 24	Jan 25	Feb 25
SAND*	Jun 24-Feb 25	Jul 24-Mar 25	Apr 25
ND-LAr Cryostat	Jun 24	Jul 24	Aug 24
NS Cryogenics	Jun 24	N/A	Aug 24
DUNE-PRISM	Nov 24	Dec 24	Jan 25
ND DAQ	Nov 24	Jan 25	Feb 25
ND Slow Control			Feb 25
ND I&I	Nov 24	Dec 24	Jan 24

* SAND will divide process into KLOE-2-SAND, Tracker, GRAIN, Integration

More details

Preliminary Design Review

	topics
Jul 2024	**ECAL + magnet**
Nov 2024	**I & I**
Dec 2024/Jan 2025	**GRAIN**
Mar 2025	**Tracker**

Review of TDR chapter draft

	reviewer
Jan 2025	**SAND consortium**
Feb 2025	**DUNE collaboration**
Mar 2025	**LBNC**

Glossary

my_glossary.tex

Insert new DUNE words and new DUNE abbreviations at the end of this file

Check if the word is already present

To define a DUNE term that has no abbreviation use:

`\newduneword{label}{term}{description}`

To define a DUNE term with an abbreviation use:

`\newduneabbrev{label}{abbrev}{term}{description}`

Examples

```
\newduneword{detmodule}{detector module}{The entire DUNE far detector is
   segmented into four modules, each with a nominal \SI{10}{\kton}
   fiducial mass}

\newduneabbrev{adc}{ADC}{Analog Digital Converter}{A sampling of a voltage
   resulting in a discrete integer count corresponding in some way to
   the input}
```

Bibliography

my_citedb.bib

Insert references (bibtex format) at the end of this file

Check if the reference is already present

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\dfirst{fnal}   first time   Fermi National Accelerator Laboratory (Fermilab)

\dword{fnal}   following times   Fermilab

More informations in the glossary

Fermi National Accelerator Laboratory (Fermilab) U.S. national laboratory in Batavia, IL. It is the laboratory that hosts Deep Underground Neutrino Experiment (DUNE) and serves as its near site. 1

\dfirst{nd}   near detector (ND)   *with link*
\dword{nd}   ND   *with link*
\dlong{nd}   near detector   *w/o link*
\dshort{nd}   ND   *w/o link*

\dword   singular   \dwords   lower case & plural
\Dword   capital   \Dwords   capital & plural

common/defs.tex   to define new commands

Examples

$\bar{\nu}_e$ is written as \anue,

Δm^2_{21} is written as \dm{21},

$\sin^2 \theta_{13}$ is written as \sinst{13},

$\nu_\mu \to \nu_\mu$ is written as \numutonumu,

$p \to K^+ \bar{\nu}$ is written as \ptoknubar,
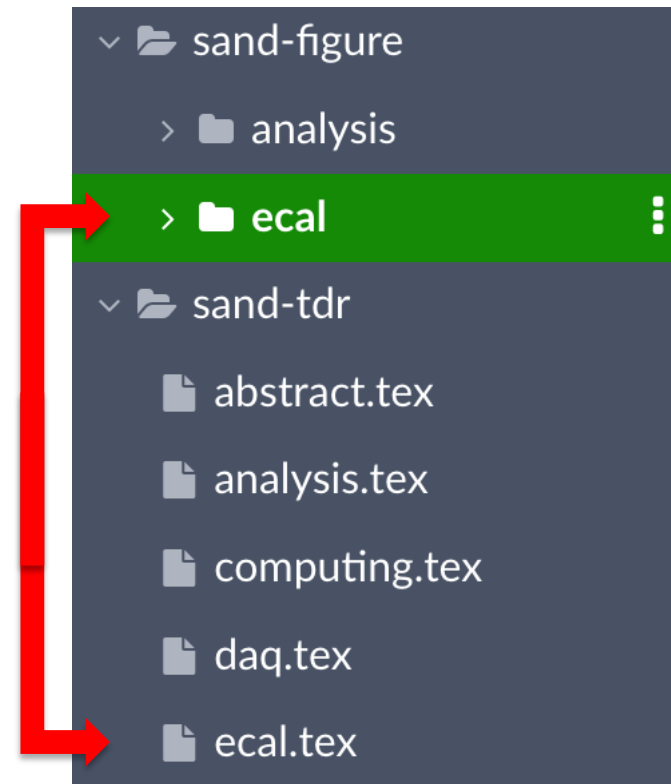
Instruction 9

Figures

JPEG use for photographs

PDF use of any line drawings, plots, illustrations

PNG use due to some inability to produce proper JPEG or PDF (contact editors)

folder for the figures associated to each topic

- sand-figure
  - analysis
  - **ecal**
- sand-tdr
  - abstract.tex
  - analysis.tex
  - computing.tex
  - daq.tex
  - ecal.tex

English

- Use American spelling: e.g., ionization (not ionisation), flavor (not flavour) and so on.

- In general, avoid use of first person (e.g., I, we, our). "We" may appear in introductory sections.

- Avoid use of second person, i.e., "you."