

Status of the ILD Technical Documentation

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DESY

ILD Meeting, Krakow, Poland

24-26 September 2013

Overview

- Objectives
- EDMS, a short introduction
- ILD documents and 3D models in EDMS
- Next steps: define workflow processes

What Purpose?

- **Main objectives**
 - Documentation consistency
 - Keep it current and accurate
 - Structure it for users' needs, and
 - Make it readily available to all who need to know
 - Configuration management
- Project information should be treated as a valuable item, so that it is available to support project reporting and decision making at all times.

What Type of Documentation?

- All relevant technical documentation to ensure information persistency:
 - Regular documents:
 - Publications, reports, notes, as well as meeting, conference and seminar related files.
 - Engineering documents and data:
 - CAD models, technical drawings, specifications, requirements, standards, engineering calculations, safety documents, quality control reports, contracts, etc.

What Functionalities are Needed?

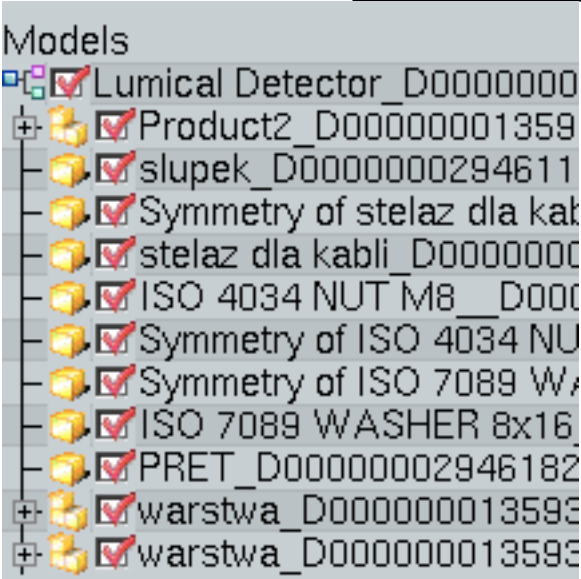
- Management of different categories of documents
- Configuration and version control
- Management of workflows, for instance for approving/releasing, change control, etc.
- Visualization and mock-up possibilities

Technical Solution

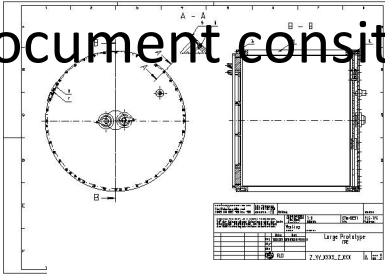
- Agreement to use an Engineering Data Management System (EDMS):
 - A complex software tool which provides functionalities such as:
 - Document and data management, including version control, access control, life cycle support
 - Design and viewing features
 - Collaborative work, including collision analysis.
 - Used at CERN for the design, procurement and construction of LHC, at DESY for the XFEL, etc.

Benefits

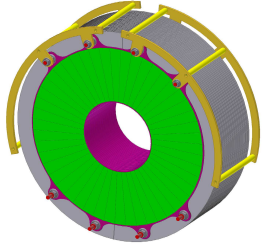
One very important benefit: It ensures document consistency.



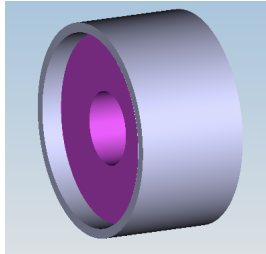
2D Drawings



3D Detailed models



3D Simplified models
(For integration work)



Technical documents

Lumical interface parameters

Ref:	10.000.0000
Item:	
Date:	09/07/2013
Page:	2

- Technical description**
 - 20 layers of W/Invarconcrete core
 - Thickness of a layer: 0.52 mm
 - Radius for 4x0.05 = 0.200 mm above glue 4x0.05 = 0.200 mm
 - On electrolyte side 0.200 mm with electrolyte
 - PCB 1 mm
 - A radius 2 mm
 - Electric (r space) 1.5 mm
- Overall dimensions**

REF - INTERNAL OR EXTERNAL DIA	INTERNAL DIA
R1 (Accessories/Invar)	70.00
R2 (Invar)	100.00
R3 (Invar)	140.00
R4 (Invar)	200.00
R5 (Invar)	240.00

- Support**
 - The Lumical will be fixed to the front plate of LHC/CL
- Accessories**
 - Power dissipation: overall 20-50 W
 - 4 cooling plates - 10 mm
 - Cables
 - 4x coax 1 fix TP cables
 - control (4 coax 1 fix TP cables)
- Alignment**

Final technical equipment:

- 1 mm in XY
- 10 mm in Z (between the two Lumical calorimeters)
- 1 mm regarding to the beam pipe

Periodic maintenance:

- 0.300 mm in XY

Others...

Create WBS

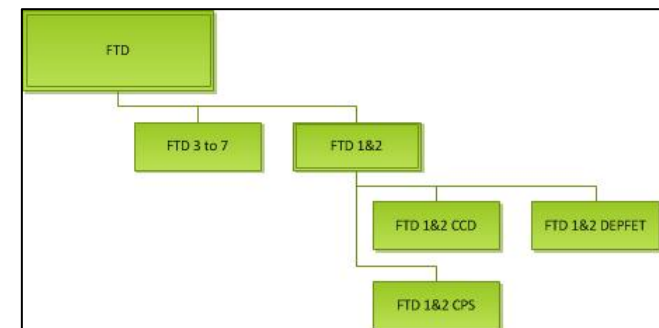
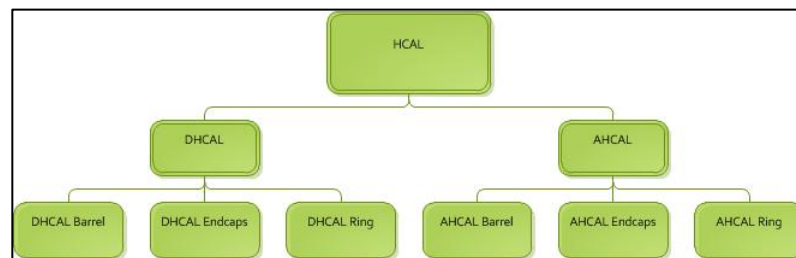
- WBS: very useful visual tool for managing scope
 - Structure which breaks the work to be done into smaller elements
 - It is a graphical way of showing the complete scope of the project
 - There are several ways of dividing the work, including by major deliverables, phase, institutions, by **functional sub-systems**, etc.
 - The complete WBS should contain placeholders for absolutely every item of work in the project.
- In EDMS: it helps navigation to relevant documents

ILD WBS

- Progressive elaboration applied to ILD WBS:
 - Updated WBS structure, implementation within EDMS is ongoing.



- To accommodate different technologies:



ILD WBS in DESY EDMS

First step: Develop a Work Breakdown Structure or WBS

international linear collider

Search [] Home Exit DESY
Advanced Search... Aura Rosca

Main Menu Classification

Check Out Submit Item Reports Bookmark History More Actions...

Select View: ILC

- Accelerator Systems
- CFS & Global
- Detectors
 - ILD
 - Calorimeters
 - Forward Region
 - ILD Documentation
 - Inner Region
 - Integration
 - Liaison Office
 - Machine Detector Interface
 - Outer Tracking
 - Physics & Optimization
 - Project Management
 - Solenoid
 - System Tests & R&D
 - Yoke

System Status: OK

WBS Element , D00000000523907,A,4,1 , Item Info : Summary

Summary WBS Properties Related Items Files Next Steps Classification Reviewer/Approver All Versions Access

Related Items

Attaches
[Export Table As](#) CSV HTML XML

File Name
[ILD-Detector-Concept.jpg](#)

Uses WBS Elements : 13 objects

Name
Calorimeters,A,1,1
Forward Region,A,1,1
ILD Documentation,A,1,1
Inner Region,A,1,1
Integration,A,1,1
... more items

Has Description : 7 objects

Name
Definition of the ILD reference detector,B,1,4
ILC Contacts,A,1,1
ILD - Letter of Intent,A,1,1
ILD Coordinate System Definition,A,1,1
ILD Detector Design,A,1,1

Properties

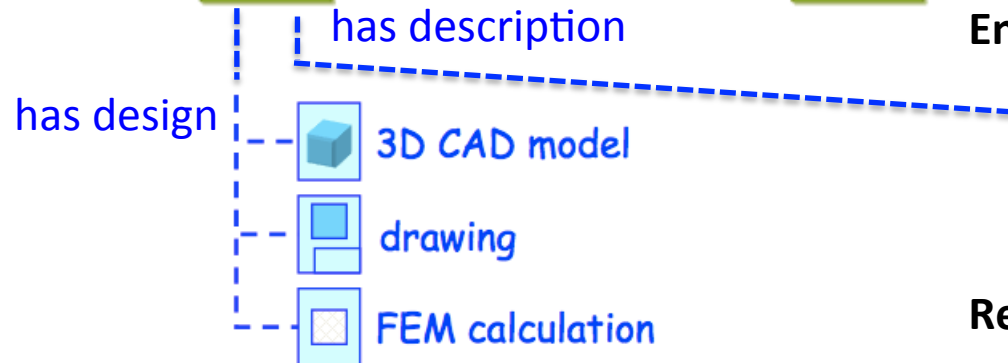
Name:	ILD
Description:	
Sub Type:	Assembly
Access Scheme in Use:	Project: ILD_WBS
Designated Access Scheme (Project):	ILD_WBS
Creator:	Hagge_Lars
Work Status:	Working (in Vault)
Purpose:	

[More Properties ...](#)

Preview Image(s)

ILD Items

- **Second step:** collect documents, upload into EDMS and **link** to the WBS structure or between themselves.



Engineering documents:

- Component lists
- Parameter tables
- Specifications
- Requirements

Regular documents:

- Notes, reports, etc.

ILD Items in EDMS

international linear collider

Main Menu Classification

Submit Bookmark Subscribe Check Out to Team Make Available To Team More Actions...

Select View: ILC

- Accelerator Systems
- CFS & Global
- Detectors
 - ILD
 - Calorimeters
 - Forward Region
 - ILD Documentation
 - Inner Region
 - Integration
 - Liaison Office
 - Machine Detector Interface
 - Outer Tracking
 - Physics & Optimization
 - Project Management

Search *ILD* Home Exit DESY

Advanced Search... Aura Rosca

Search Results

Results 1 - 50 of 55

Export Table As CSV HTML XML

EDMS ID	Name	Description	Work Status	Access Scheme in Use	Item Type	Last Mod
D00000001028635.A.1.1	ILD_Forward-Region	Step file of the forward region of the ILD detector, extracted from the DB at LAL, at 04.09.2013.	Released	Project: ILD_Integration	General Document	Rosca_Au
D00000001026045.A.1.1	Digital HCAL Detector CAD Model Step File	Step file of the semi-digital hadron calorimeter of the ILD detector, by Jean Christophe Ianigro, 23.07.2013.	Working	Team: ILD_Integration_Team	General Document	Rosca_Au
D00000001021485.A.1.1	Study on ILD Construction Transports	Study on number of heavy transports for the ILD construction in the Japanese mountain hall	Released	Project: ILC_MDI	General Document	Buesser_f
D00000001016275.A.1.1	PCMAG Drawings	Drawings of the magnet for the Large Prototype TPC of the ILD detector	Released	Project: ILD_Integration	Technical Drawing	Rosca_Au
D00000001010101	international linear collider	Drawings of the maonet for the				

Search *ILD* Home Exit DESY

Advanced Search... Aura Rosca

Main Menu Classification

Select View: ILC

- Accelerator Systems
- CFS & Global
- Detectors
 - ILD
 - Calorimeters
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 - Outer Tracking
 - Physics & Optimization
 - Project Management
 - Solenoid
 - System Tests & R&D
 - Yoke

Assembly , D00000000989043,A,1,9 , Item Info : Summary

Summary EBOM Properties Related Items Next Steps Classification Reviewer/Approver All Versions

Related Items

Attaches
There are no attached files

Is In Team Folder : 1 object

- CAD Main Assemblies...

Has Description : 1 object

- ILD Detector CAD Model Step File.B.1.1

Is Design for WBS Element : 1 object

- ILD.A.4.1

Properties

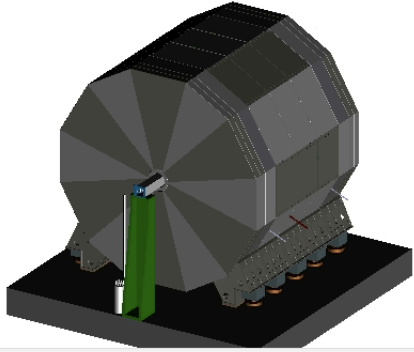
Name: ILD Model
Description: STEP import from ILD_SM4_PRD41097_10_05_12.stp; Author: Alexandre Gonnin, LAL

Access Scheme in Use: Team: ILD_CAD_Integration_Team

Designated Access Scheme (Project):
Creator: SuehI_Stefan
Work Status: Working
Purpose:

[More Properties...](#)

Preview Image(s)



System Status:

1 items in the Attached Files List.

What ILD Documents in EDMS?

- Technical notes:
 - Notes on the integration of the ILD detector;
 - ILD0dimensions-weight130209: D00000000913606
 - Definition of the ILD reference detector: D00000000913635
 - Such tables are an important tool to **synchronize Engineering and Simulation models.**
- Updates for the DBD design are ongoing, see next slide.

The image shows a screenshot of a CAD assembly table. The table lists various components and their dimensions. A large, semi-transparent watermark with the word 'updating' is overlaid diagonally across the table. The table includes columns for part names, dimensions, and material specifications.

Definition of the ILD reference detector

ILD Joint steering board, September 21, 2008
(updated version: November 13, 2008 P. Geide)

1. Introduction

In the following document the ILD detector is defined, as discussed on the second ILD meeting in Cambridge, UK, September 2008. The detector defined is the so-called reference detector for ILD, which has the following specifications:

- The overall dimensions and main features of the detector are defined as a basis for the further evolution of ILD. They will be used for the LOI studies.
- The details of the detector are defined primarily for the purpose of the LOI studies (MOCKA and Apsler) and will be used for the simulation studies.
- The detector will be used for any large scale (GeV) simulation studies.
- As much as possible the choice of technology is left to the LOI studies which were presented at Cambridge. However, any technology choice which has not yet been finalized, or are still an open issue, may be taken into account. These cases are driven by the desire to define a detector which is easy to build, and for which more information is available, or better simulation techniques have been developed.
- Whenever possible we will define a virtual detector, which will deliver a certain performance, but which does not define a specific technology. In some cases, the technology choice is left to the LOI studies, but ILD has chosen this technology typically the technology which is currently most mature technology. This however does not imply a preference for an eventual technology choice for the ILD group.
- In some cases we distinguish between a baseline detector, and possible upgrade or alternative options. This refers to additional detector elements, which may or may not be included, depending primarily on the wanted performance, and possible simulation results.
- In many cases we have not yet chosen a specific technology, but follow more than one solution. These solutions currently are all considered with equal weight, and achieving more R&D results on all of them is considered of highest priority. During the process leading up to the LOI we will continue to evaluate this, and decide how many different options we will describe in the LOI.


2. Basic Parameters

The following table shows the main parameters of ILD_1:

Parameter	Value	Notes
Rmin	3440	(Mocka: coil and cryostat modeled as one Al tube with 750 thickness)
Rmax	4190	
Z	3872	

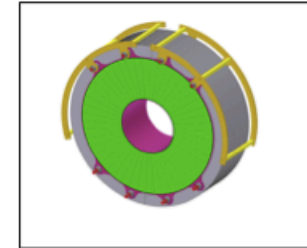
New Important Documents

- Sub-system **interface parameter** documents, example shown for LumiCal.
 - For each sub-system and every technology
- Requirements for the detector integration, installation steps, requirements on working space, etc.
- PM documents, for now the documents relevant for the cost estimation.

	<i>Lumical interface parameters</i>	Ref	ILD-000-xxxx
		Issue	
		Date	09/07/2012
		Page	2

1. Technological description

- 30 layers of W/Si/electronics cards:
- Thickness of a layer :
 W 3.5 mm
 Si 0.32 mm
 Kapton foil 4x0.05 = 0.200 mm
 epoxy glue 4x0.05 = 0.200 mm
 Cu electronics paths 0.050 mm
 Outer ring (outside tungsten and Si plates) with electronics:
 PCB 1 mm
 Al radiators 2 mm
 Electronic (+ glue) 1.5 mm



2. Overall dimensions

	W/Si centered on outgoing beam
Rin(support/sensitive)	76/80
Rout active	195.2
Rout support	280
Zin	2500
Zout	2685

Total thickness : 185 mm
 Estimate weight : 250 kg

3. Support

- The Lumical will be fixed to the front plate of LHCal

4. Services

- Power dissipation : overall 20-50 W
- 4 cooling pipes ~ 10 l/min
- Cables
 - ✓ output 360 LVDS cables
 - ✓ 6 power lines (10mm²)
 - ✓ control (4 coax 1 flex TP cables)

5. Alignment

Initial alignment requirement :

- 1 mm in XY
- 10 mm in Z (between the two LumiCal calorimeters)
- 1 mm regarding to the beam pipe.

Position measurement requirement :

- 0.300 mm in XY

What ILD 3D Models in EDMS?

Currently linked to ILD top node:

- D00000000989043,A,1,9: Full ILD detector 3D model from Alexandre Gonnin, which is a placeholder model.
- D00000000872433,A,1,4: Placeholder model, old unmaintained version.
- D00000000952125: Mokka simulation model of ILD_01_pre01, updates for the DBD versions ILD_o1_v05, ILD_o2_v05, ILD_o3_v05 cannot be obtained from the wrf files generated by GEANT4 – many details in these models, generated files are very too big, very too slow and practically useless for anyone.

Collection of existing detailed CAD models for sub-detectors ongoing, already uploaded for several systems.

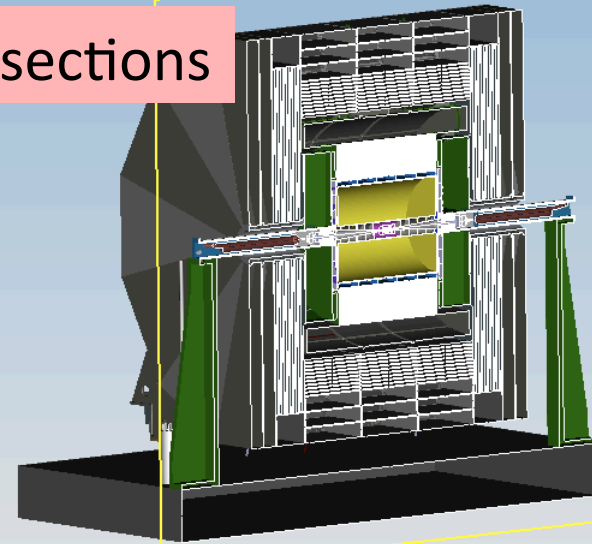
Exchange of Data

- Sub-system models are contributed by designers at different laboratories.
- We need to define rules for the CAD data exchange
 - Some issues that came up several times recently:
 - Data exchange format.
 - Recommended: **STEP AP214**.
 - Definition of the reference coordinate system.
 - There is an official document defining the ILD coordinate system for physics studies, but no document for the CAD integration work.

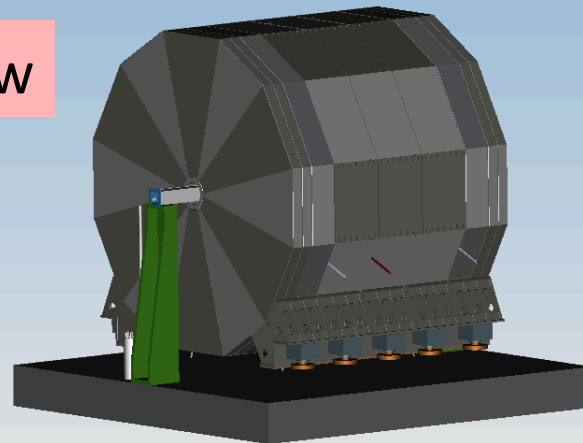
3D Viewers: iSeries and JT2Go

- Every CAD part and drawing has visualization files that can be viewed without using a CAD system.

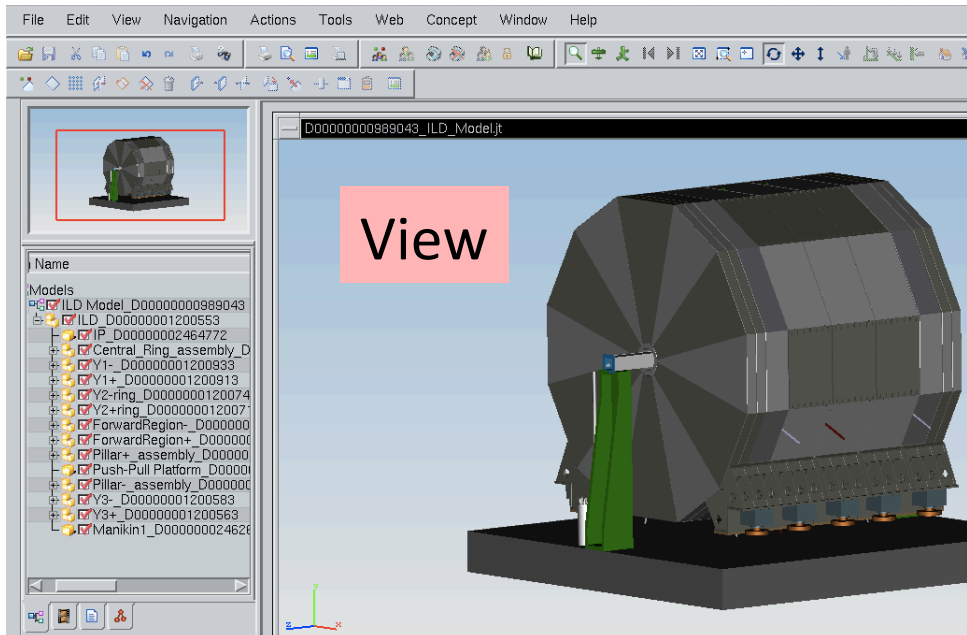
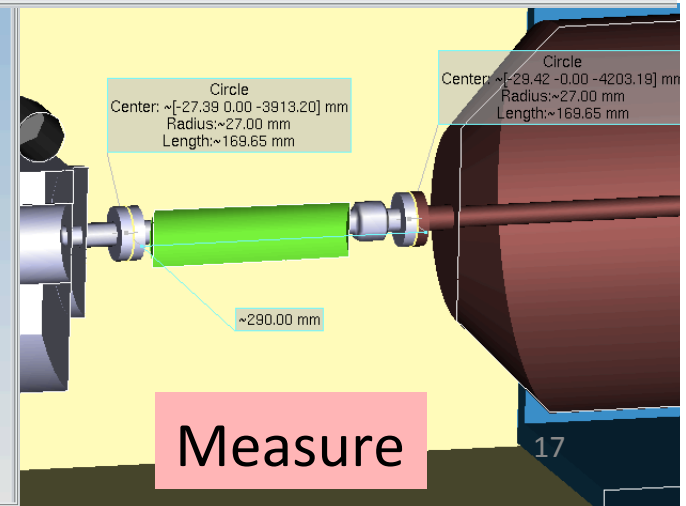
Create sections



View



Measure



Web Interface

- Support for easy and up-to-date access into the EDMS for the experimental community:
 - Web interface:
 - <http://ippapprd03.desy.de/EDMSTreeBrowser/?no=D00000000546957&conf=getGePartFull>
 - interface developed by the IPP group at DESY
- URL to be embedded into an access web site.

How it Looks for the R&D Activities

Home

Facilities ▼

Moveable Infrastructure ▼

LC Infrastructure ▼

Contact



Test Beam Documentation

Large TPC Prototype

TPC Large Prototype⁽⁴¹⁾

Last updated on: 2013-09-20 09:53

The Linear Collider TPC of the ILD 🔑

Description of the R&D activities for the LCTPC. 2013-04-25

[D*1017825.A.1.1](#) 🔑

+ Computing and Analysis⁽⁷⁾

- Integration and Installation⁽³⁾

- Magnet⁽³⁾

First Version of the PCMAG Field Map 🌐

Description of the results of the magnetic field measurement of PCMAG and the first version of a magnetic field map. 2013-04-24

[D*1016285.A.1.1](#) 🌐

Magnetic Field Map for a Large TPC Prototype 🔑

Description of the magnetic field map for the Large Prototype TPC of the ILD detector 2013-04-23

[D*1016035.A.1.1](#) 🔑

The Linear Collider TPC: Revised magnetic field requirements 🔑

Description of the requirements for the B-field of the Large Prototype TPC of the ILD detector 2013-04-23

[D*1015925.A.1.1](#) 🔑

PCMAG Drawings

Mechanical Support

+ Large Prototype Subsystems⁽²⁹⁾

- Project Management⁽¹⁾

LP2008_schedule 🔑

Schedule for the construction of the large TPC prototype in 2008. 2013-04-25

[D*1017695.A.1.1](#) 🔑

Manufacturing

Mission

The goal of this website is to ensure a complete documentation of the infrastructures developed within the AIDA project and an up-to-date access to public information stored in the DESY and CERN EDMS.

Links

[CERN EDMS](#)

[DESY EDMS](#)

[AIDA at CERN](#)

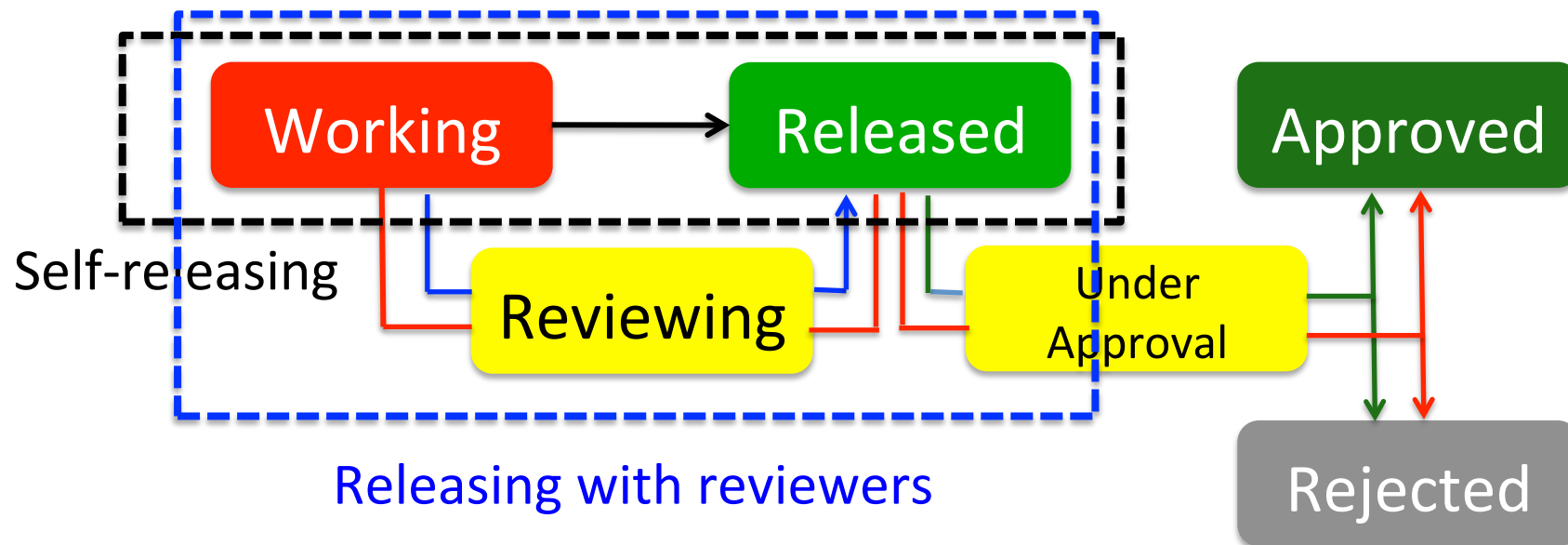
[DESY](#)

Feedback

Make us a suggestion about how we can improve the documentation.

Releasing Procedures

- Need to define **formal releasing procedure** for official documents, as the engineering documents.
- Life cycles available in EDMS:
 - Involve specific roles in EDMS



Summary

- **Many documents and CAD models uploaded in EDMS:**
 - Collection and uploading of documents relevant for the DBD is on going
- **Documentation organized according to a WBS:**
 - Most of the existing ILD documents need to be connected to the WBS, work in progress.
- **Need to start development of processes to support our activities:**
 - Start with releasing with reviewers for the engineering documents.