The Way to the DBD

Karsten Buesser
DESY

ILD Regional Integration Workshop
Orsay
20. April 2011

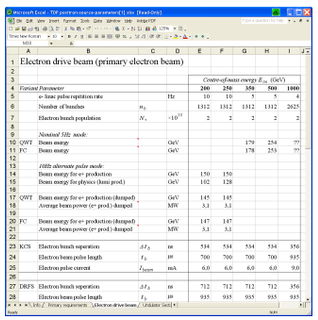
- The DBD will be published by the end of 2012
  - Its outline and contents are stil under discussion
  - Recent RD proposal: one volume for two or even three topics:
    - ILC physics case
    - ILD
    - SiD
  - ILD content will then be in the order of 100 pages or less
- ILD might want to produce an accompanying longer document (LoI style?)
- The DBD cannot fully document ILD; even a longer ILD-specific report can only do parts
- The Detailed Design Documentation of ILD is more:
  - CAD models
  - Simulation models (MOKKA)
  - Technical details for subdetectors
  - Specification and requirement documents
  - Optimisation results
  - Physics simulation results
  - (...)

Machine: Technical Design Documentation TDD

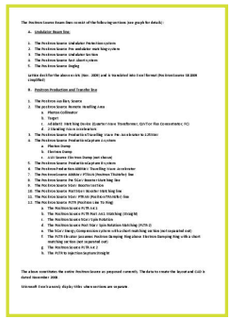
TDD, TDR and ILC-EDMS

Technical Design Report (TDR) summarizes TDD for publication

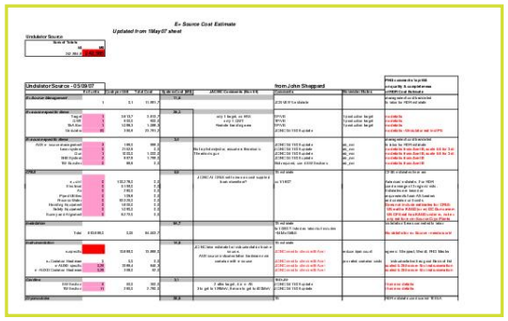
Technical Design Documentation (TDD) captures entire design efforts, results & rationale



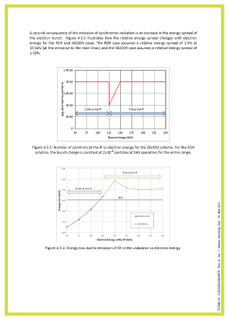
Parameters



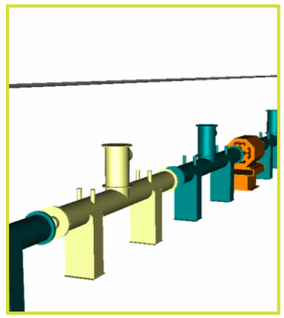
Specifications



Cost Estimation

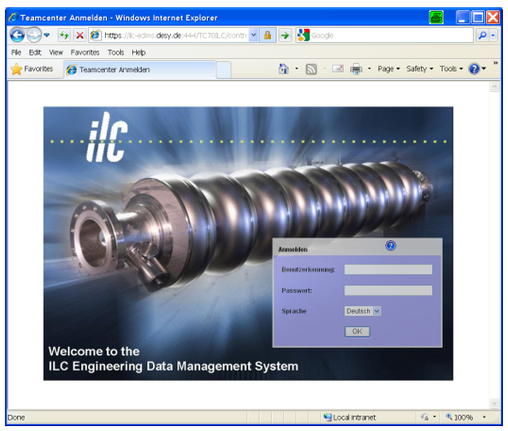


Calculations



CAD Models Design Summary

...



ILC-EDMS organizes the Technical Design Documentation, providing **structure**, **traceability**, **version & configuration mgt.**, and **change control**

L. Hagge

ILD Work Breakdown Structure

Generic Part , D00000000523907,A,4,1 , Item Info : Assembly

Summary | Assembly Structure | Properties | Related Items | Files

EDMS-ID	Name
D00000000523907,A,4,1	ILD
D00000000524017,A,1,1	Calorimeters
D00000000524177,A,1,1	Forward Region
D00000000524337,A,1,1	ILD Documentation
D00000000524127,A,1,1	Inner Region
D00000000524287,A,1,1	Integration
D00000000524347,A,1,1	Liaison Office
D00000000536877,A,1,1	Machine Detector Interface
D00000000524087,A,1,1	Outer Tracking
D00000000524297,A,1,1	Physics & Optimization
D00000000524357,A,1,1	Project Management
D00000000523957,A,1,1	Solenoid
D00000000524367,A,1,1	System Tests & R&D
D00000000523917,A,1,1	Yoke

- Discussed at Integration/EDMS meeting in June 2010 here in Paris

Documents

ILC Document , D00000000951395,A,1,1 , Item Info : Summary

Summary | Properties | Related Items | Files | Assignment | Classification | Reviewer/Approver | All Versions | Access

Related Items

Attaches

Export Table As (•) CSV ( ) HTML ( ) XML

File Name
ilc-note-2009-050.pdf
ilc-note-2009-050_stamp.pdf
ilc-note-2009-050.jpg

Related Items

Is In Team Folder : 1 object

Name
Push-Pull...

Is Description for : 1 object

Name
Machine Detector Interface,A,1,1

Properties

ILC Document Type:	Report
Name:	Design of the Detectors and the Interaction Region with a Push-Pull Arrangement
Description:	Full title: Functional Requirements on the Design of the Detectors and the Interaction Region of an e+e- Linear Collider with a Push-Pull Arrangement of Detectors
Access Scheme in Use:	Project: ILC_MDI
Designated Access Scheme (Project):	ILC_MDI
Creator:	List_Benno
Work Status:	Released

More Properties ...

Preview Image(s)

ILC-Note-2009-050
March 2009
Version 4, 2009-03-19

Functional Requirements on the Design of the Detectors and the Interaction Region of an e+e- Linear Collider with a Push-Pull Arrangement of Detectors

B Parker (BNL), A Mikhailichenko (Cornell Univ.), K Buesser (DESY), J Hauptman (Iowa State Univ.), T Tauchi (KEK), P Burrows (Oxford Univ.), T Markiewicz, M Oriunno, A Seryi (SLAC)

Abstract

The Interaction Region of the International Linear Collider [1] is home to two experimental detectors working in a push-pull mode. A time efficient implementation of this mode leads to specific requirements and challenges for many detector and machine systems, in particular the IR magnet, the cryogenics and the alignment system, the beamline shielding, the detector design and the overall integration. This paper attempts to capture the functional requirements of a push-pull interaction region and machine detector interface from any particular conceptual or technical solution that might have been proposed to date by either the ILC Beam Delivery Group or any of the three detector concepts [2]. As such, we hope that it provides a set of ground rules for interpreting and evaluating the MDI parts of the proposed detector concept's Letters of Intent, due March 2009. The authors of the present paper are the leaders of the IR Integration Working Group within Global Design Effort Beam Delivery System and the representatives from each detector concept submitting the Letters Of Intent.

INTRODUCTION

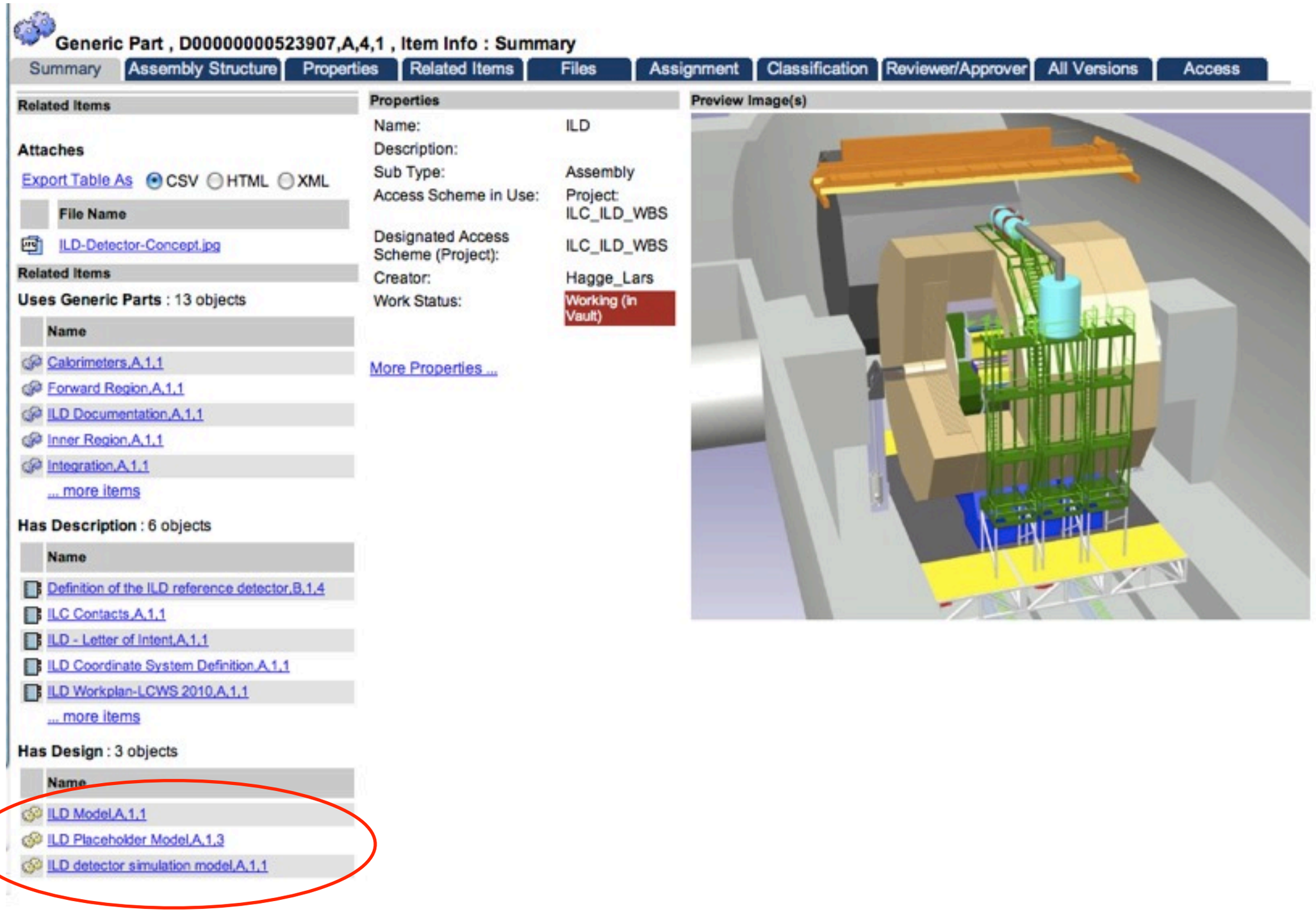
The Reference Design Report (RDR) [1] of the International Linear Collider (ILC) specifies that the site will have one interaction region (IR) with the facilities to support two independent detectors that time-share the interaction point (IP) in a so-called push-pull arrangement. Three detector concept study groups (named ILD, SiD and 4th) have submitted expressions of interest (EOI) to the ILC Research Director (RD) and have agreed to supply the director with Letters of Intent (LOI), describing their detector concept and its physics measurement potential. These are to be evaluated by the International Detector Advisory Group (IDAG).

There, in addition to the usual hurdles required between the accelerator and detector design, the machine detector interface (MDI), the ILC will need to provide the physical and administrative infrastructure to allow two competing teams of physicists with differing detector designs fair and equal access to beam collisions with minimal down-time overhead. At this point in the life cycle of the ILC, the site, the time scale for construction, and the final selection of detector concepts have not been made. In order to proceed, the RD has appointed a panel comprised of two MDI representatives from each of the three detector concepts and three representatives of the ILC's Beam Delivery System (BDS) which is charged with the design of the IR. These are the authors of this report.

This document is meant to be the mechanism by which the four groups involved mutually define the MDI and Detector-to-Detector Interface (DDI) requirements by which the relevant parts of their respective LOIs can be evaluated. While the unknowns mentioned above, as well as the lack of engineering estimates to date, preclude any definitive decisions, all parties involved in the hope is having the consistent set of agreed-to assumptions, goals and requirements documented. These should be as minimalist as possible. It is neither the purpose of this report to prescribe the technology to be used [2] to achieve the requirements nor to list the myriad site-dependent safety requirements (e.g. deficiency, adequate emergency egress, non-flammable materials, etc.) to which the detectors must conform. Collaboratively developed technical solutions and interfaces between the final three detectors will be developed in the post-LOI time frame.

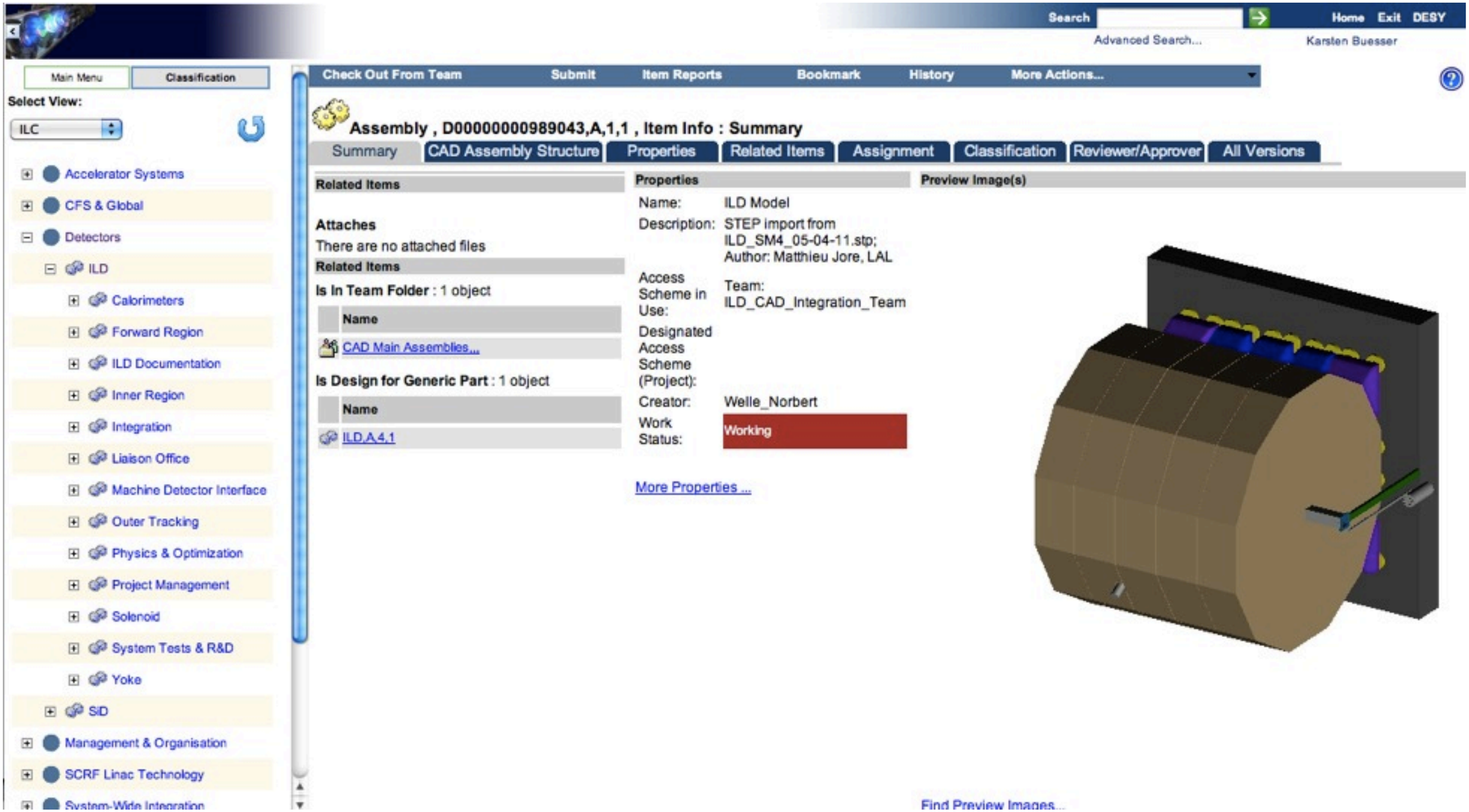
- Example: MDI Interface Document
- Need agreement on required documents in the WBS

ILD WBS Top Node



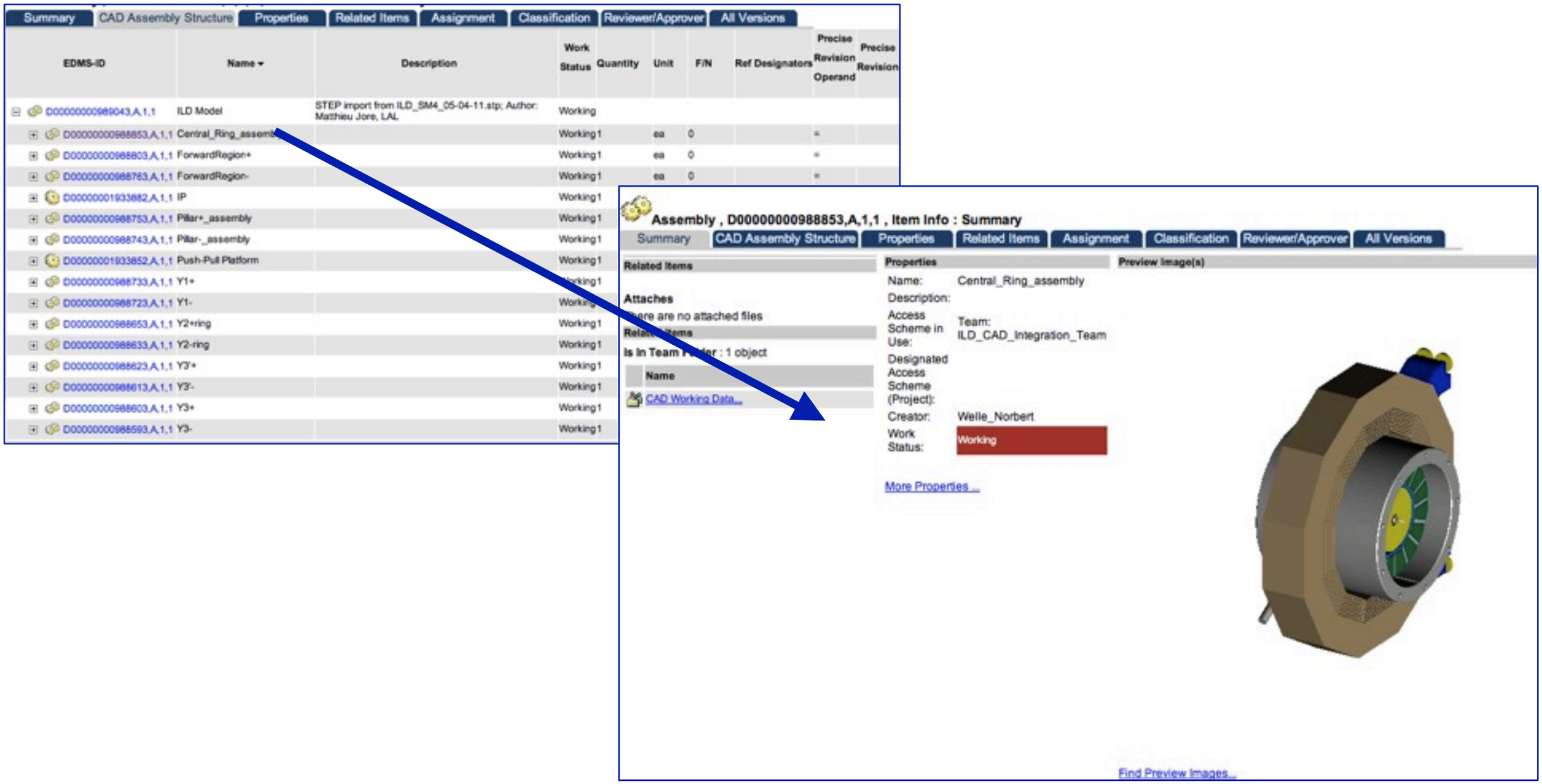
- Has three detector models: detailed CAD, placeholder, simulation

ILD Detailed CAD Model in EDMS



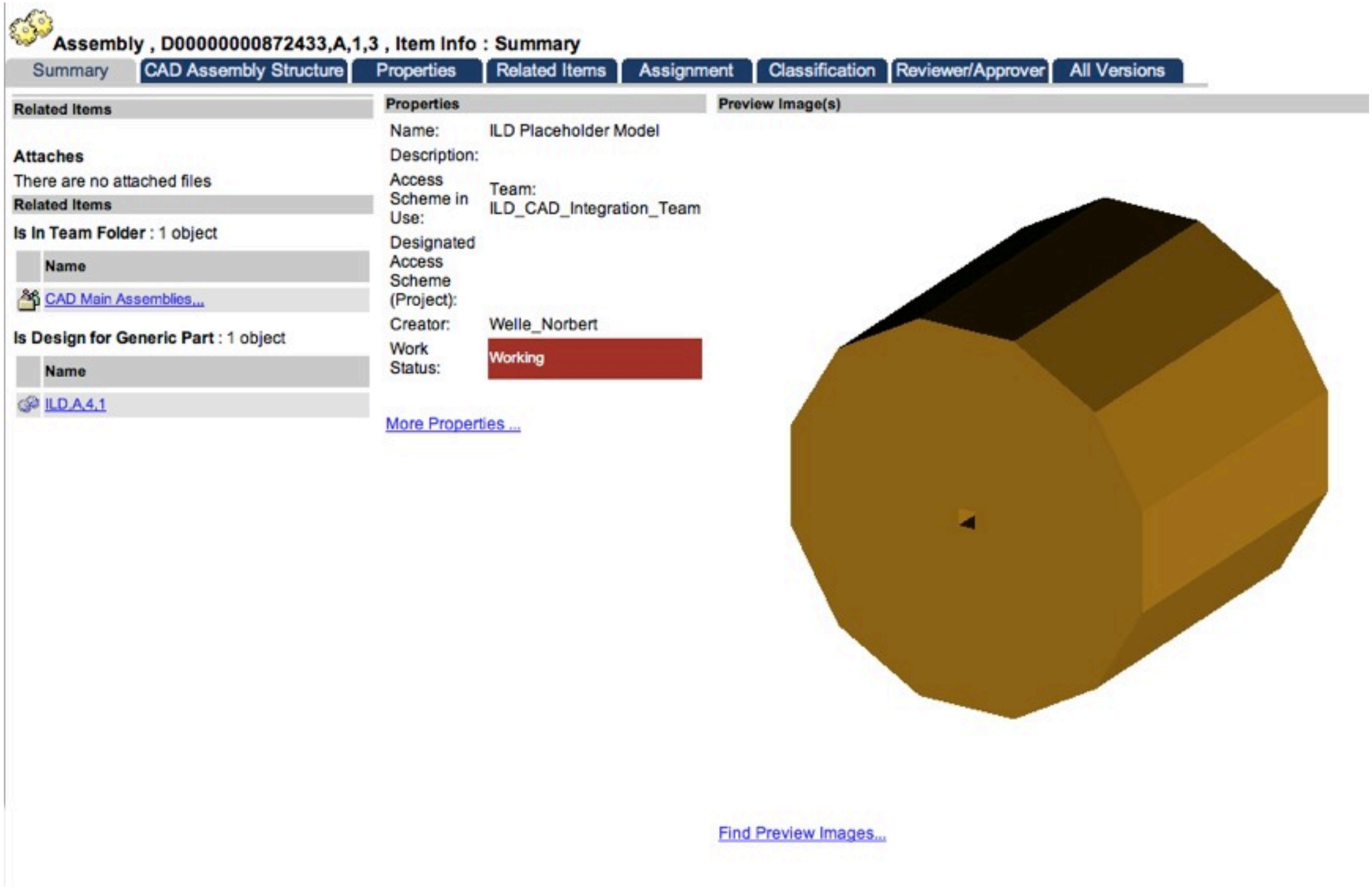
- Detailed CAD Model (M. Joré) imported as STEP-file by Benno et al.

CAD Model Structure



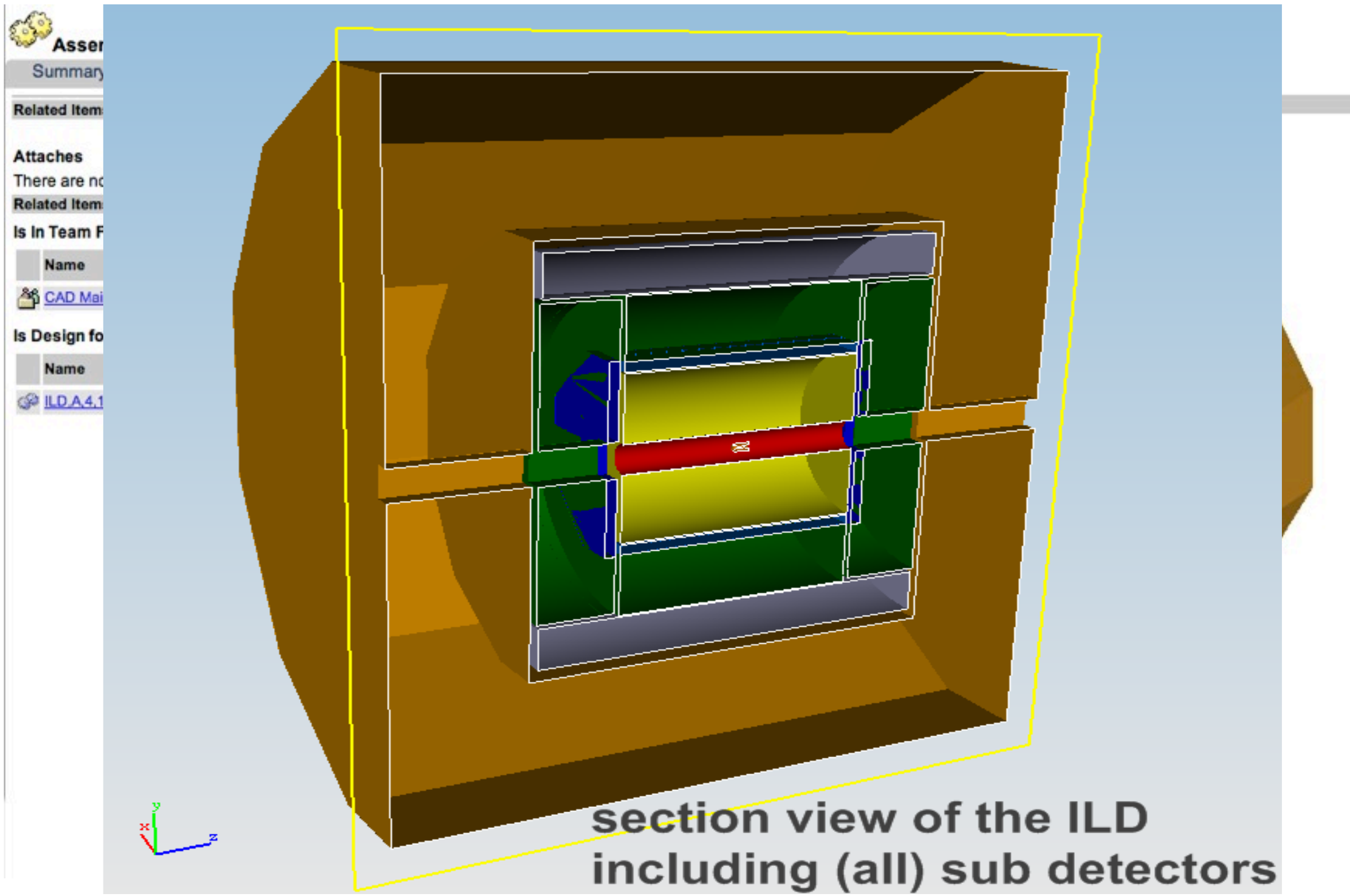
- CAD model hierarchy is preserved

ILD Placeholder Model



- Detector model for integration purposes:
  - placeholders for subdetectors, supplies, cables, supports, etc.

ILD Placeholder Model



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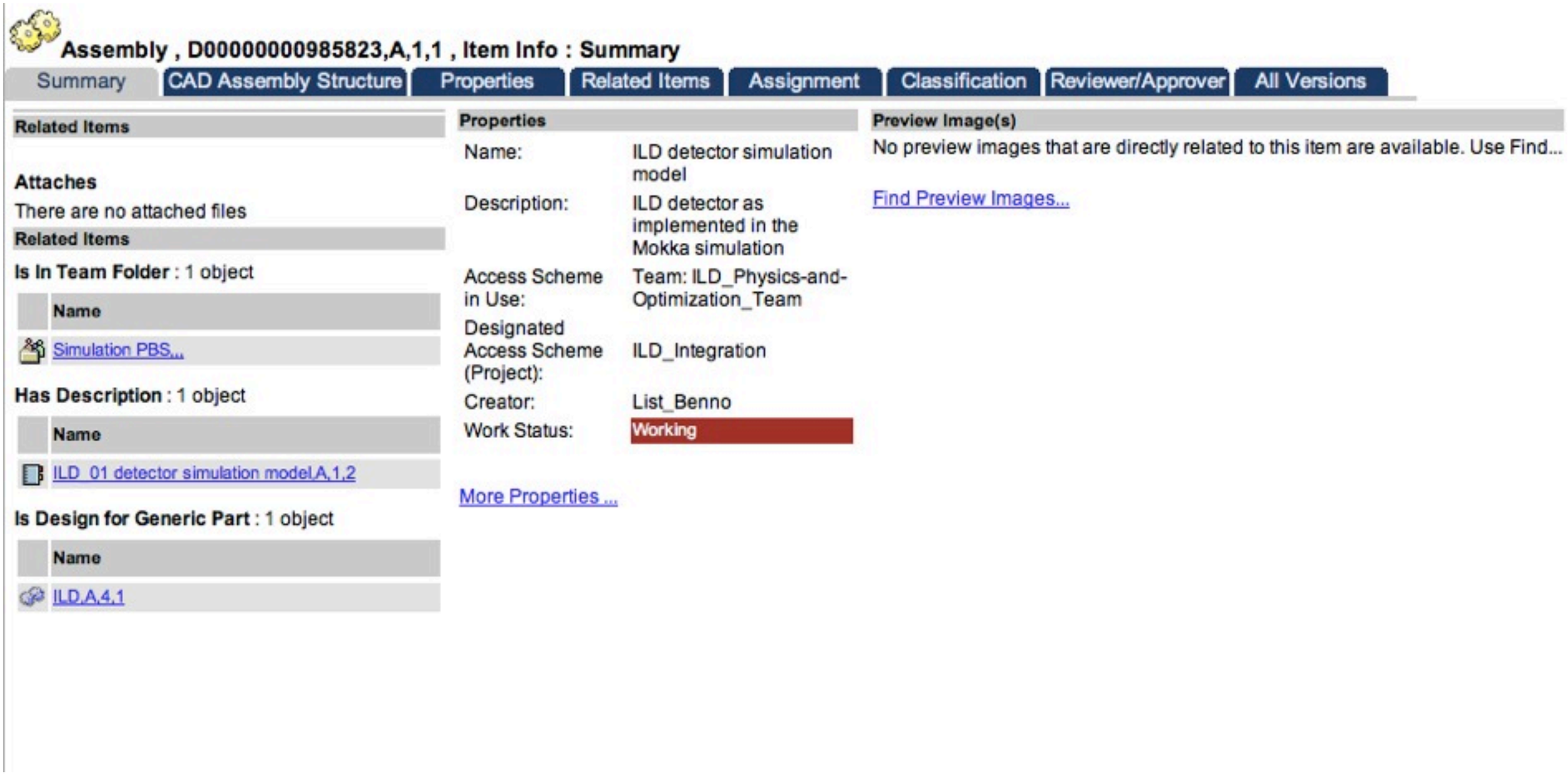
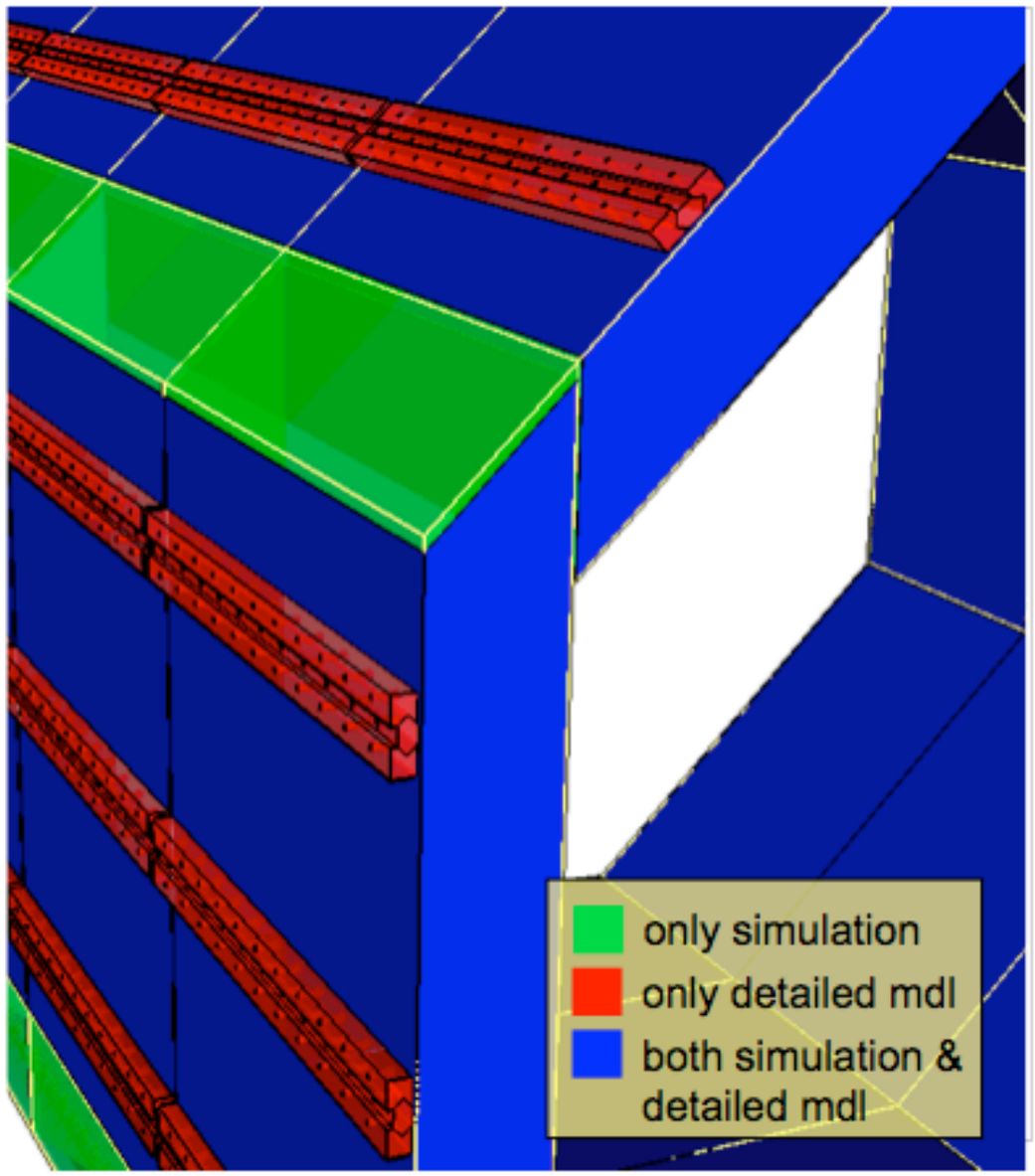
ILD Simulation Model



- Exported from MOKKA

ILD Simulation Model

Comparing Simulation and Detailed Model (2)

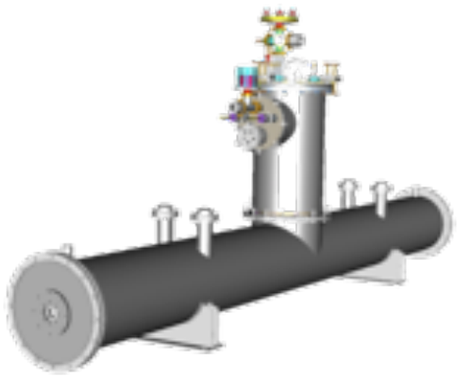


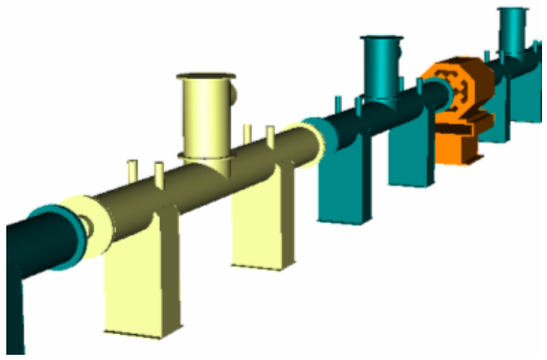
- After re-orienting detailed model, shapes of active material generally in good accordance
- Some extra space in simulation model at ends of modules
- Rails not accounted for in simulation model

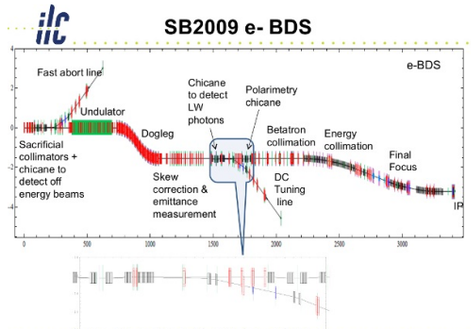
- Again discussion: How to treat dead material?
- Note: If detailed model gets fully detailed, comparison needs to made for smaller units, e.g. per module
  → requires compatible structures of simulation and detailed models

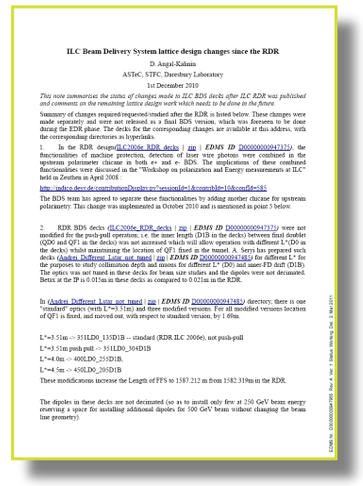
Document Consistency

Example: Traceability









ILC Beam Delivery System lattice design changes since the RDR

D. Angal-Kalinin

ASTeC, STFC, Daresbury Laboratory

1st December 2010

This note summarises the status of changes made to ILC BDS decks after ILC RDR was published and comments on the remaining lattice design work which needs to be done in the future.

Summary of changes required/requested/studied after the RDR is listed below. These changes were made separately and were not released as a final BDS version, which was foreseen to be done during the EDR phase. The decks for the corresponding changes are available at this address, with the corresponding directories as hyperlinks.

1. In the RDR design(ILC2006e_RDR_decks | zip | *EDMS ID* D0000000947370), the functionalities of machine protection, detection of laser wire photons were combined in the upstream polarimeter chicane in both e+ and e- BDS. The implications of these combined functionalities were discussed in the "Workshop on polarization and Energy measurements at ILC" held in Zeuthen in April 2008 :

http://indico.desy.de/contributionDisplay.py?sessionId=1&contribId=10&confId=585

The BDS team has agreed to separate these functionalities by adding another chicane for upstream polarimetry. This change was implemented in October 2010 and is mentioned in point 5 below.

2. RDR BDS decks (ILC2006e_RDR_decks | zip | *EDMS ID* D0000000947370) were not modified for the push-pull operation; i.e. the inner length (D1B in the decks) between final doublet (QD0 and QF1 in the decks) was not increased which will allow operation with different L*(D0 in the decks) whilst maintaining the location of QF1 fixed in the tunnel. A. Seryi has prepared such decks (Andrei_Different_Lstar_not_tuned | zip | *EDMS ID* D0000000947482) for different L* for the purposes to study collimation depth and muons for different L* (D0) and inner-FD draft (D1B). The optics was not tuned in these decks for beam size studies and the dipoles were not decimated. Betax at the IP is 0.015m in these decks as compared to 0.021m in the RDR.

In (Andrei_Different_Lstar_not_tuned | zip | *EDMS ID* D0000000947482) directory; there is one "standard" optics (with L*=3.51m) and three modified versions. For all modified versions location of QF1 is fixed, and moved out, with respect to standard version, by 1.69m.

L*=3.51m -> 351LD0_135D1B -- standard (RDR,ILC 2006e), not push-pull

L*=3.51m push pull -> 351LD0_304D1B

L*=4.0m -> 400LD0_255D1B

L*=4.5m -> 450LD0_205D1B

These modifications increase the Length of FFS to 1587.212 m from 1582.319m in the RDR.

The dipoles in these decks are not decimated (so as to install only few at 250 GeV beam energy reserving a space for installing additional dipoles for 500 GeV beam without changing the beam line geometry).

- Traceability is the foundation for making documents **consistent**, and for **capturing rationale**

All CAD models: Norbert Collomb, STFC

L. Hagge

19.03.2011 ALCPG11, Eugene

Global Design Effort

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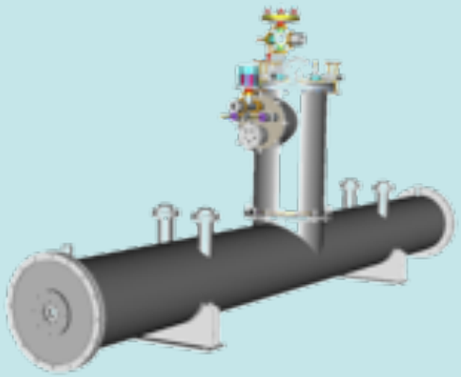
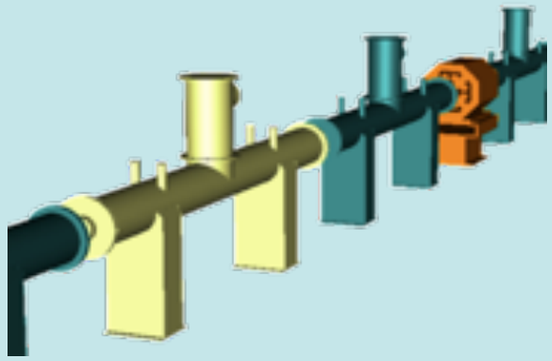
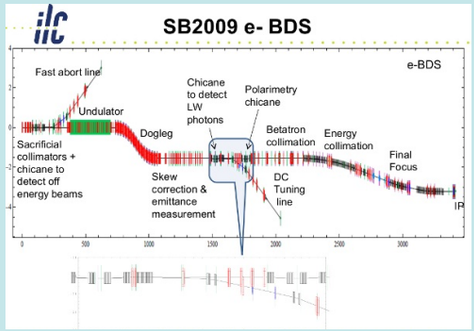
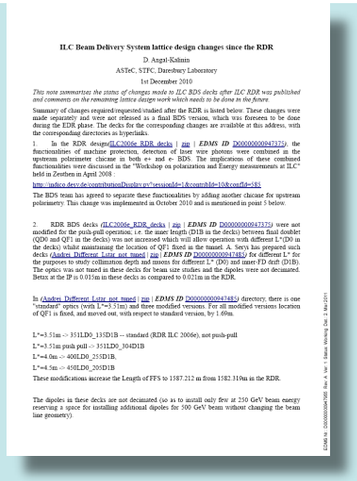
Consistency

Propagating Changes ...









ILC Beam Delivery System lattice design changes since the RDR

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http://indico.desy.de/contributionDisplay.py?sessionId=1&contribId=10&confId=585

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In (Andrei_Different_Lstar_not_tuned | zip | *EDMS ID* D0000000947483) directory, there is one "standard" optics (with L*=3.51m) and three modified versions. For all modified versions location of QF1 is fixed, and moved out, with respect to standard version, by 1.69m.

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L*=3.51m push pull -> 351LD0_304D1B

L*=4.0m -> 400LD0_255D1B.

L*=4.5m -> 450LD0_205D1B

These modifications increase the Length of IFFS to 1587.212 m from 1582.310m in the RDR.

The dipoles in these decks are not decimated (so as to austall only few at 250 GeV beam energy reserving a space for installing additional dipoles for 500 GeV beam without changing the beam line geometry).

EDMS No. D0000000947695 Rev. 4 Ver. 1 Status: Working Draft 3 Mar 2011

Lattice Design Description

Helical Undulator → **Undulator Section** → **Lattice**

1 is-used-by 2 depends-on 3 is-described-by

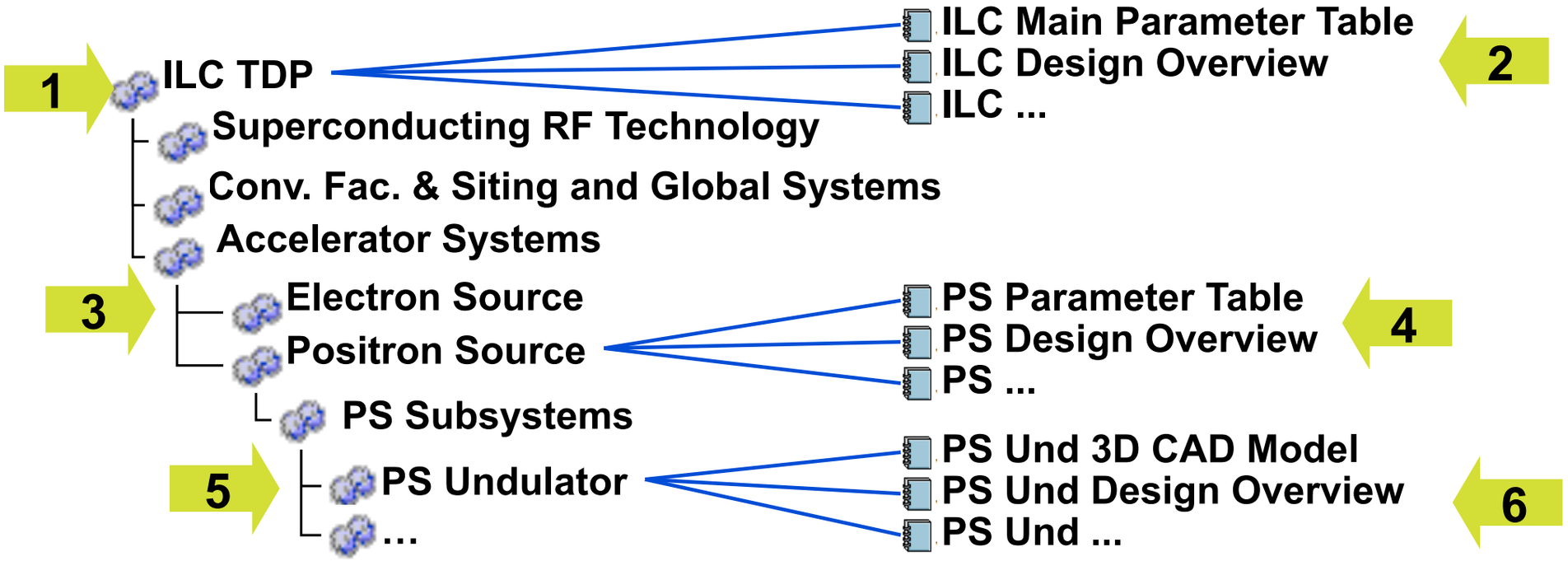
What happens if e. g. the lattice changes?

- Create new version of lattice
- Undulator section points to old version
  → needs update, check if undulator still fits beamline
- Traceability helps to (re-) establish consistency

L. Hagge

Summary: Explore TDD

- WBS provides leading hierarchy for TDD activities
- Everything gets reviewed, released and stamped
- Ideally, documents should be consistent per WBS node
- Agree on & provide comparable doc‘s per WBS node
- **Support for Document Upload available at DESY**



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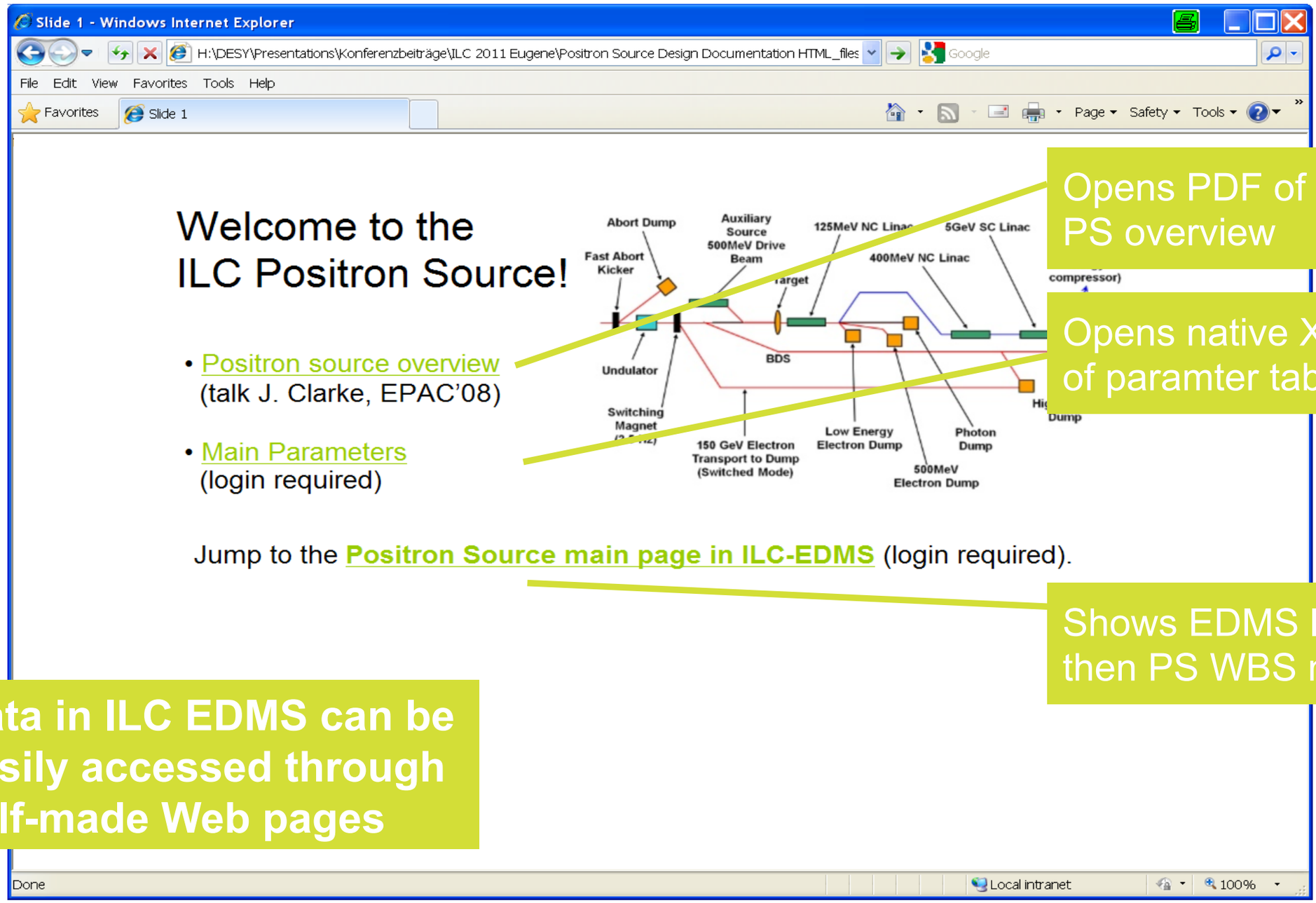
Direct Access from Web



Opens PDF of PS overview

Opens native XLS of paramter table

Shows EDMS login, then PS WBS node

Data in ILC EDMS can be easily accessed through self-made Web pages

L. Hagge

To Do

Need to discuss here:

- what should go into the Detailed Design Documentation
  - CAD models
  - MOKKA models
  - Agree on set of required documents
  - detector optimisation results
  - physics benchmarks
  - (...)
- who is doing what
  - MDI/Integration group
  - ILD management
  - subdetector collaborations
  - other ILD working groups (costing, software)
  - Benno, Lars and our ILC-EDMS friends at DESY
  - new person to be hired at DESY (50% for this type of work)
- We should propose a procedure to all in ILD at the May workshop
  - Write a 2-3 page proposal...

Conclusion

- We need a way to document the ILD design properly
- We do not know exactly what comes after the DBD/TDR
- Most optimistic scenario:
  - The ILC will be built soon
    - We need to continue from the DBD starting point towards the detector realisation
- Maybe more realistic scenario:
  - A longer decision and planning period will follow with unknown resources at hand
    - Need to make sure that the ILD documentation is stored properly and might be accessed in a well defined way in the future
- We need to make sure that the ILD documentation is to some extent synchronised with the ILC machine documentation
  - and with SiD if possible!

- Detailed Design Documentation is „the ILD Legacy“....