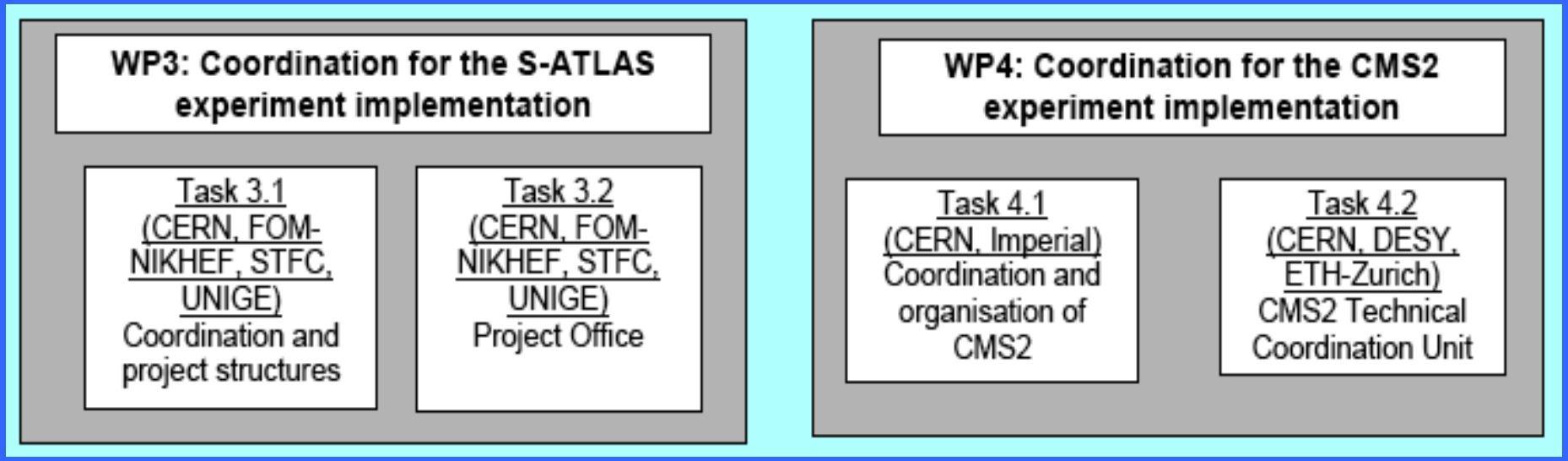
SLHC – PP (WP3) Co-ordination of the experimental upgrades – ATLAS

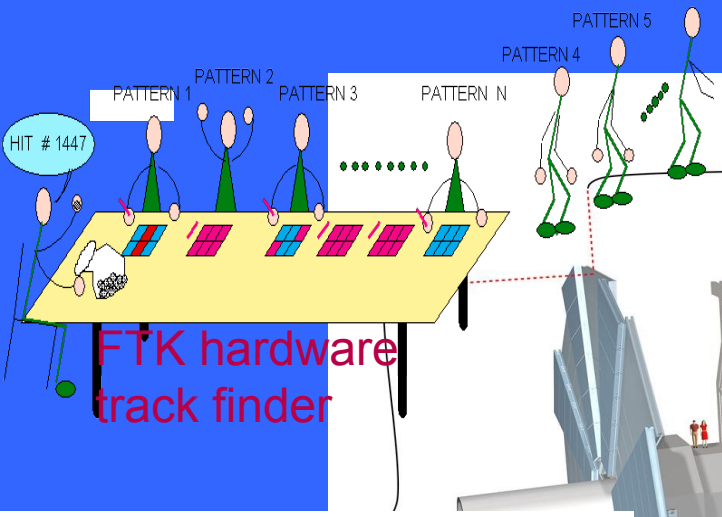
- The main significance of the work-package
  - Outlines a timescale for the equivalents of LoI, possibly TP and Initial MoU for the ATLAS upgrade (becoming real projects)
  - Change the perspective of having a LHC detector lifetime of 10 years, to a long term project running well beyond 202(n) and having to deal with a substantial higher luminosity than foreseen in the original design
  - Brings some extra resources into the coordination of this work

- The WP was written to cover both phase I (2016-17) and II (2020 or so), however some of the items above are not achievable for phase II by April 2011
  - The focus has changed towards phase I but organisationally the work is equivalent

Detector work

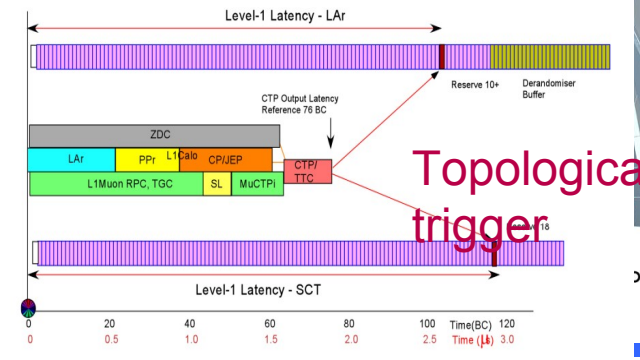
- Objectives for the detector WPs:
  - Establish the formal structures needed for the ATLAS upgrade construction project, and through Technical Documentation, Cost and Schedule planning, establish an initial MoU for the Upgrade Construction.
  - Establish a Project Office to address the critical technical integration and coordination issues of the new detectors, and the technical and managerial tools needed for the project planning and follow up.
  - In addition WP5 will contain an experimental component (40%) and WP8 will address a real R&D concern for SLHC detectors (powering)



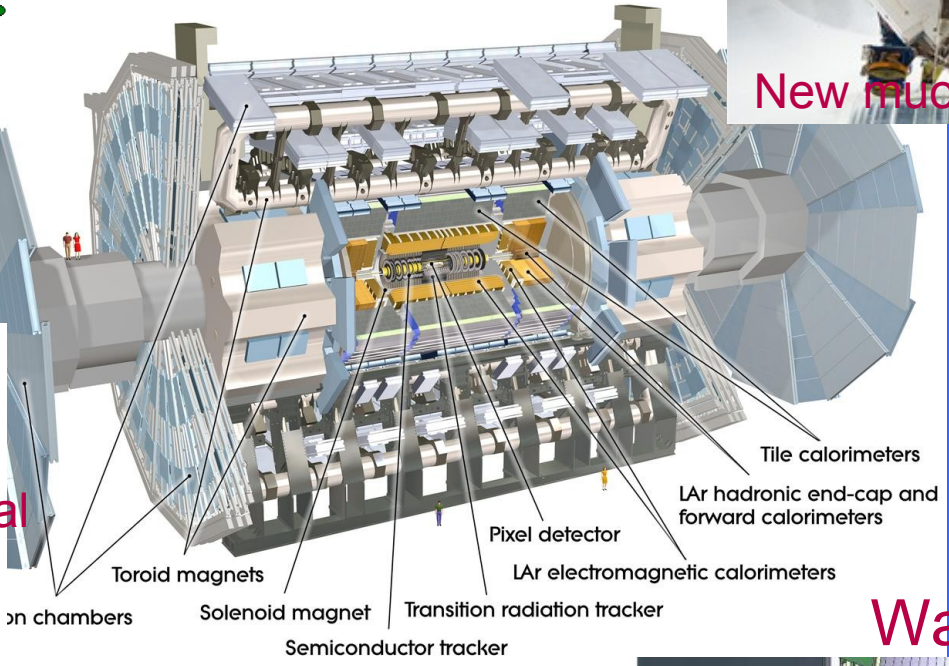


FTK hardware track finder

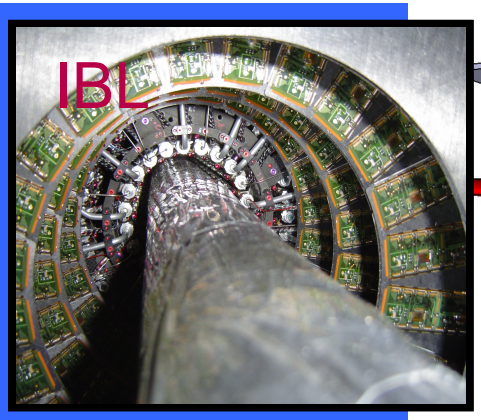
New muon small wheel



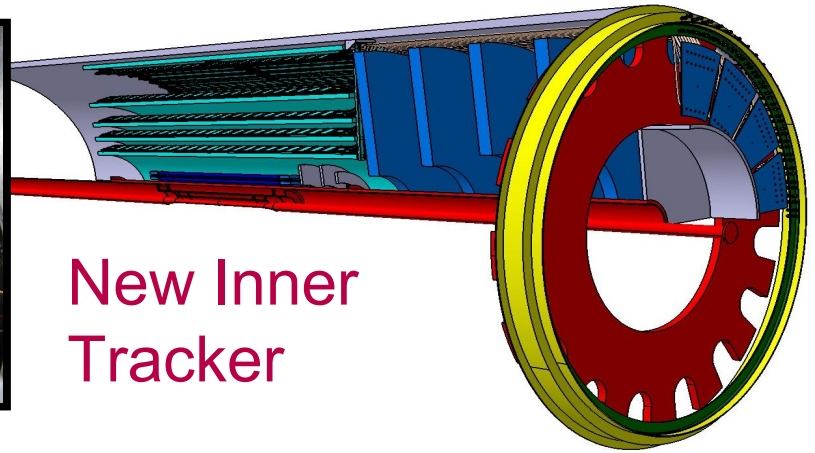
Topological trigger



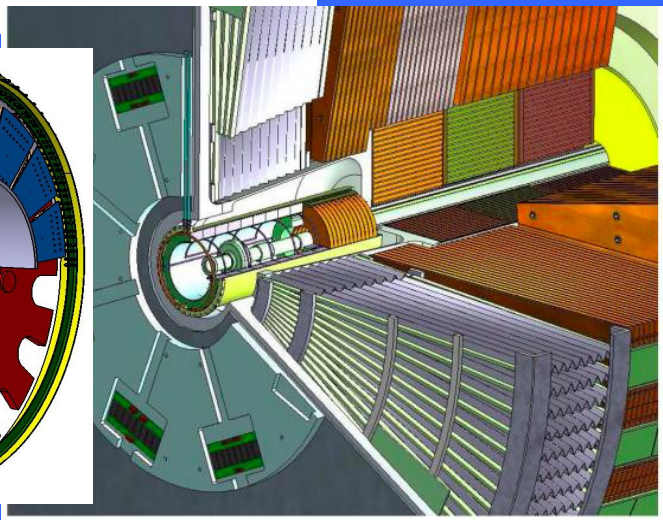
Warm FCAL



IBL



New Inner Tracker



What are the key timescales/issues?

- Phase 1
  - What detector elements will need replacement/modification to cope - if any ?
    - In ATLAS we plan a new pixel B-layer around a smaller beam-pipe, all inside the envelope of the current PIXEL system. (Insertable B-layer: IBL)
    - TDR is finished (approved by ATLAS, with LHCC), also costs and IMoU
    - New hardware fast track-finder FTK project approved
    - TDR and MoU being prepared
    - We are evaluating what other measures are needed for other parts of ATLAS
- Phase 2
  - What detector elements will need replacement?
    - ID and forward regions (machine interface, FCAL, muons) main victims, electronics and trigger in general
    - Timescales still uncertain, but a new ID requires 6-8 years – and we are not ready to start either
    - Phase-2 LoI was prepared in 2010, but now awaits outcome of a task-force to decide how to share the work between Phase-1 and Phase-2.
    - A fairly substantial draft exists
    - Will contain a cost estimate and some minimal responsibility matrix
    - But now scheduled for end-2011

LHC Schedule

- The LHC schedule has continually evolved throughout the SLHC-PP project
- Much less uncertainty now since the successful start of the LHC
- Phase-0 shutdown now 2013-14
- Phase-1 shutdown now 2017 or 2018
- Phase-2 now 2022?
- Particularly the Phase-2 is a major shift and so naturally most of our effort in cost-books etc. has moved to Phase-1
- Our plans have also evolved, including some of what was planned for Phase-2 being brought into Phase-1

Tasks 3.1-2 Already done

Deliverables task 3.1	Description	Nature	Delivery date
3.1.1	Project management structure and review office for R&D phase in place	O, R	M06
3.1.2	Establish the initial Memorandum of Understanding for the upgrade	R	M36
3.1.3	Develop detailed cost books for the upgrade including the installation phase	R	M36

Deliverables task 3.2	Description	Nature	Delivery date
3.2.1	Document the technical scope of the upgrade including an initial cost-estimate	R	M24
3.2.2	Schedule for the upgraded detector parts and for the S-ATLAS installation	R	M32
3.2.3	Technical documentation, drawing and CAD information for the existing experiment and the upgraded elements	R	M36

Milestones	Description	Nature	Expected date
3.1	Schedule for the R&D phase	R	M09
3.2	Upgrade project structures adapted to the implementation phase	O, R	M24

Documents for Milestones/deliverables already achieved

3.1.1 Deliver project management structure and review office for R&D

In place: Talks and minutes in Indico for PO and USG meetings, also for R&D reviews

3.2.1 Document the technical scope and initial cost estimate

IBL TDR https://edms.cern.ch/document/1119960 (complete)

LoI https://edms.cern.ch/document/1020649 (in work)

Milestones 3.1 (M9) and 3.2 (M24) Schedule for R&D Phase and adapt organisation to implementation phase:

Organisation has been re-made to better suit implementation; more later

Tasks 3.1-2 Next steps

Deliverables task 3.1	Description	Nature	Delivery date
3.1.1	Project management structure and review office for R&D phase in place	O, R	M06
3.1.2	Establish the initial Memorandum of Understanding for the upgrade	R	M36
3.1.3	Develop detailed cost books for the upgrade including the installation phase	R	M36

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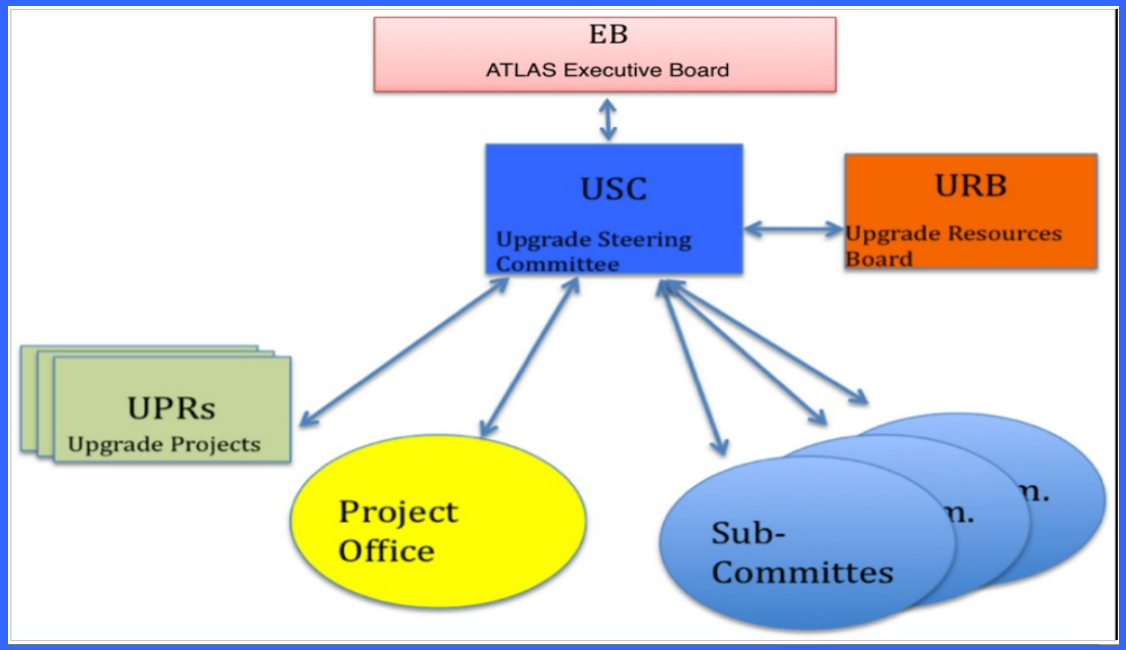
Milestones	Description	Nature	Expected date
3.1	Schedule for the R&D phase	R	M09
3.2	Upgrade project structures adapted to the implementation phase	O, R	M24

Milestone 3.1.2: Project Structures

- Major further advances with new Upgrade Organisation in place
  - Main document EDMS 1093133; sub-committees defined in 1096488 and 1096494
- Upgrade Steering Group --> Upgrade Steering Committee
  - ATLAS System PLs directly in charge
- URB:
  - National Upgrade Physicists for two way discussion of resources
- UPR:
  - When a project is mature and enters the execution phase, we set up a project management structure for it. Leaders sit in the USC to monitor progress.
- Sub-committees:
  - USC appoints sub-committees with relevent experts to deal with specific choices or issues
  - Phase-1 sub-committee up and running to make base-line plan
  - Inner Tracker Sub-committee to advance the inner tracker layout and organise the R&D

Organisation for project approval and implementation



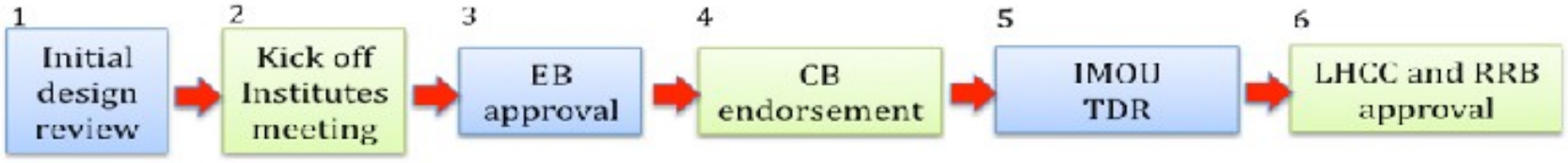


Fig. 2: Stages in Upgrade Project approval process

Deliverable 3.1.2 Initial MoU

- Done for biggest Phase-I project, IBL
- In preparation for next approved project FTK
- We move some of Phase-2 to Phase-1
  - When the Phase-1 sub-committee reports in June, we can prepare MoU for any further projects
  - Considering: new small muon wheels, new topological trigger at L1, possibly new calo electronics, possibly new warm FCAL
- Too early for initial MoU for Phase-2

Deliverable 3.1.3 - Cost books

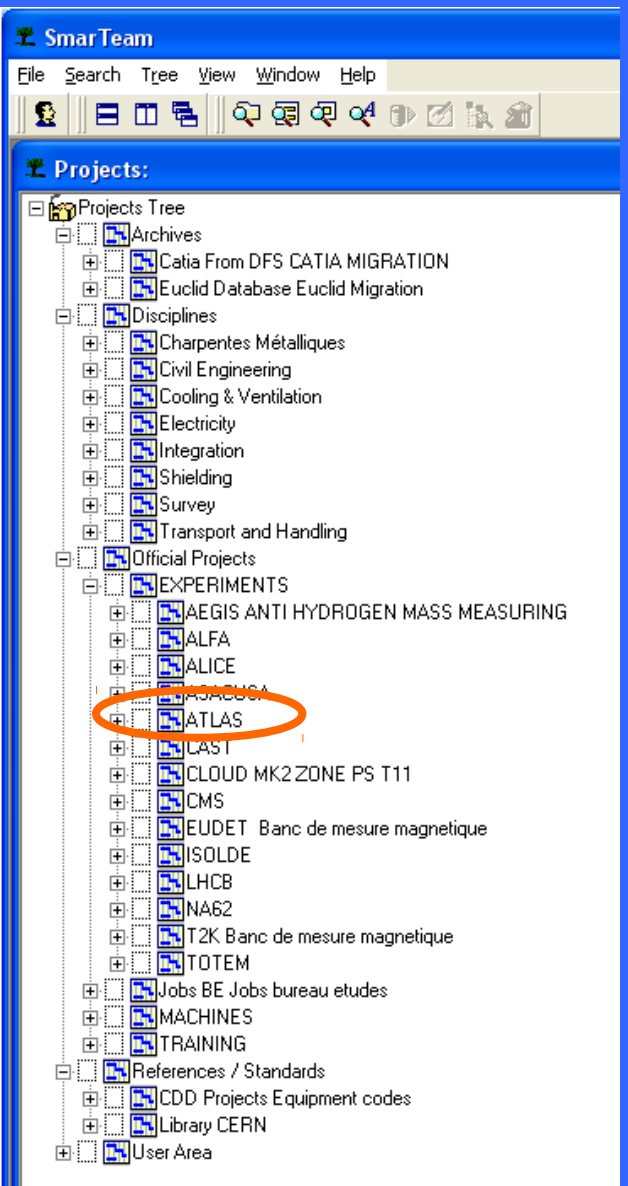
- Initial cost book available for overall upgrade, but needs detailing
- Detailed cost book done for IBL
- In preparation for FTK
- Rest of Phase-1 can follow as the projects mature
- Phase-2 is further off and detailed cost books will be made at a more appropriate time

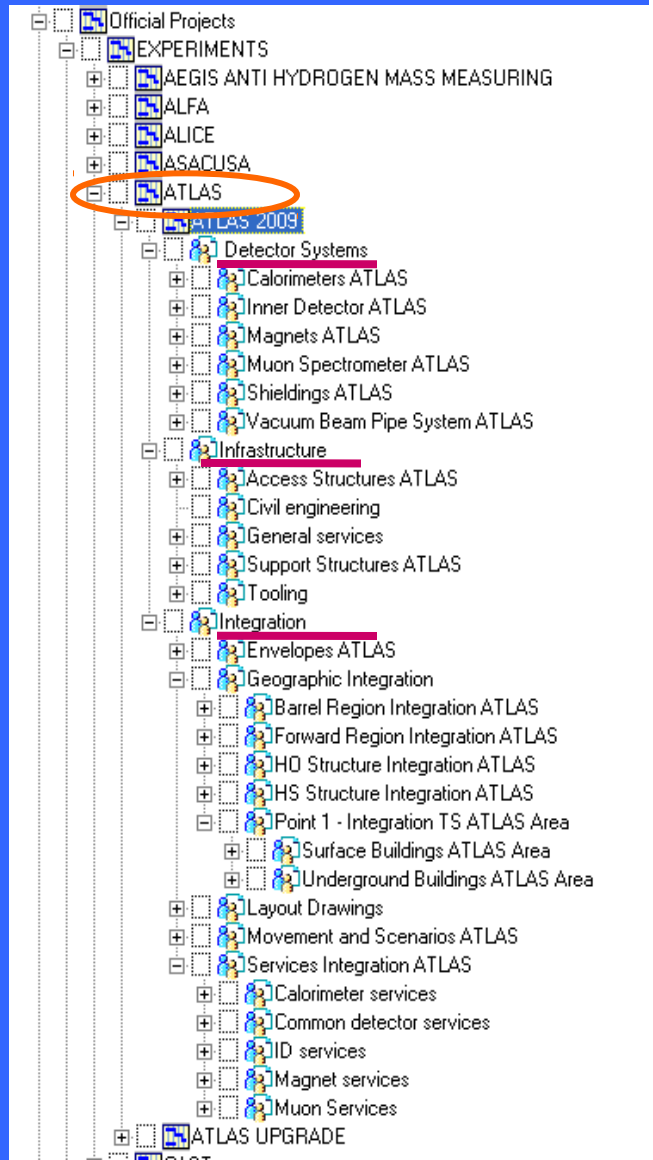
Deliverables 3.2.2 and 3: Schedule and CAD repository

- Schedule prepared, see EDMS 1012819
  - Reasonably complete task list
  - Needs up-dating to current LHC schedule
  - Needs amending for split of tasks between Phase-1 and Phase2
- CAD drawing repository
  - See talk by Tatiana Klioutchnikova in USC meeting 20/01/2011
  - Moved Euclid to Catia and SmarTeam
    - 8,000 models moved
  - New projects now made in Catia

Engineering data organization

SmarTeam is a data management system for CAD data : 3D models and drawings. Archiving, control and approval of drawings happens with the help of CDD.

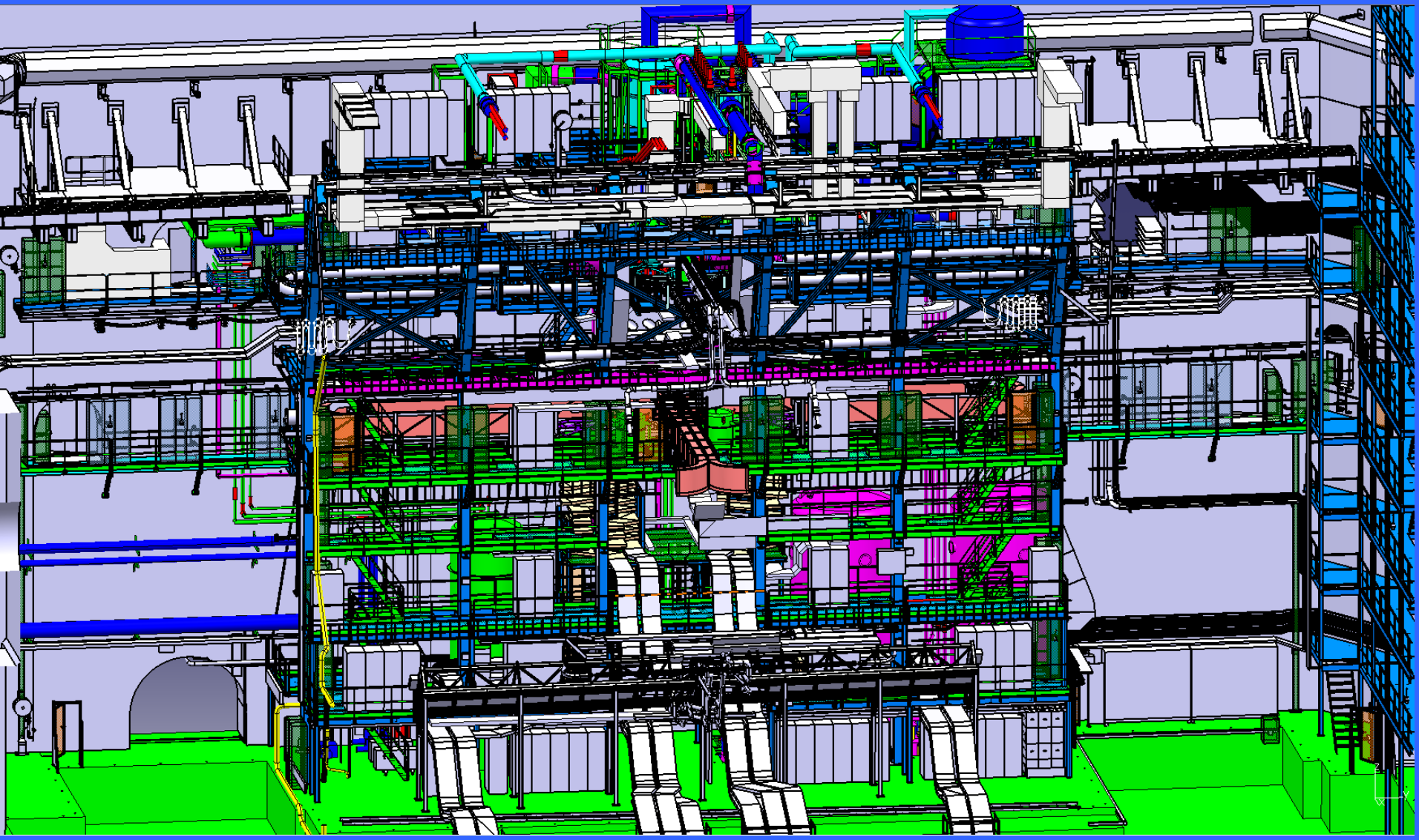




CDD folders

- **ATL** : Atlas Detector
  - **ATLV** : Vacuum Beam, Pipe system
  - **ATLI** : Inner Detector
  - **ATLS** : Solenoid Magnet
  - **ATLA** : LArg Calorimeter
  - **ATLL** : Tile Calorimeter
  - **ATLT** : Toroid Magnet
  - **ATLM** : Muon Spectrometer
  - **ATLJ** : Shielding
  - **ATLH** : Support Structures
  - **ATLD** : DAQ. Trigger. Control
  - **ATLU** : Luminosity Counters
- **ATF** : Atlas General Facilities
  - **ATFI** : Infrastructure
  - **ATFE** : External Services
- **ATA** : Atlas Assembly and Test Area
  - **ATAB** : Buildings
  - **ATAA** : LArg Calorimeter
  - **ATAL** : Tile Calorimeter
  - **ATAT** : Toroid Magnets
  - **ATAM** : Muon Chambers
- **ATC** : Atlas Technical Coordination
  - **ATCZ** : Master Envelopes
  - **ATCN** : 3D Nominal Simplified Objects
  - **ATCV** : 3D Nominal Detailed Objects
  - **ATCA** : Detail Layout drawings
  - **ATCU** : 3D CATIA Objects
  - **ATCC** : Conflicts / Critical Areas
  - **ATCI** : Installation
  - **ATCS** : Service Integration
  - **ATCO** : Access and Opening Scenarios
  - **ATCT** : Test Beams
- **ATU** : Atlas Upgrade
  - **ATUV** : Vacuum Beam
  - **ATUI** : Inner Detector
  - **ATUA** : LArg Calorimeter
  - **ATUM** : Muon Spectrometer
  - **ATUJ** : Shielding
  - **ATUC** : Technical Coordination

USA wall of the cavern with HS structure and equipment



After migration 3D models need to be corrected and cleaned. Whis work allows to assemble together very big number of sub-assemblies.

Summary

- WP3 is fully aligned with the ATLAS upgrade work that currently includes most groups in ATLAS
- Nearly all deliverables and milestones already passed
  - Rest can be completed in next months for Phase-1
- Resource use ok, all partners active
- Remaining milestones and deliverables can be answered by existing documentation
  - But now with emphasis on Phase-1; IBL and FTK
  - For Phase-2 we have more time and will complete the LoI when we have optimised the split of projects between Phase-1 and Phase-2, and when the build projects have been defined.