

Consideration of Results of Collaborative Agreement AA366/10

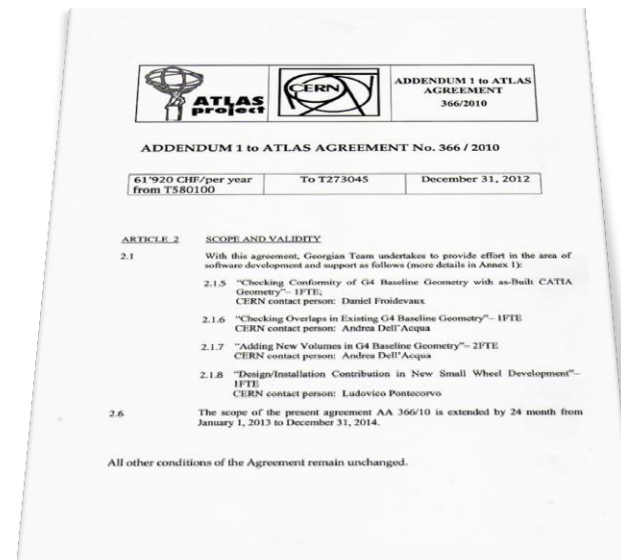
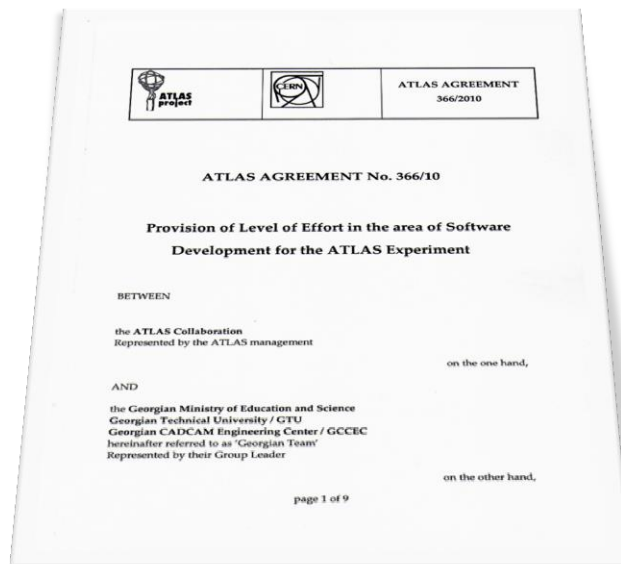
Dr Alexander Sharmazanashvili



South-Caucasus GRID & Cloud Computing Workshop – Tbilisi, Georgia
23 October, 2014

Agreement AA366/10

- Pilot Project AA347/09 in 2009
- In 2010 we have signed Agreement AA366/10 for 2 years
- In 2012 we have signed Addendum of AA366/10 for 2 years and modify list of working packages



Agreement AA366/10

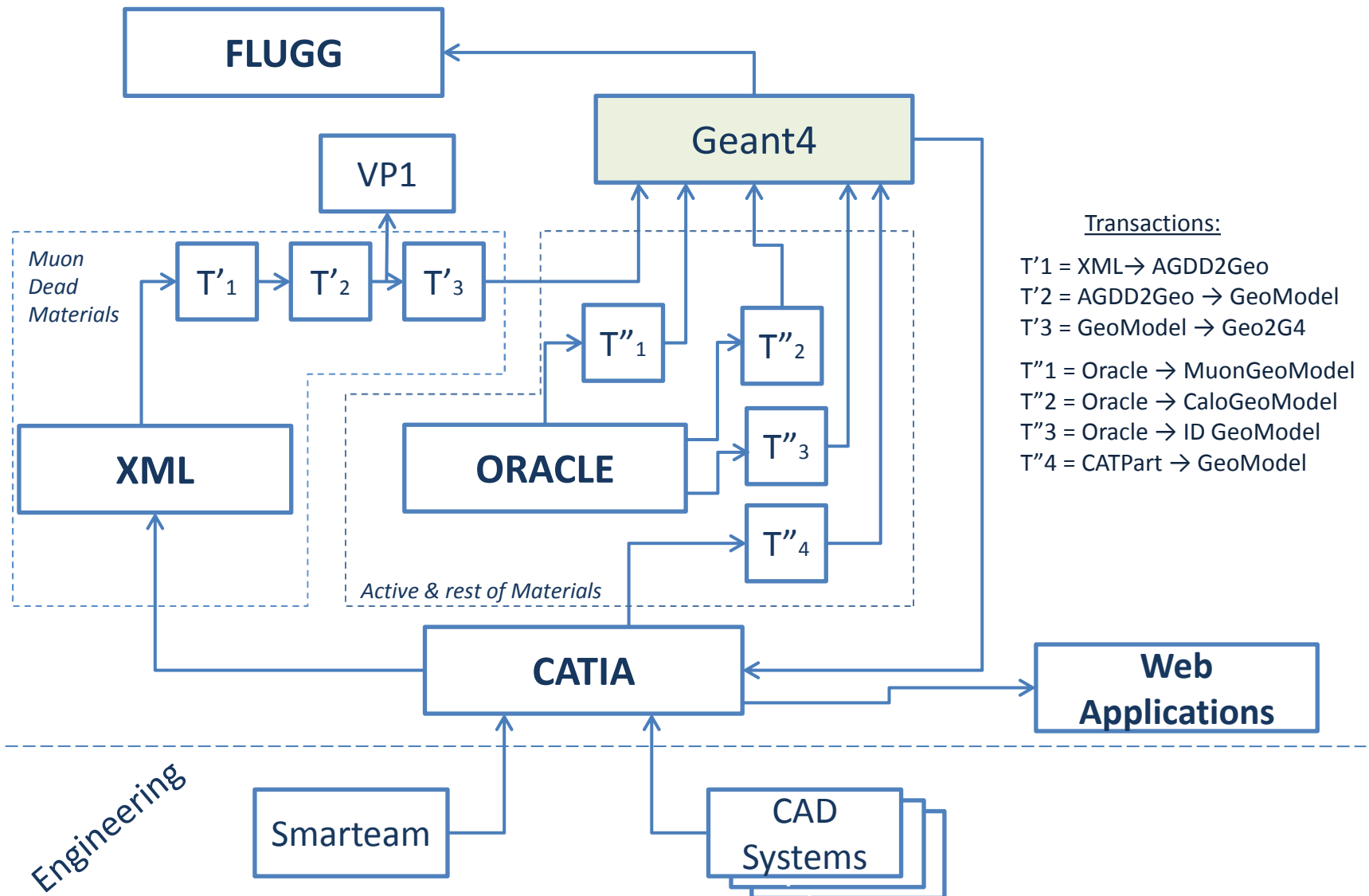
Georgian Engineering Team (GET) executing
3 general working packages for ATLAS:

WP1: Checking G4 baseline geometry for
Integration conflicts and Conformity with
as-built geometry

WP2: Adding New volumes in G4 baseline geometry

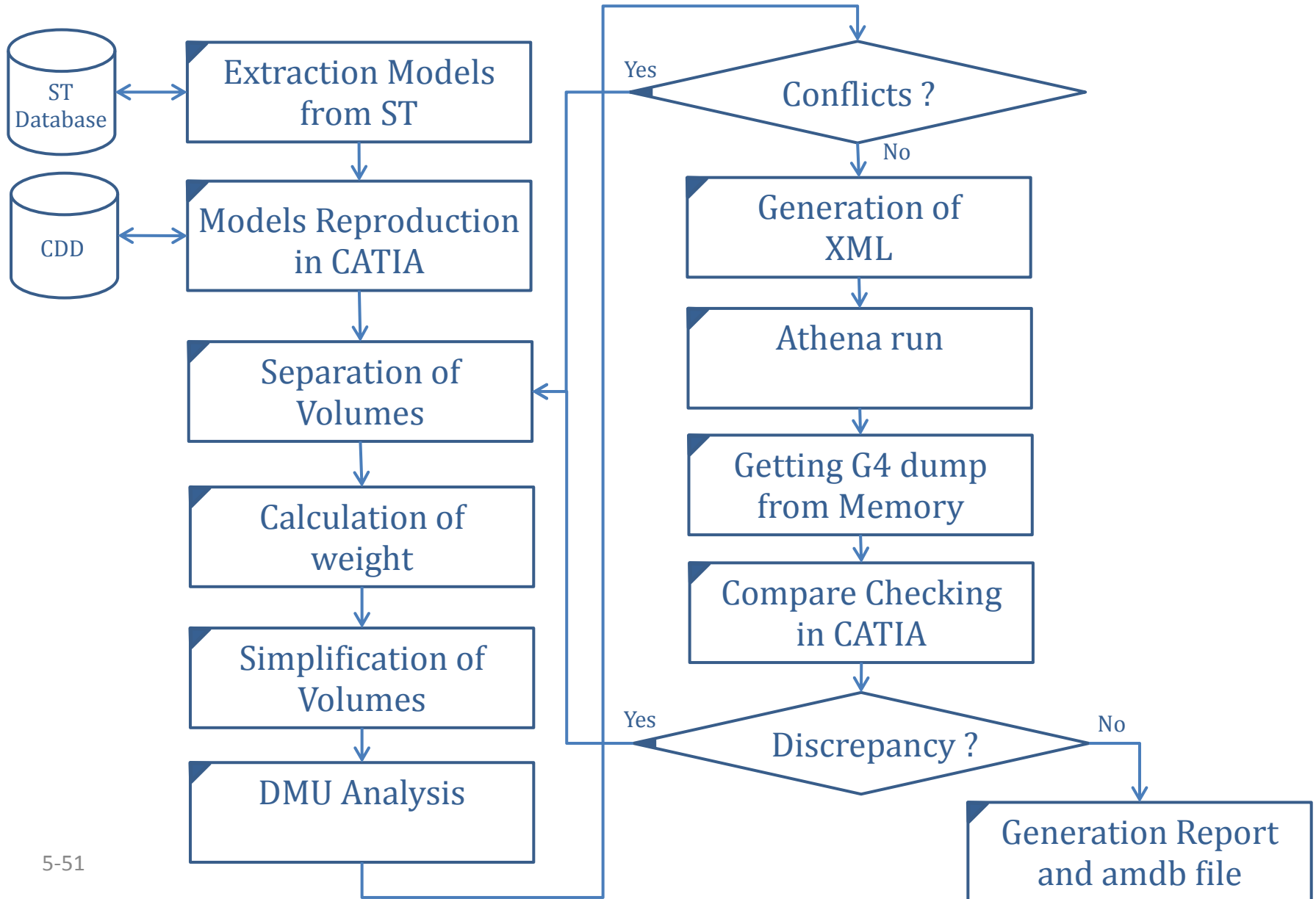
WP3: Development of COOL Tag Browser software
tool for ATLAS Oracle database

Geometry HUB on the base of CATIA



Simulation Loop Life Cycle

1st Methodology was issue together with Laurent Chevalier in 2010



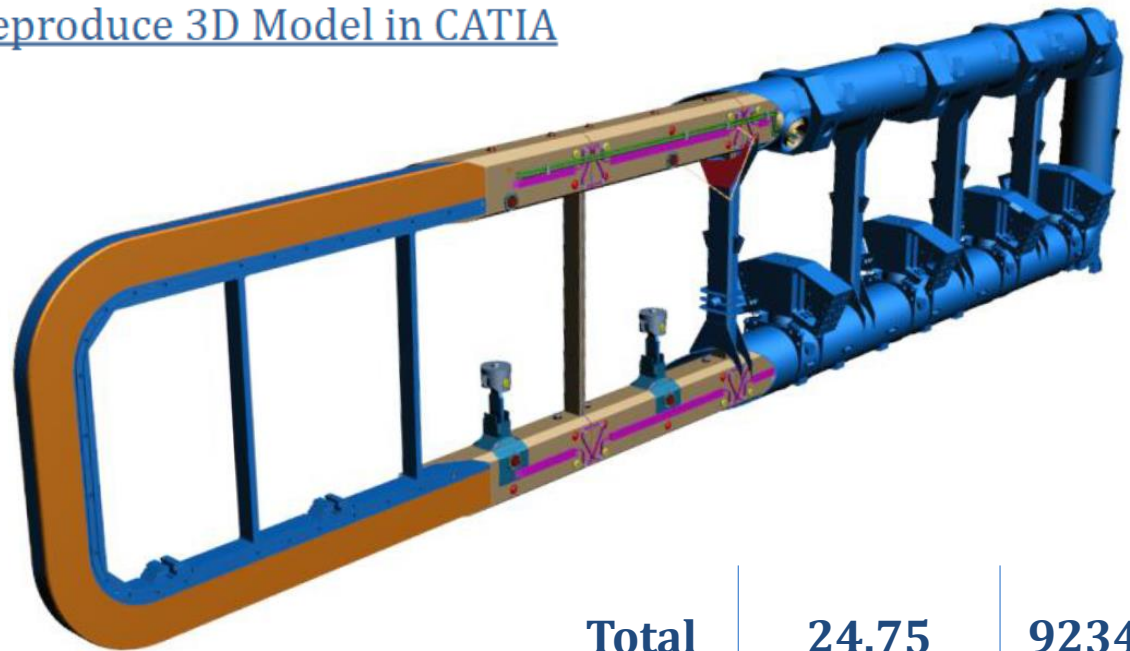
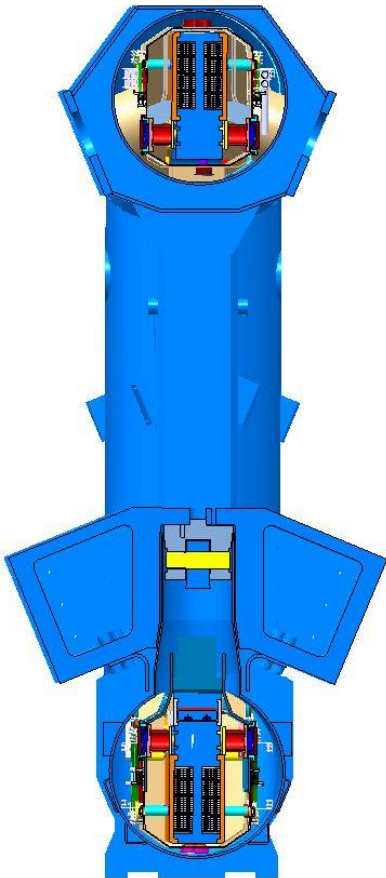
WP1: Cheking G4 Baseline Geometry

- Projects have been done:
 1. Checking of ATLAS coils baseline geometry
 2. Integration conflicts study for colis
 3. Checking of MDT supports baseline geometry
 4. Checking of TGC1 supports baseline geometry
 5. Checking of TGC2 supports baseline geometry
 6. Checking of End-Cap Toroid baseline geometry
- 2 dissertations where completed
- 1 publication
- 2 participations in International symposiums:
 - 2010 in Ancona, Italy
 - 2012 in Carlsrue, Germany

WP1: Cheking G4 Baseline Geometry

Checking of ATLAS colis baseline geometry

1 Reproduce 3D Model in CATIA



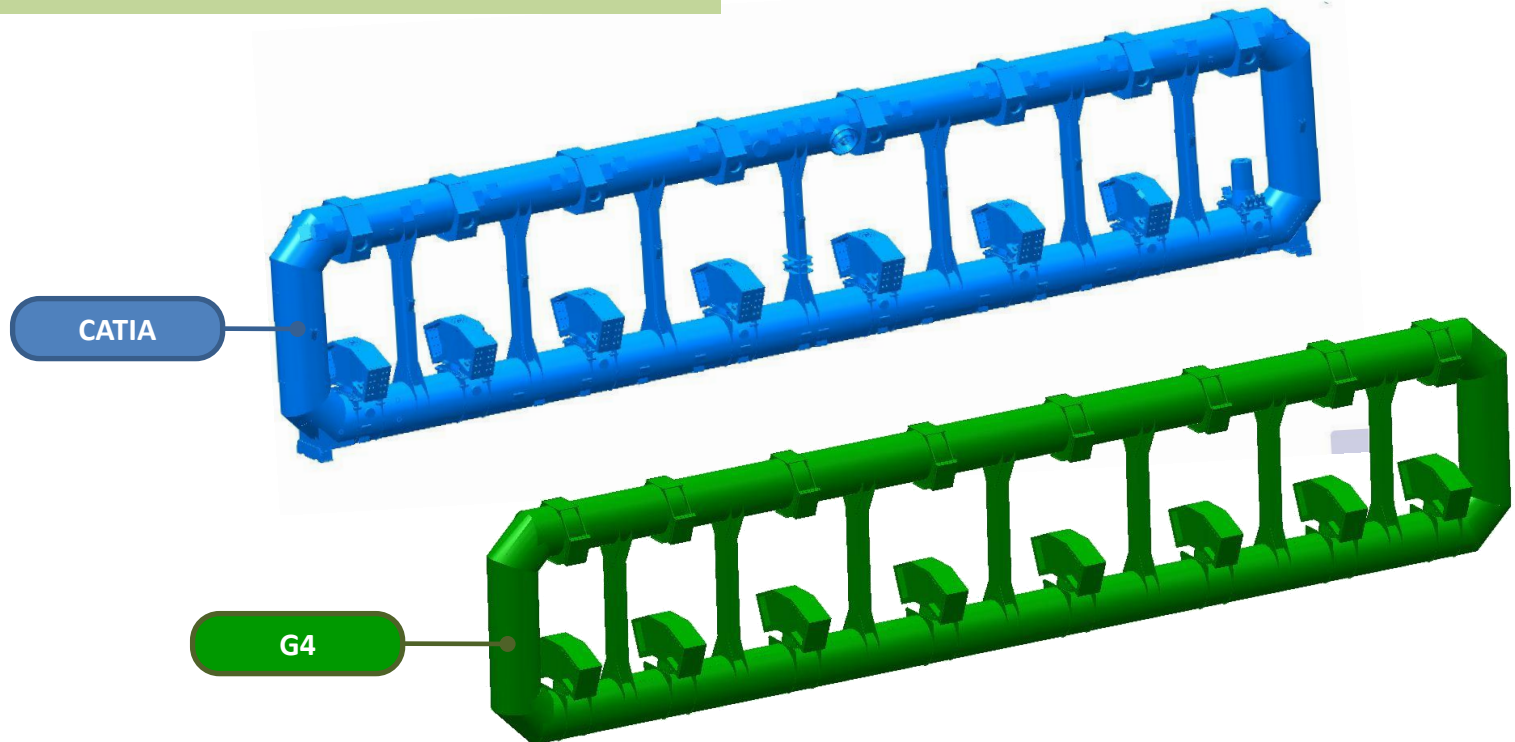
Total	24.75	92348
	Volume (m3)	Mass (kg)

- 225 CDD Drawings have been added to SmarTeam Model during the reproduction

WP1: Cheking G4 Baseline Geometry

Checking of ATLAS colis baseline geometry

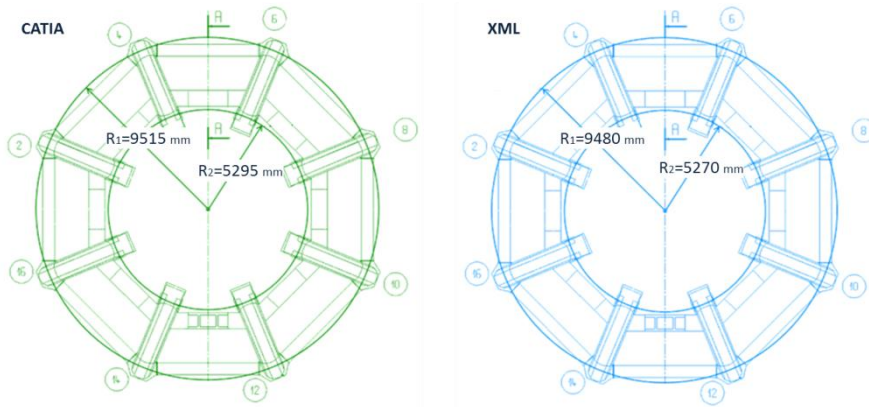
Model	Volume (m3)	Mass (kgs)	Difference (kgs)
CATIA	24.75	92130	
G4	22.13	80453	-11677



WP1: Cheking G4 Baseline Geometry

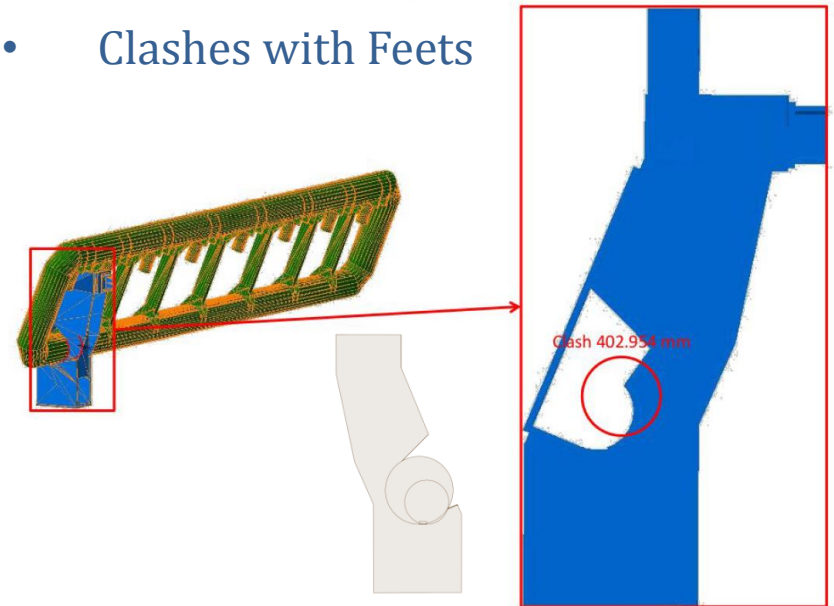
Integration Conflicts Study for Coils

- COIL's + Warm Structure Displacement

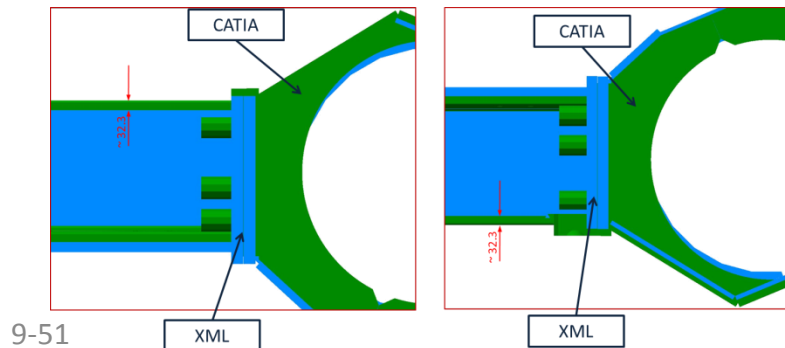


$$\Delta_{R1} = R1|_{\text{CATIA}} - R1|_{\text{XML}} = 9515 \text{ mm} - 9480 \text{ mm} = 35 \text{ mm}$$
$$\Delta_{R2} = R2|_{\text{CATIA}} - R2|_{\text{XML}} = 5295 \text{ mm} - 5270 \text{ mm} = 25 \text{ mm}$$

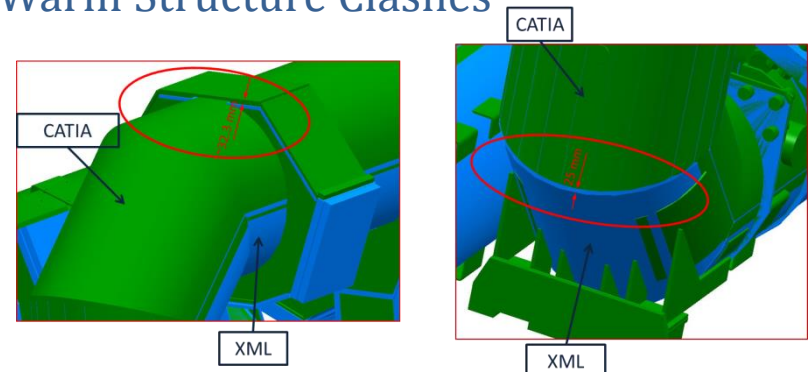
- Clashes with Feets



- Warm Structure Clashes

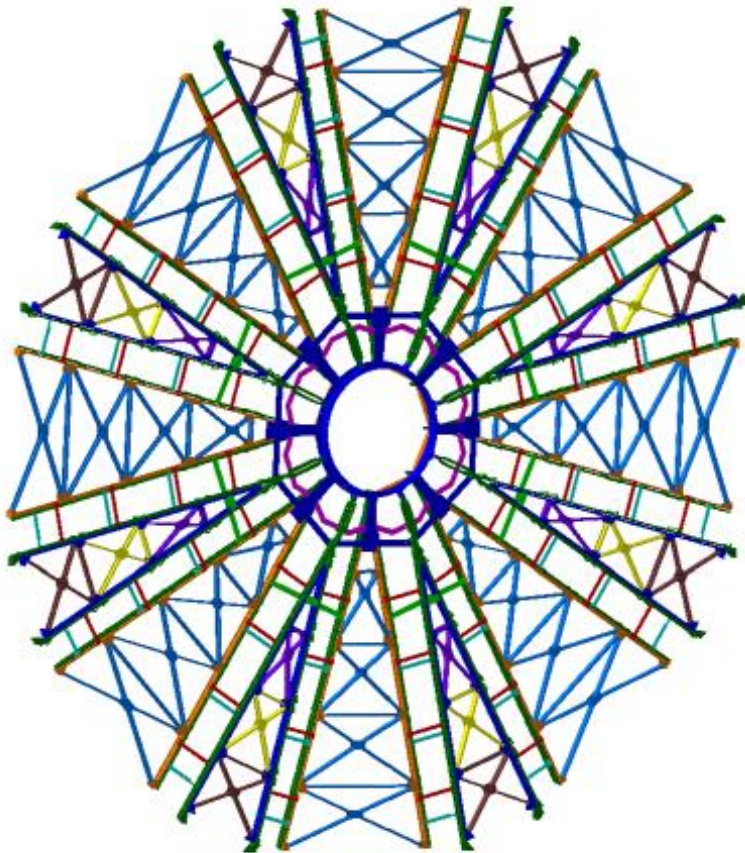


- Warm Structure Clashes



WP1: Cheking G4 Baseline Geometry

Checking of MDT supports baseline geometry



Big Sector Wheel

5'822 kg Total Weight	= 1419kgs Vol.1	+ 918kgs Vol.2	+ 339kgs Vol.3 +
	+773.5kgs Vol.4.1,4.2	+ 708.5kgs Vol.5	+ 1216kgs Vol.6.1-6.8
	+448kgs Bolts&Nuts		
2.0464 m ³ Total Volume	= 0.0657 m ³ Vol.1	+ 0.0425 m ³ Vol.2	+ 0.0157 m ³ Vol.3
	+0.0358 m ³ Vol.4.1,4.2	+ 0.0328 m ³ Vol.5	+ 0.0563 m ³ Vol.6.1-6.8
	+ 0.056 m ³ Bolts&Nuts		

Small Sector Wheel

4'710 kg Total Weight	= 1438.56 kgs Vol.1	+ 1051.92 kgs Vol.2	+ 397.44 kgs Vol.3
	+ 306.72 kgs Vol.4	+ 248.4 kgs Vol.5	+ 216 kgs Vol.6
	+ 239.76 kgs Vol.7	+ 162 kgs Vol.8	+ 125.28 kgs Vol.9
	+ 524 kgs Bolts&Nuts		
1.6159 m ³ Total Volume	= 0.5328 m ³ Vol.1	+ 0.3896 m ³ Vol.2	+ 0.1472 m ³ Vol.3
	+ 0.1136 m ³ Vol.4	+ 0.092 m ³ Vol.5	+ 0.08 m ³ Vol.6
	+ 0.0888 m ³ Vol.7	+ 0.06 m ³ Vol.8	+ 0.0464 m ³ Vol.9
	+ 0.0655 m ³ Bolts&Nuts		

BW MDT All Sector Total

3.6723
Volume (m³)

10'532
Weight (kgs)

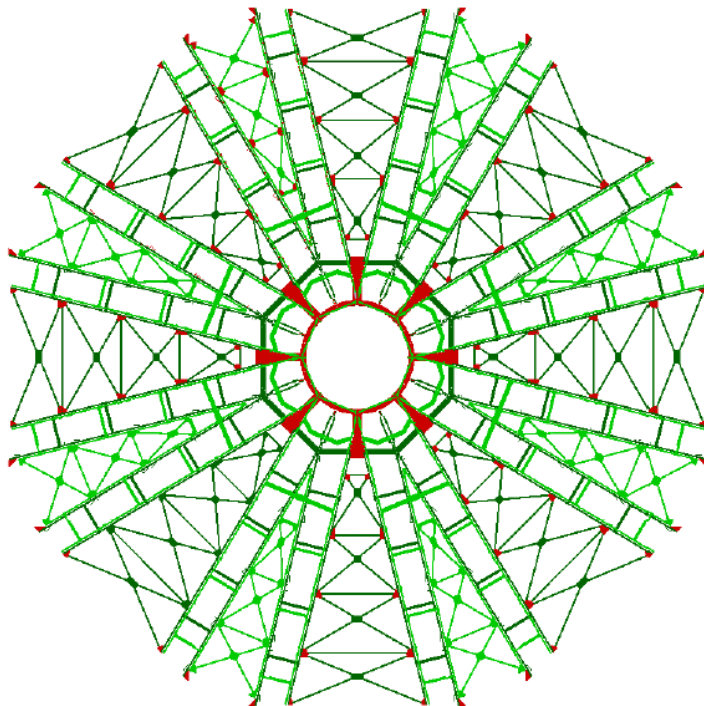
- 74 CDD Drawings have been added to SmarTeam Model during the reproduction

WP1: Cheking G4 Baseline Geometry

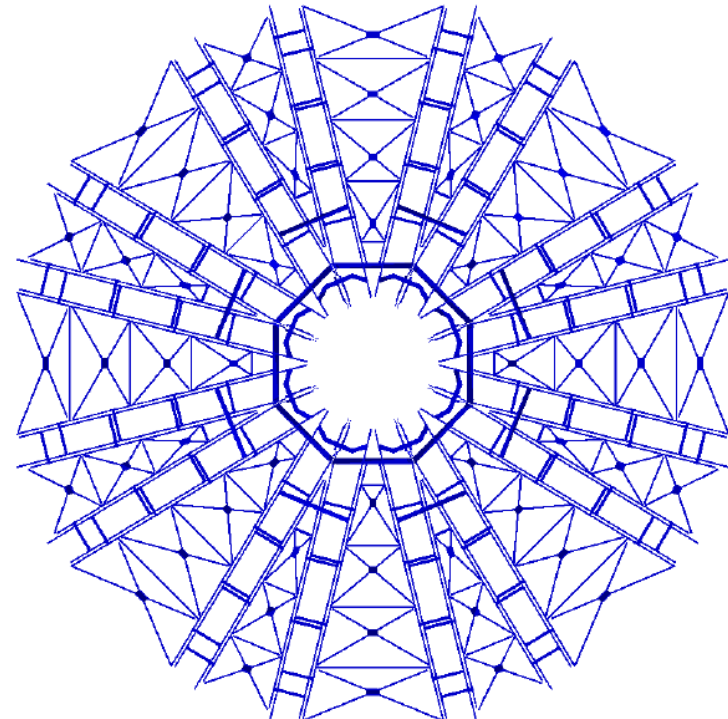
Checking of MDT supports baseline geometry

Model	Material	Density (kg/m3)	Volume (m ³)	Weight (kgs)	Missing (kgs)
CATIA	Aluminum/Stainless Steel	2700 / 8000	3.6723	10'532	
PERSINT/XML	Aluminum	2700	2.3184	6'260	-4'272

CATIA Model / [09-11-2013 Georgian Team](#)

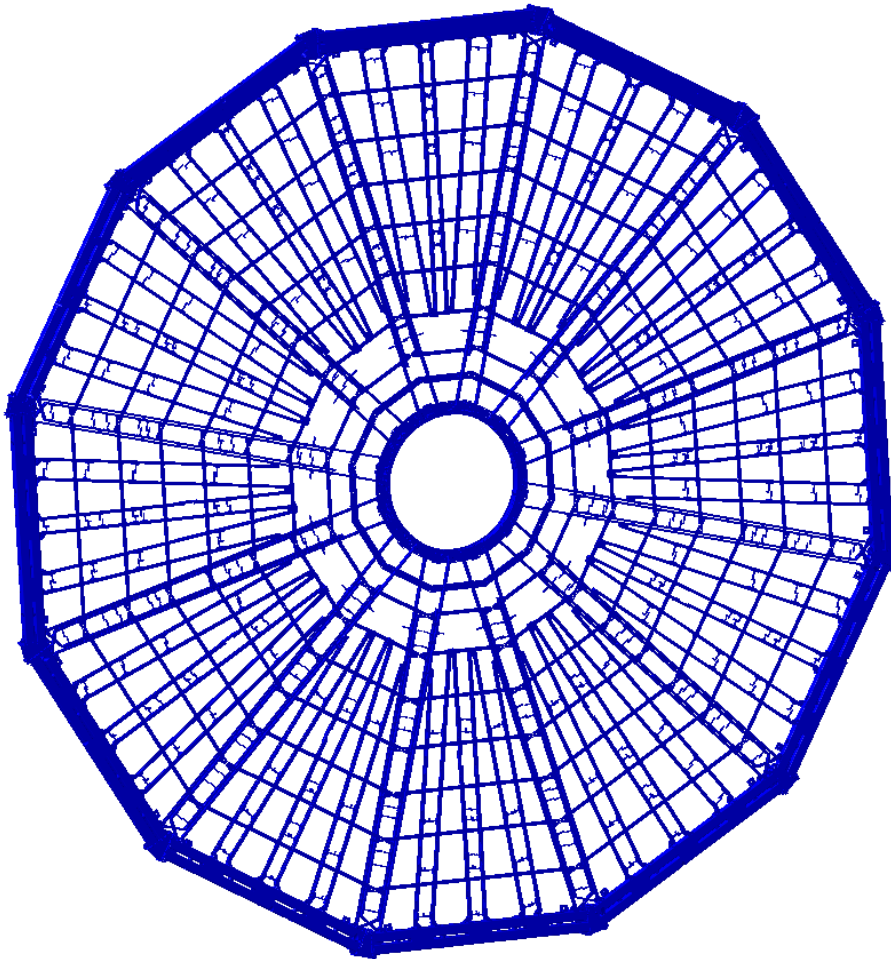


Existing XML / [09-11-2013 J.Mayer](#)



WP1: Cheking G4 Baseline Geometry

Checking of TGC1 supports baseline geometry

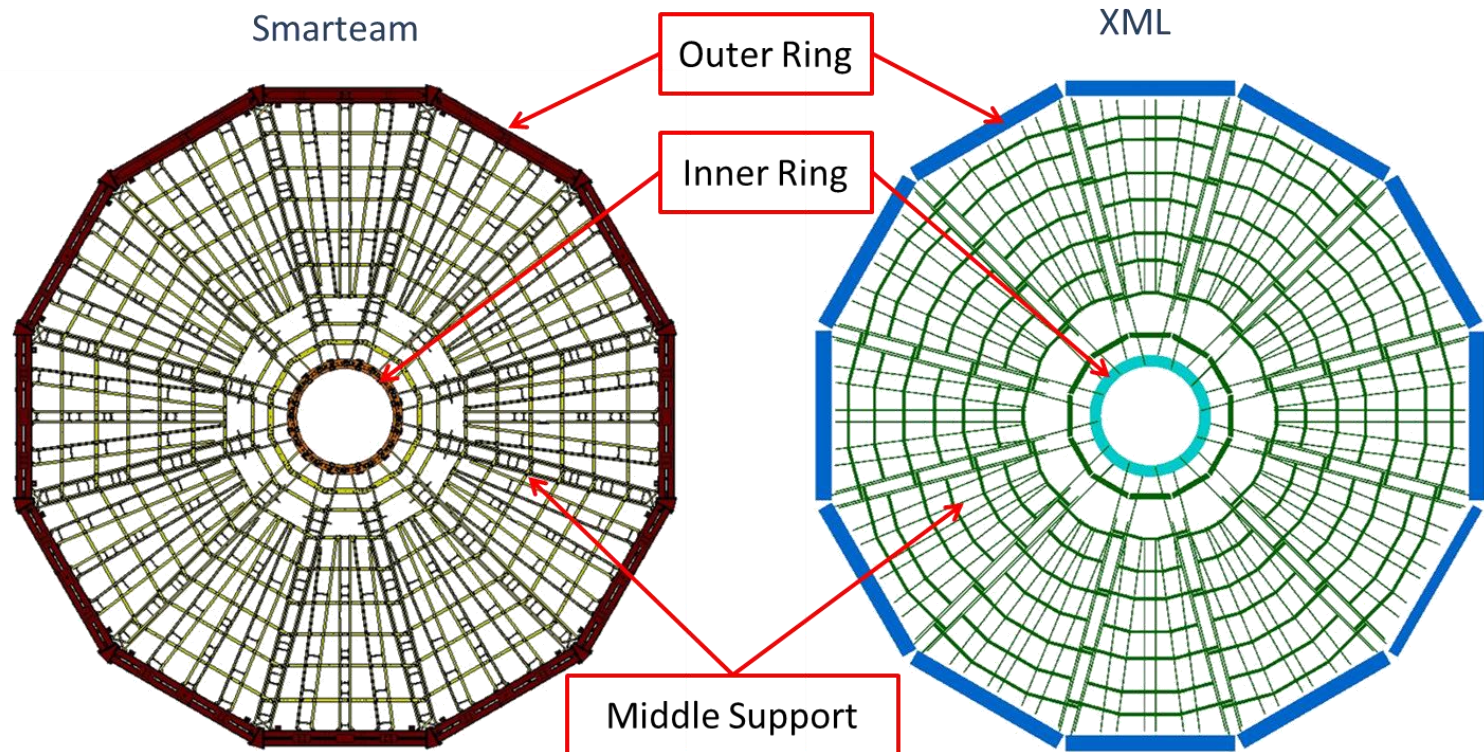


Volume: 5.0292 m³
Weight : 13578.84 kg

WP1: Cheking G4 Baseline Geometry

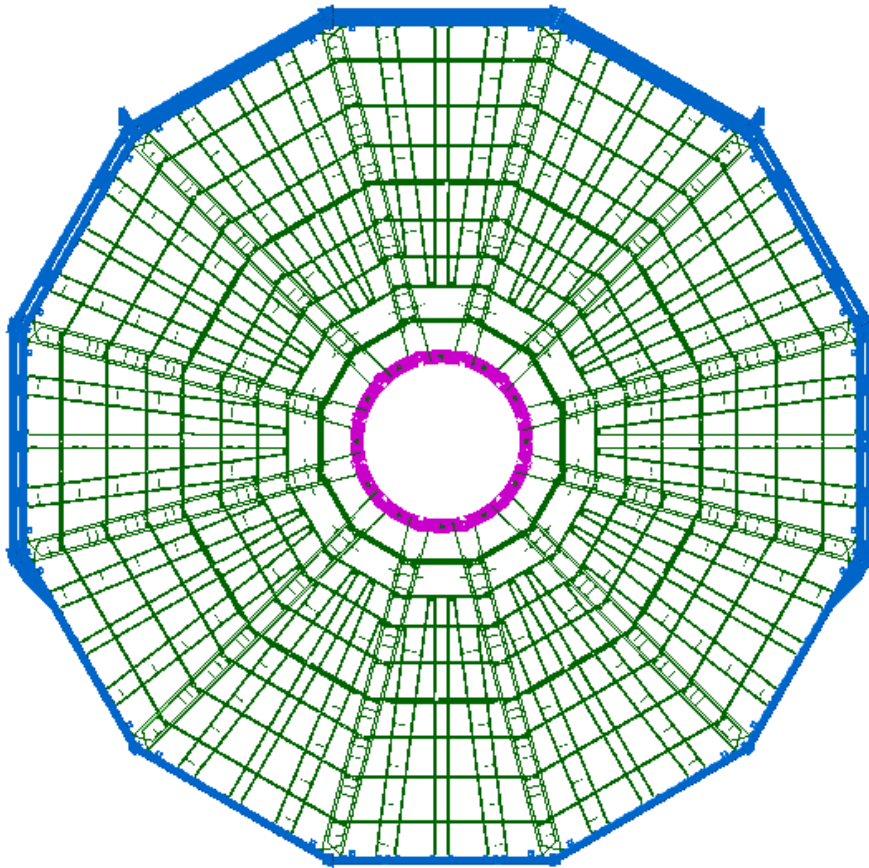
Checking of TGC1 supports baseline geometry

	Model	Material	Density (kg/m ³)	Volume (m ³)	Weight (kgs)	Difference (kgs)
TGC1	Smarteam Geometry	Aluminum	2700	5.0351/5.038	13'594.8/13'597	
	XML Geometry	Aluminum	2700	2.79025/2.738	7'533.7/7'397	-6'200



WP1: Cheking G4 Baseline Geometry

Checking of TGC2-3 supports baseline geometry

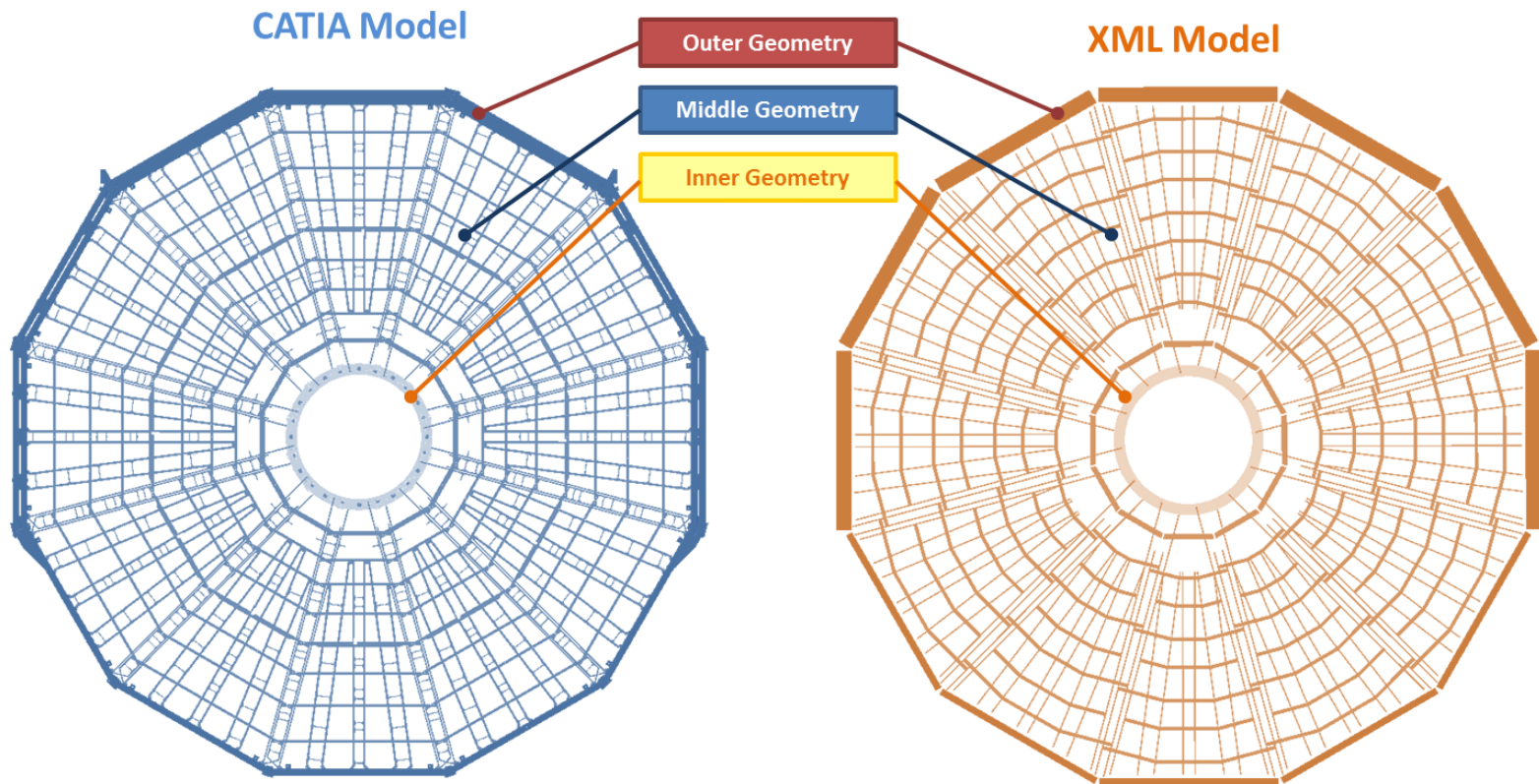


Volume: 5.4106 m³
Weight : 14'608.6 kg

WP1: Cheking G4 Baseline Geometry

Checking of TGC2-3 supports baseline geometry

TGC 2-3	Volume (m ³)			Weight (kgs)		
	CATIA	XML	Diferance	CATIA	XML	Diferance
Outer Geometry	2.1552	0.7725	1.3827	5819	2086	3733
Middle Geometry	2.9936	2.0126	0.981	8083	5434	2649
Inner Geometry	0.265	0.1033	0.1617	716	279	437
Total	5.4138	2.8884	2.5254	14617	7799	6819

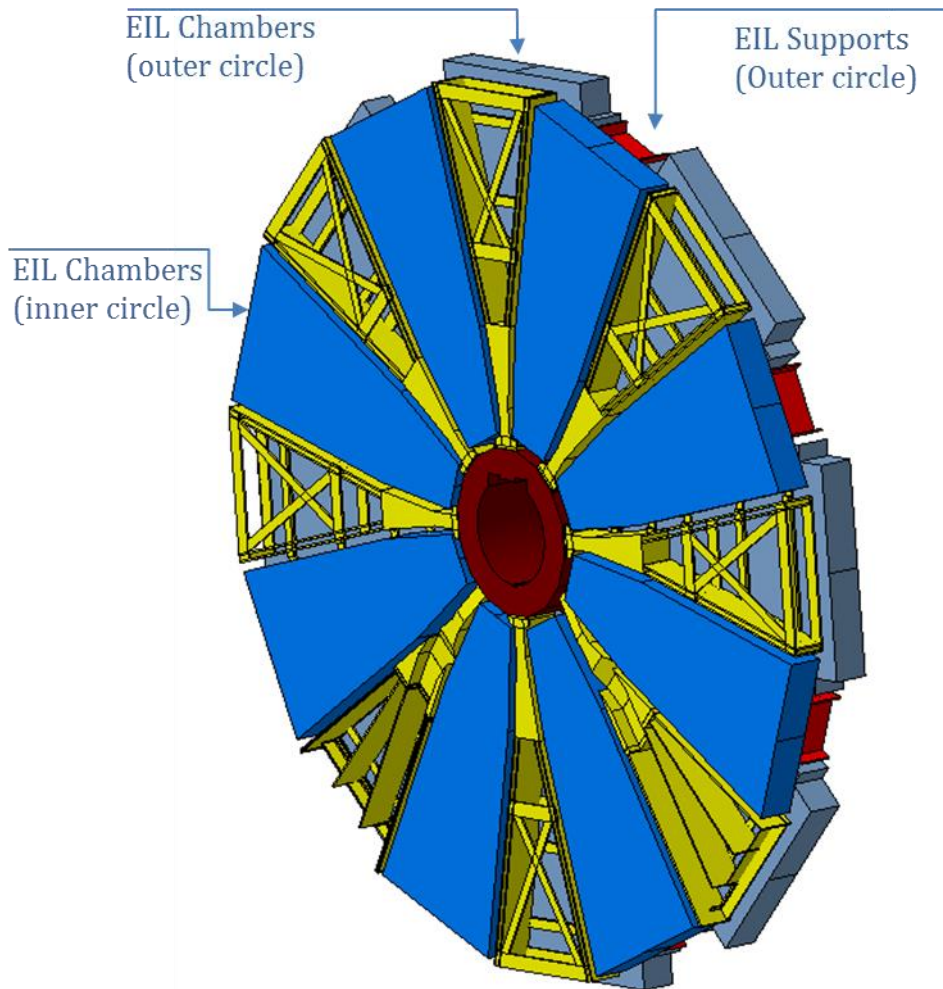


WP2: Adding New Volumes to Baseline Geometry

- Projects have been done:
 1. Adding New Small Wheel (NSW) Inner Circle
 2. Adding NSW Outer circle geometry
 3. Adding NSW Chambers geometry
 4. Adding Electronic Boxes
 5. Adding LA Drain Line
 6. Adding LA Pump
 7. Adding By Pass Tube
 8. Adding LN2-GN2 Lines
 9. Adding Cryostat Safety Line
 10. Adding Solenoid Line
 11. Adding Middle Services –S1

WP2: Adding New Volumes to Baseline Geometry

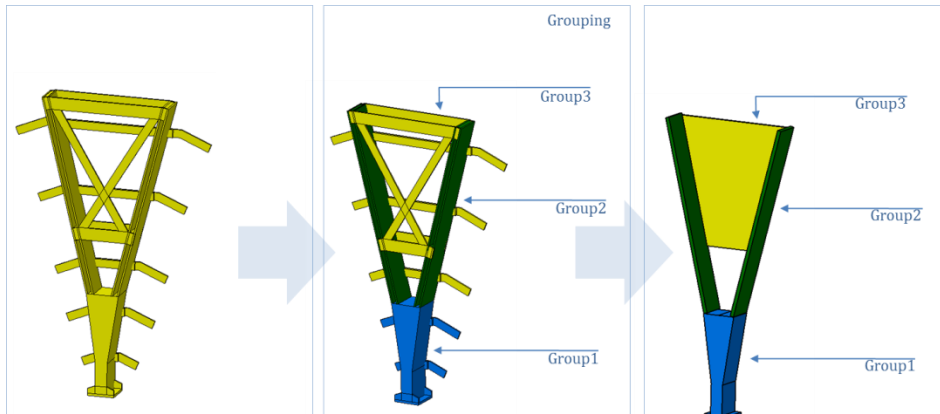
Adding New Small Wheel (NSW) Inner Circle



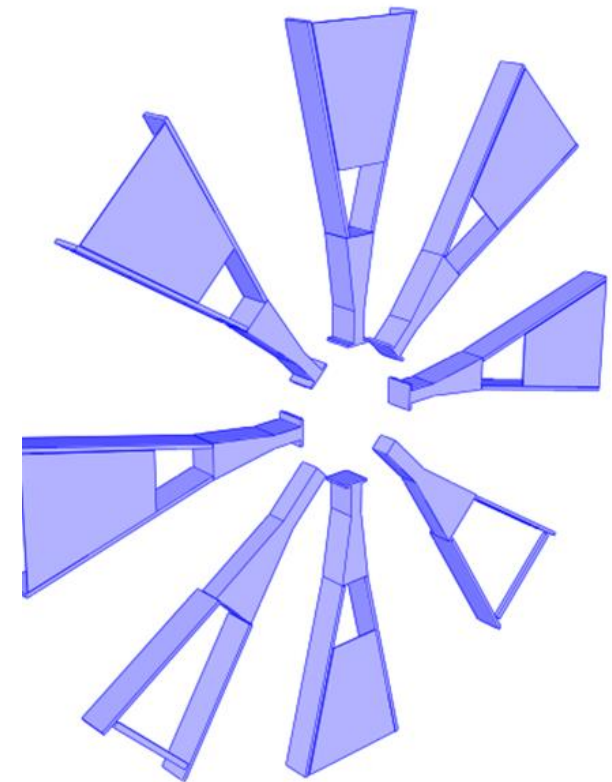
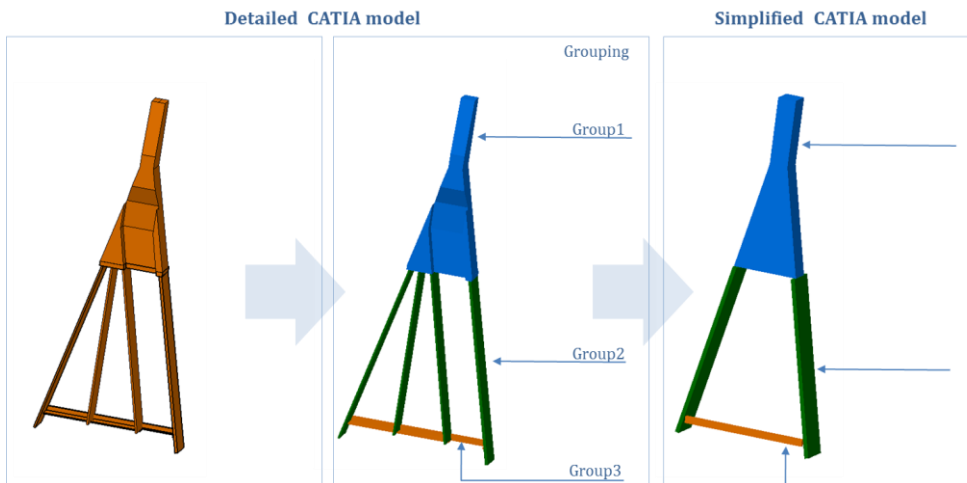
WP2: Adding New Volumes to Baseline Geometry

Adding New Small Wheel (NSW) Inner Circle

1

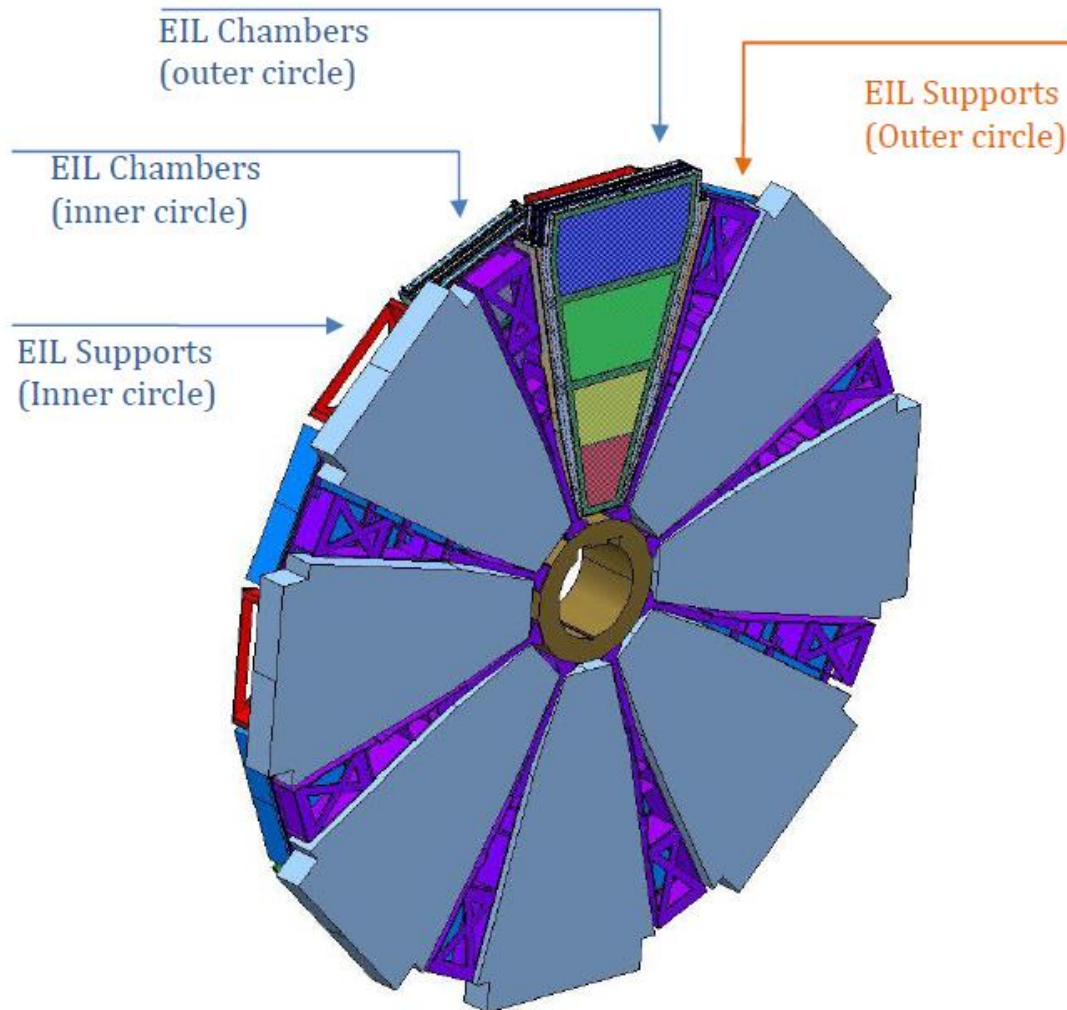


2



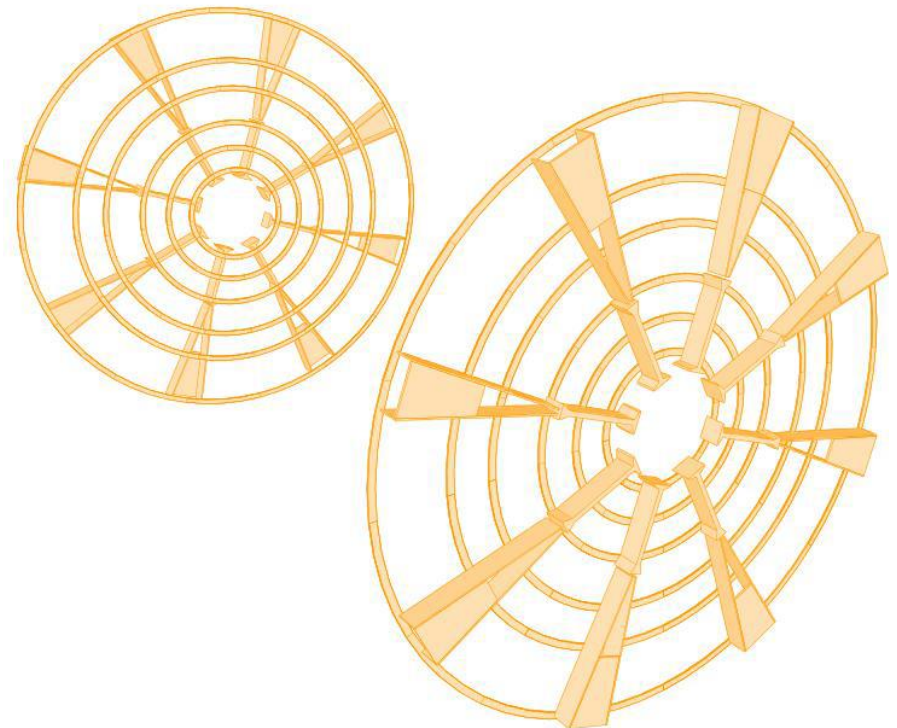
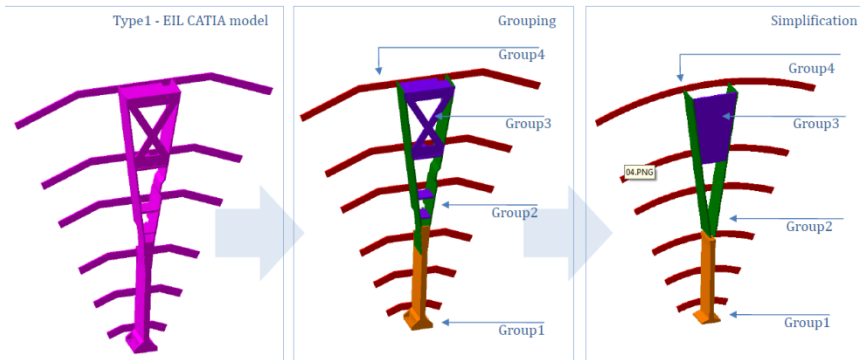
WP2: Adding New Volumes to Baseline Geometry

Adding New Small Wheel (NSW) Outer Circle



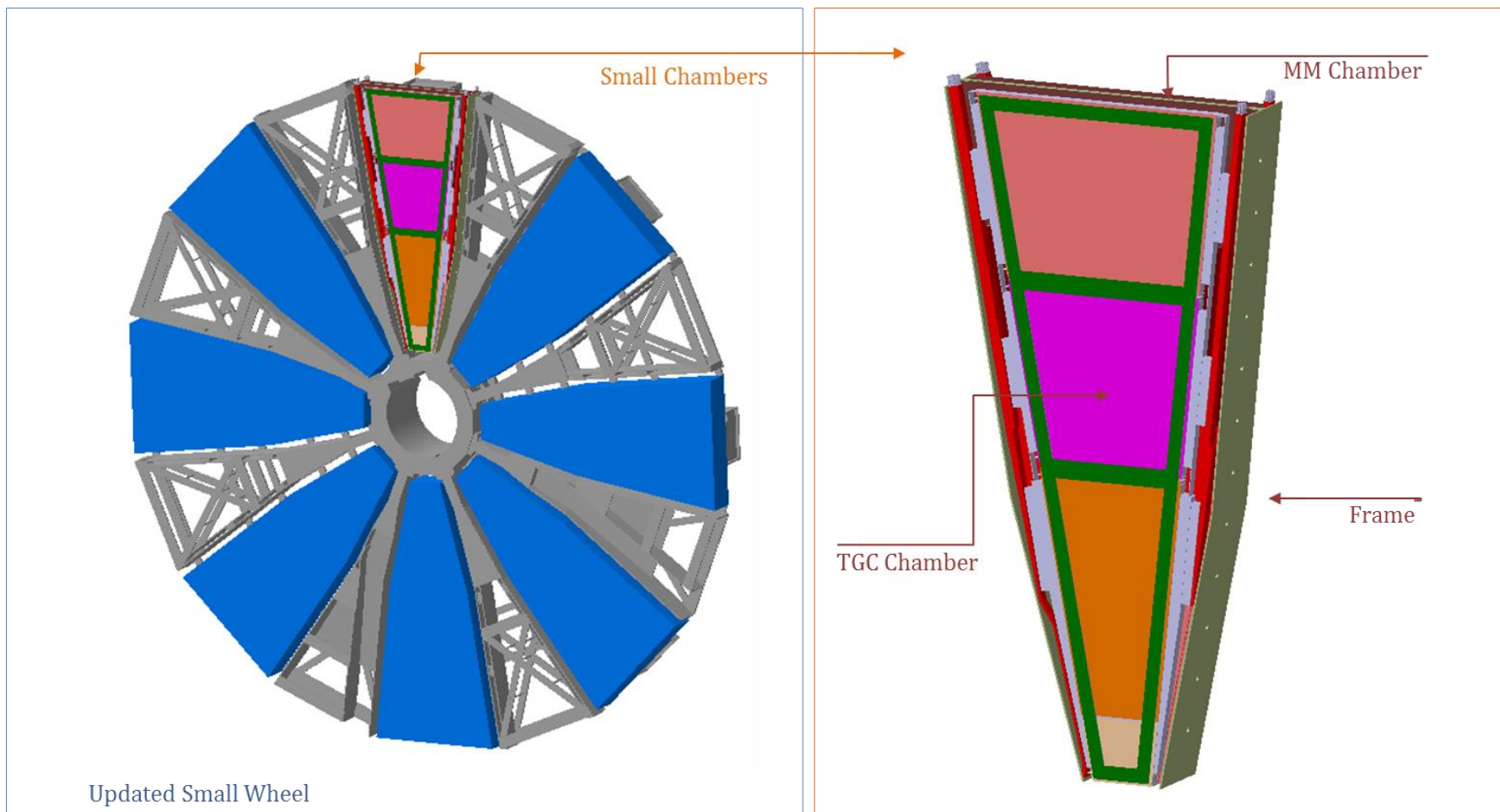
WP2: Adding New Volumes to Baseline Geometry

Adding New Small Wheel (NSW) Outer Circle/EIL Support



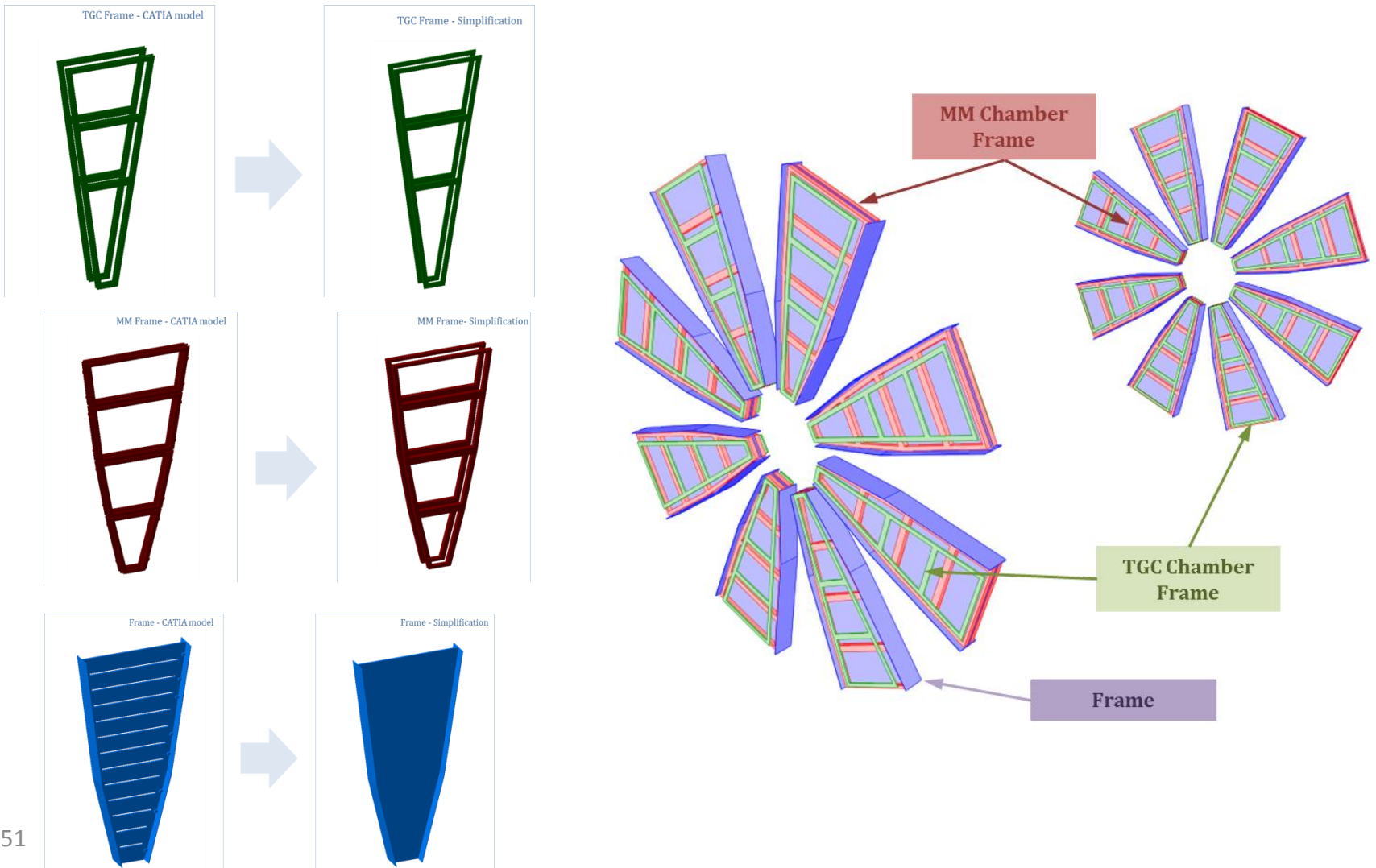
WP2: Adding New Volumes to Baseline Geometry

Adding NSW Chambers geometry



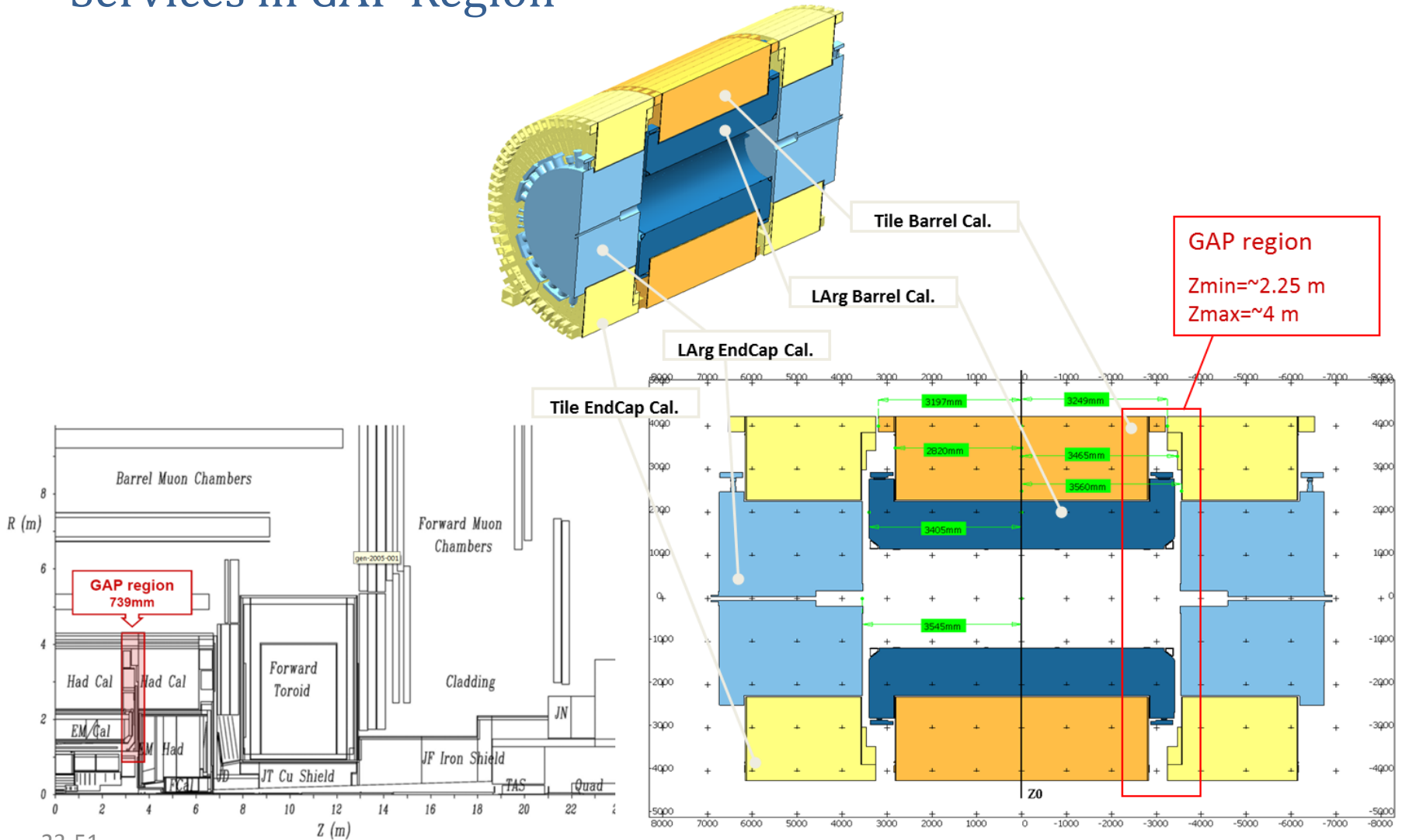
WP2: Adding New Volumes to Baseline Geometry

Adding NSW Chambers geometry



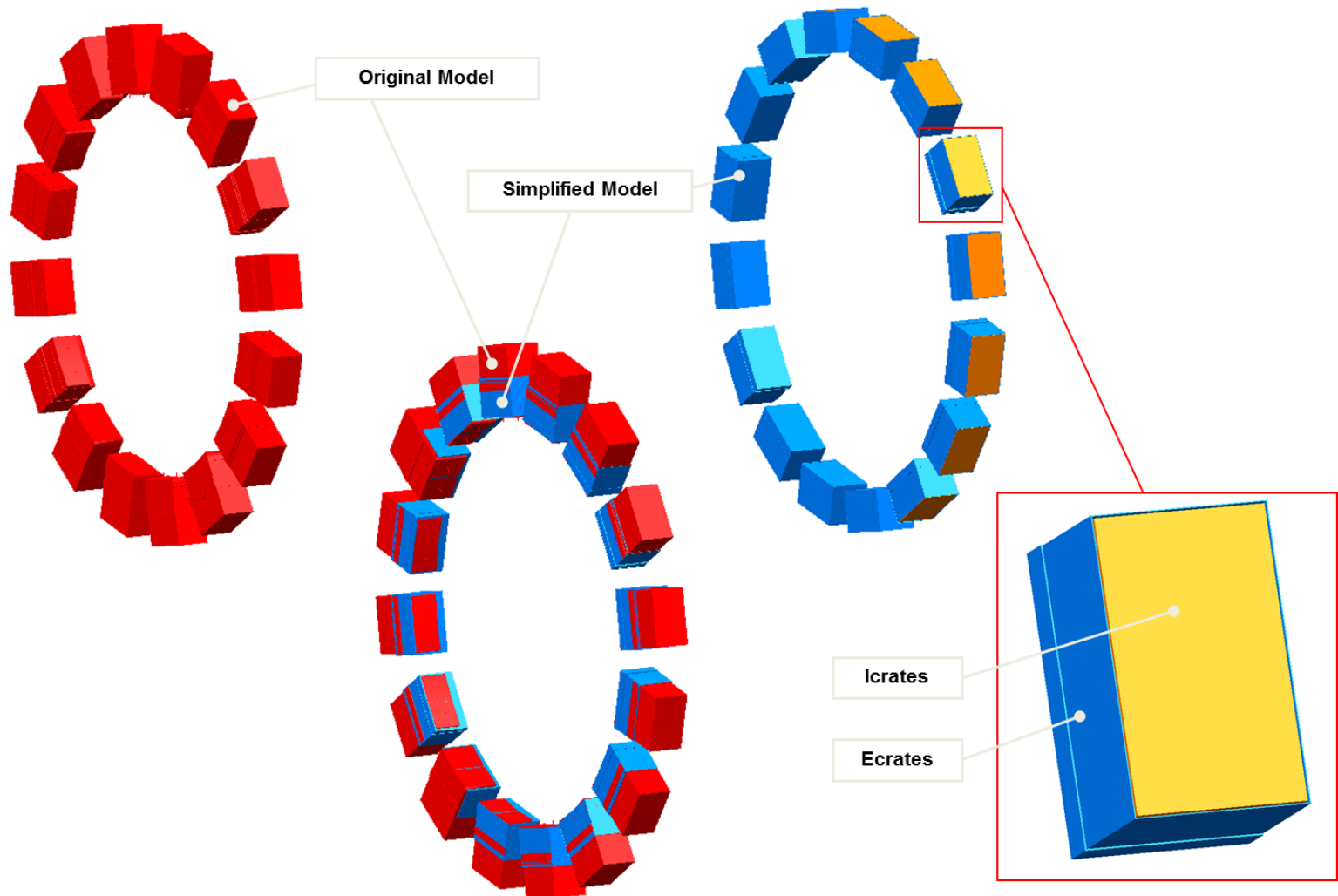
WP2: Adding New Volumes to Baseline Geometry

Services in GAP Region



WP2: Adding New Volumes to Baseline Geometry

Adding Electronic Boxes

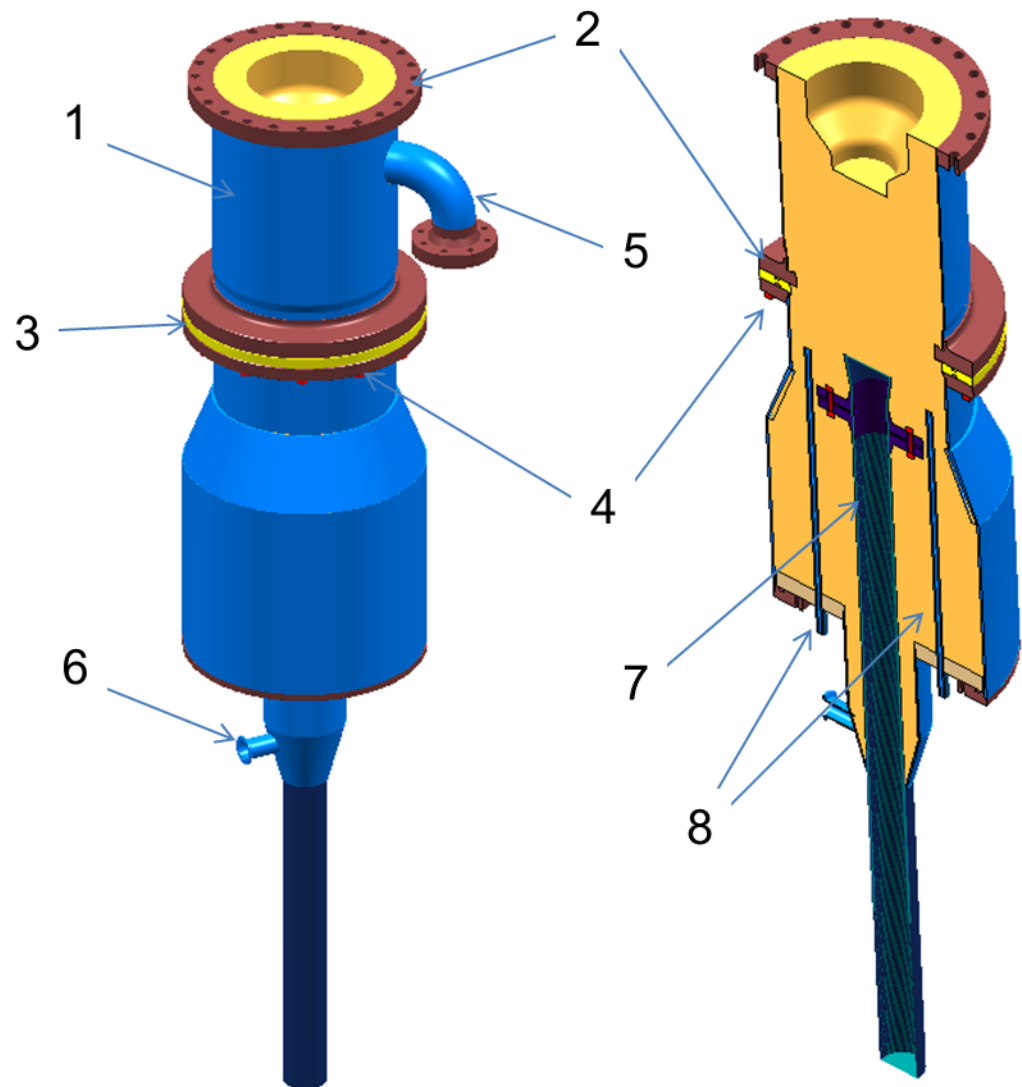


WP2: Adding New Volumes to Baseline Geometry

Adding LA Drain Line

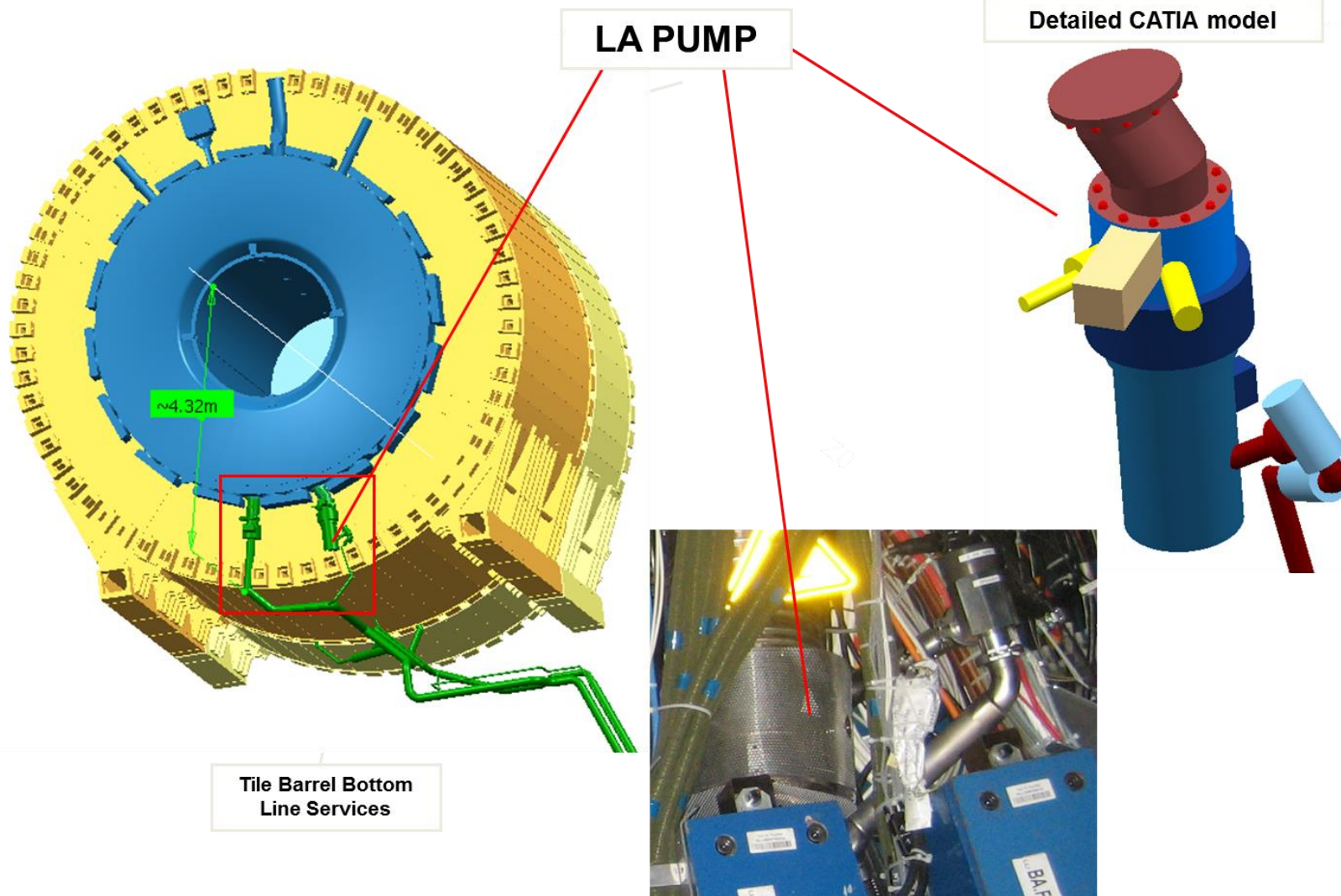
General structure of model is
as follow:

- 1) Vacuum Shell
- 2) Flanges on vacuum shell
- 3) Insulation washer
- 4) M8x50 bolts on flanges. There are total 24 bolts
- 5) Pipe branch on the upper cylinder of vacuum shell
- 6) Pipe branch on the bottom cylinder of vacuum shell
- 7) LA tube with flange
- 8) Inner pipes. There are 3 pipes.



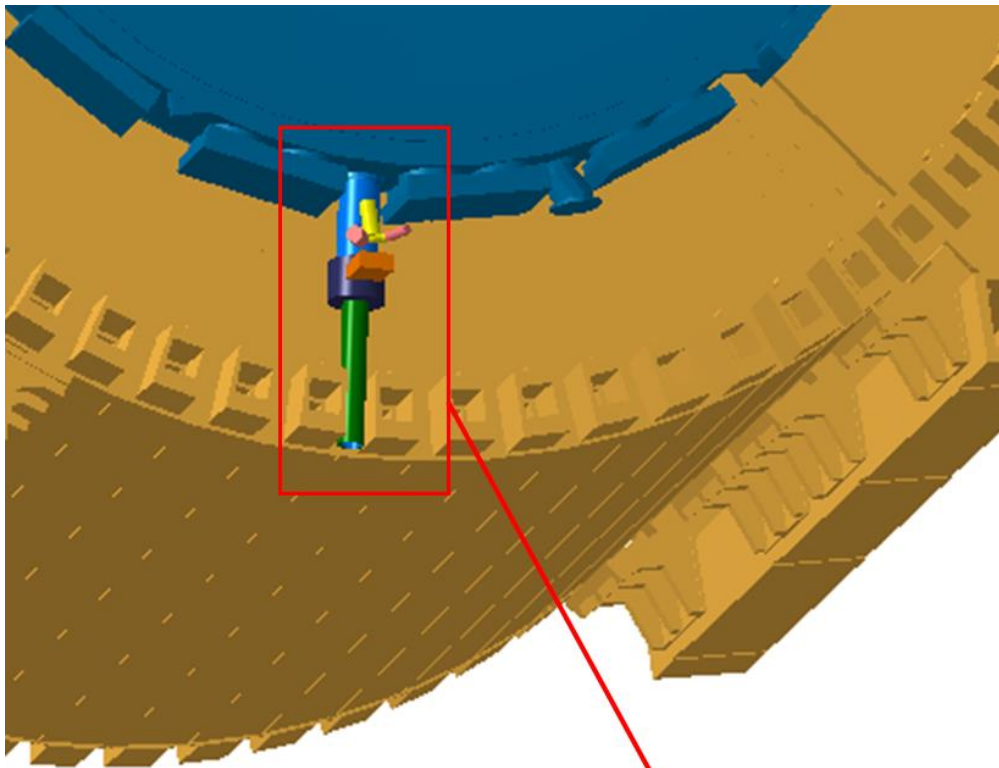
WP2: Adding New Volumes to Baseline Geometry

Adding LA Pump

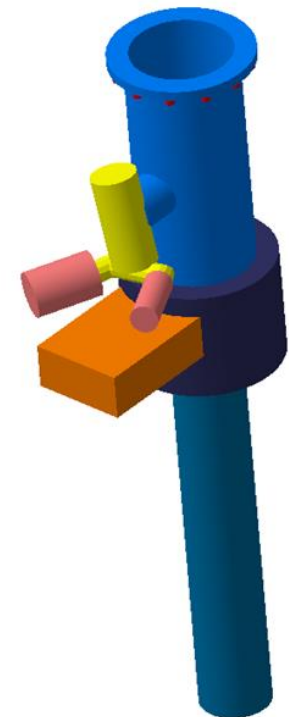


WP2: Adding New Volumes to Baseline Geometry

Adding By Pass Tube

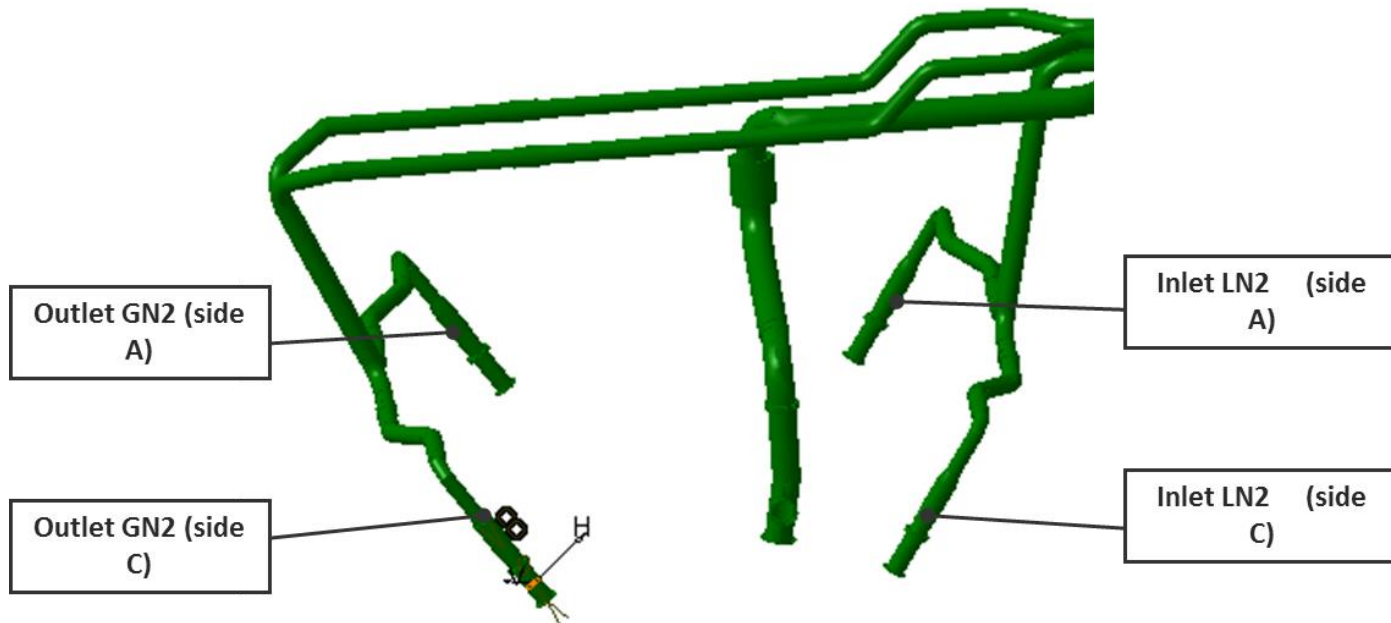
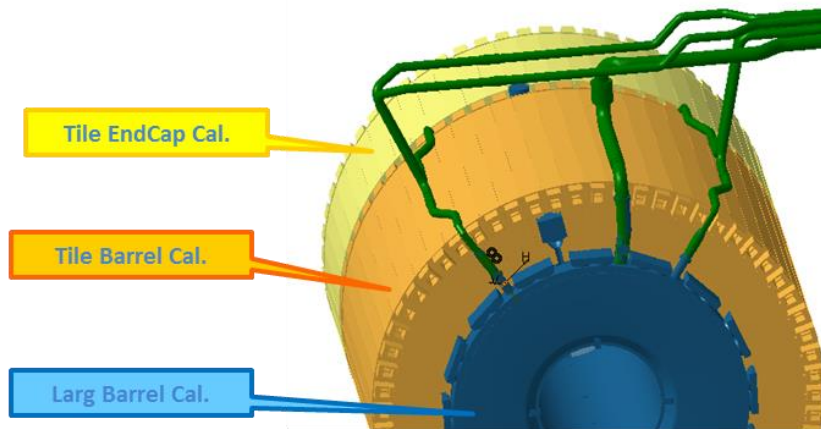


By Pass Tube



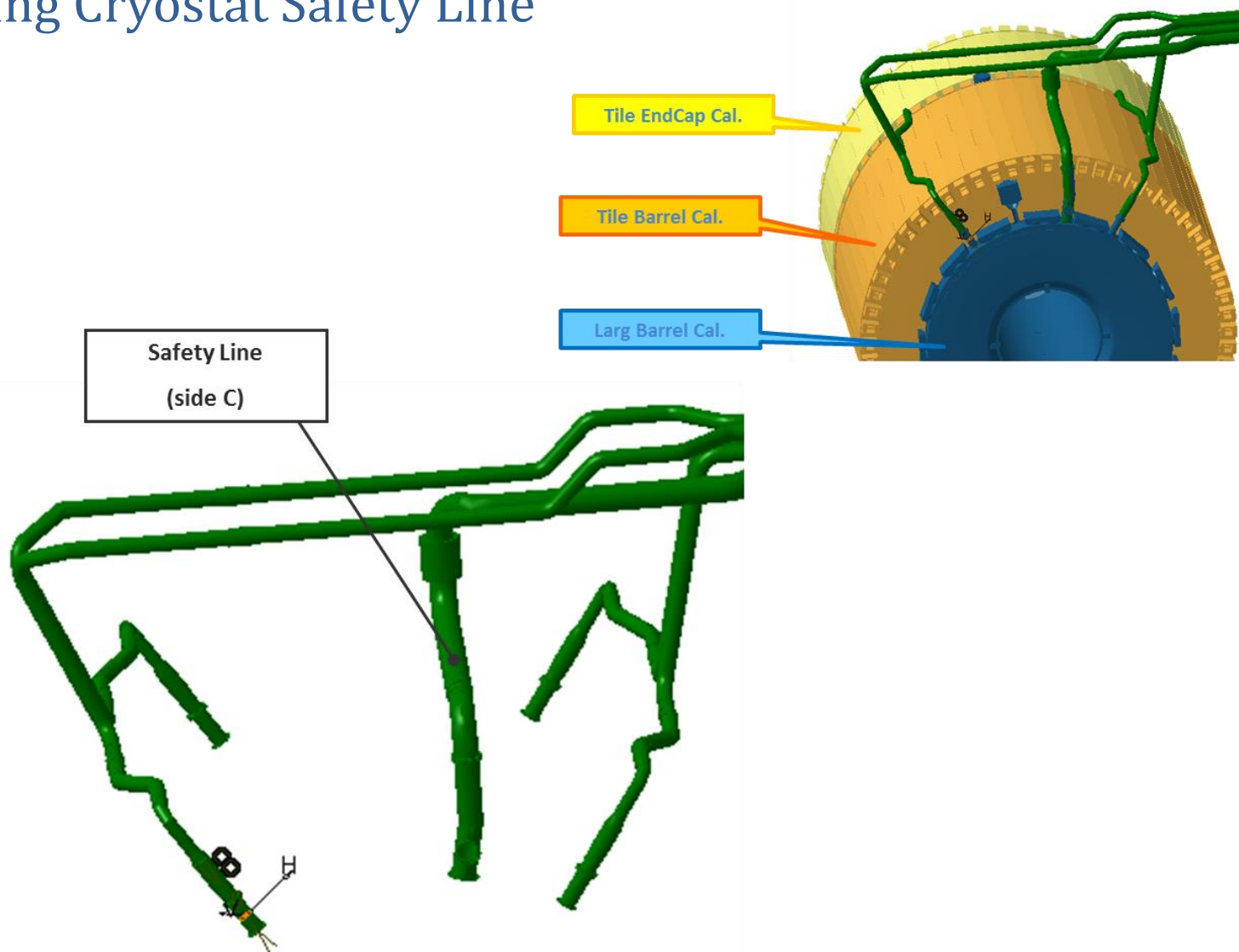
WP2: Adding New Volumes to Baseline Geometry

Adding LN2-GN2 Lines



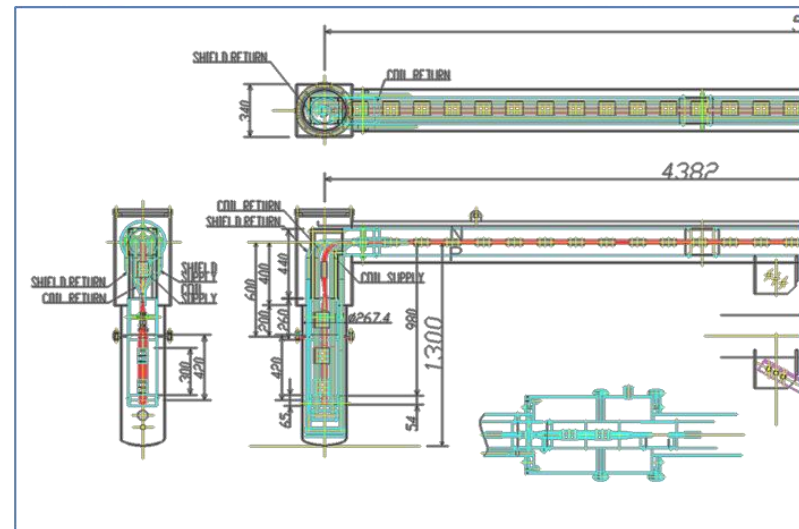
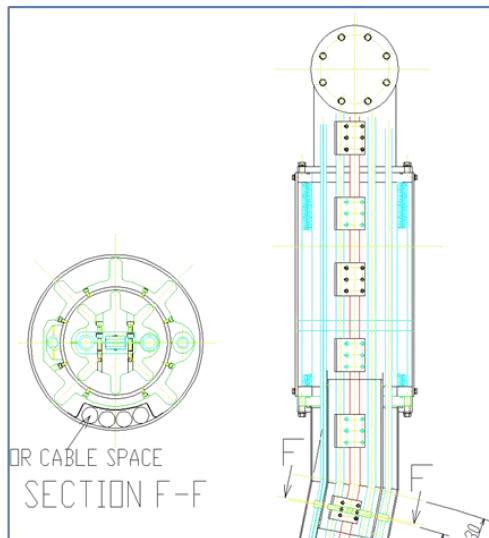
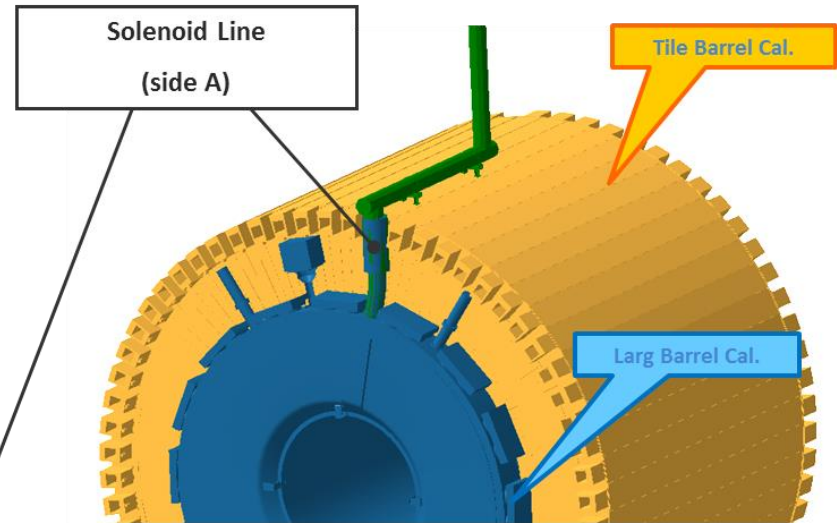
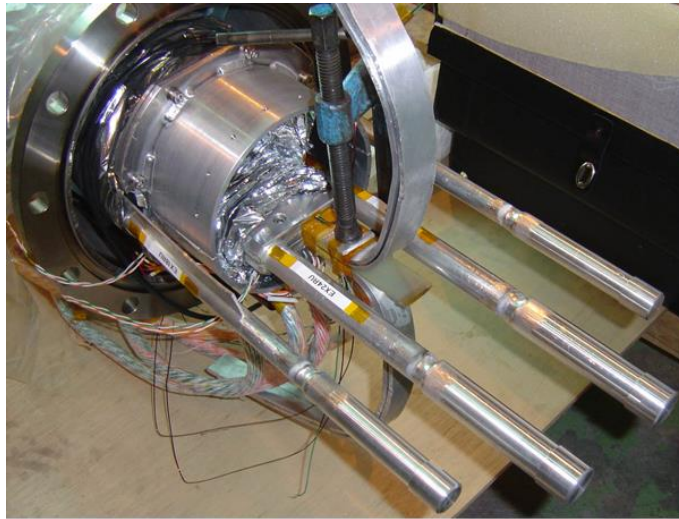
WP2: Adding New Volumes to Baseline Geometry

Adding Cryostat Safety Line



WP2: Adding New Volumes to Baseline Geometry

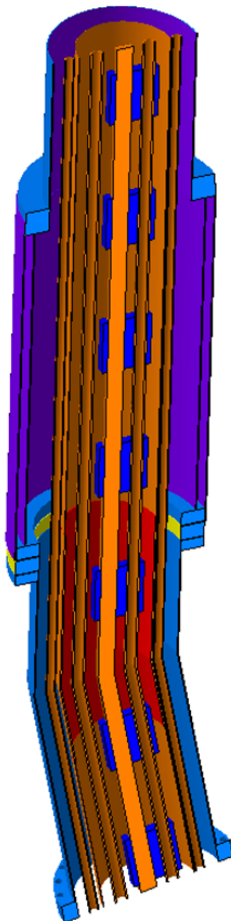
Adding Solenoid Line



WP2: Adding New Volumes to Baseline Geometry

Adding Solenoid Line

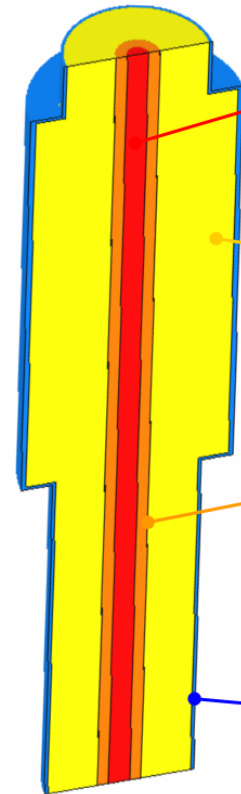
Detailed CATIA Model



Geant Code

```
Geant4 code snippet showing volume definitions and material assignments for the solenoid assembly.
```

Simplified CATIA Model Grouped volumes according to materials



Volume 4
Material: Liquid Argon

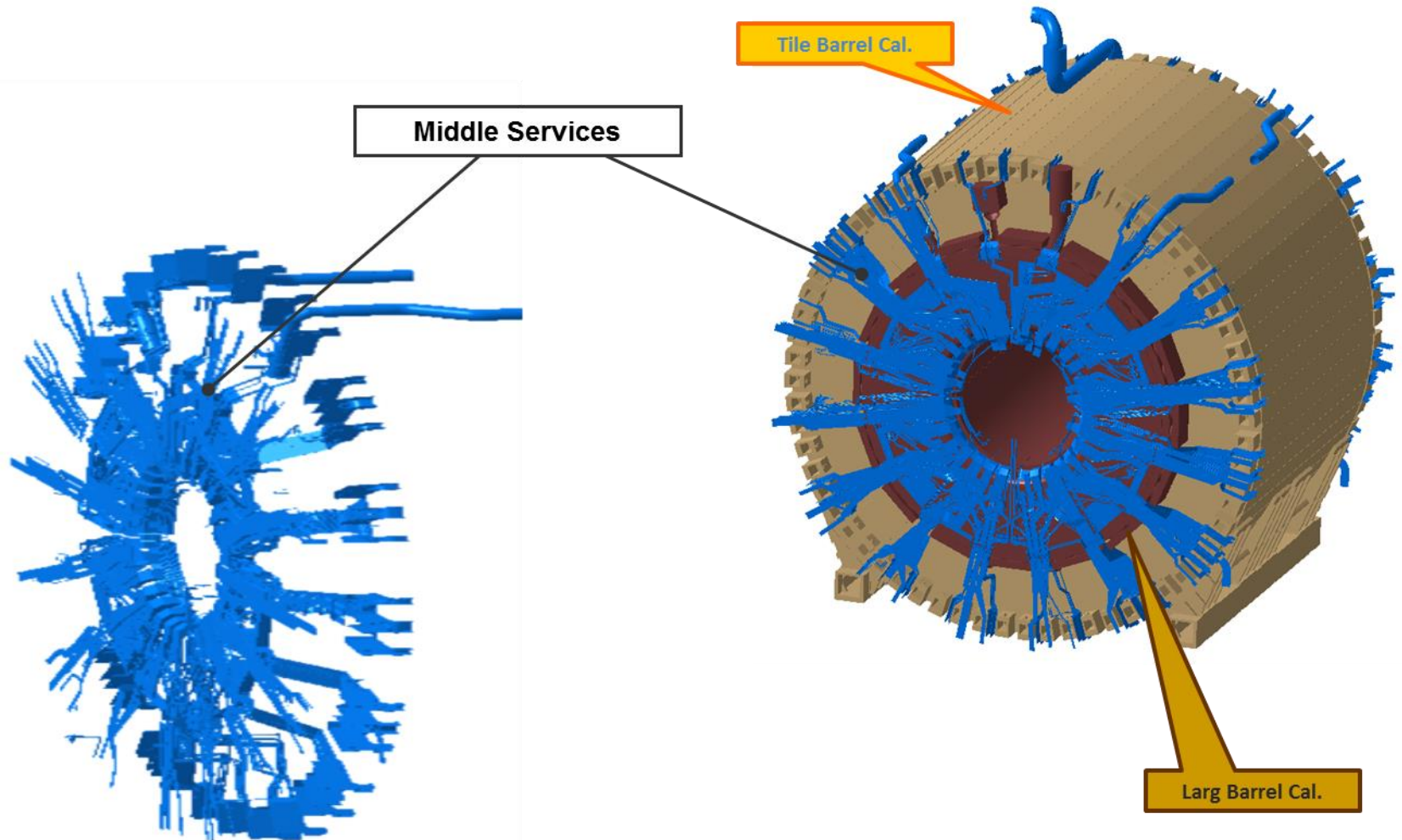
Volume 3
Material: Air

Volume 2
Material: Aluminum

Volume 1
Material: Stainless Steel

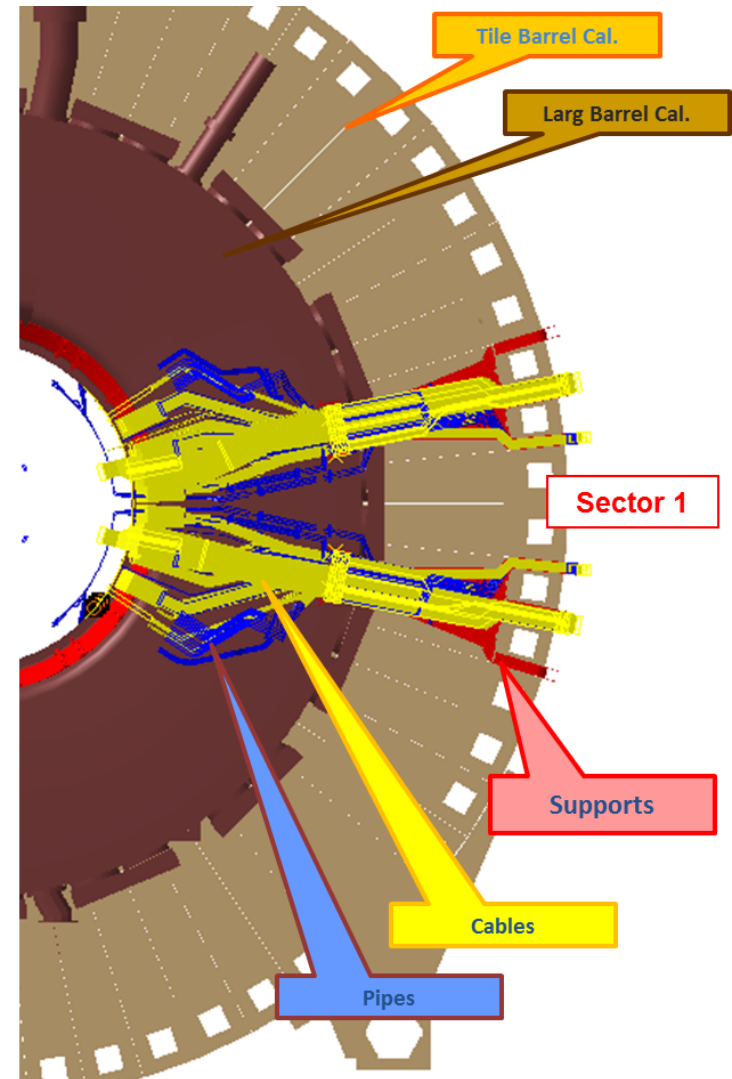
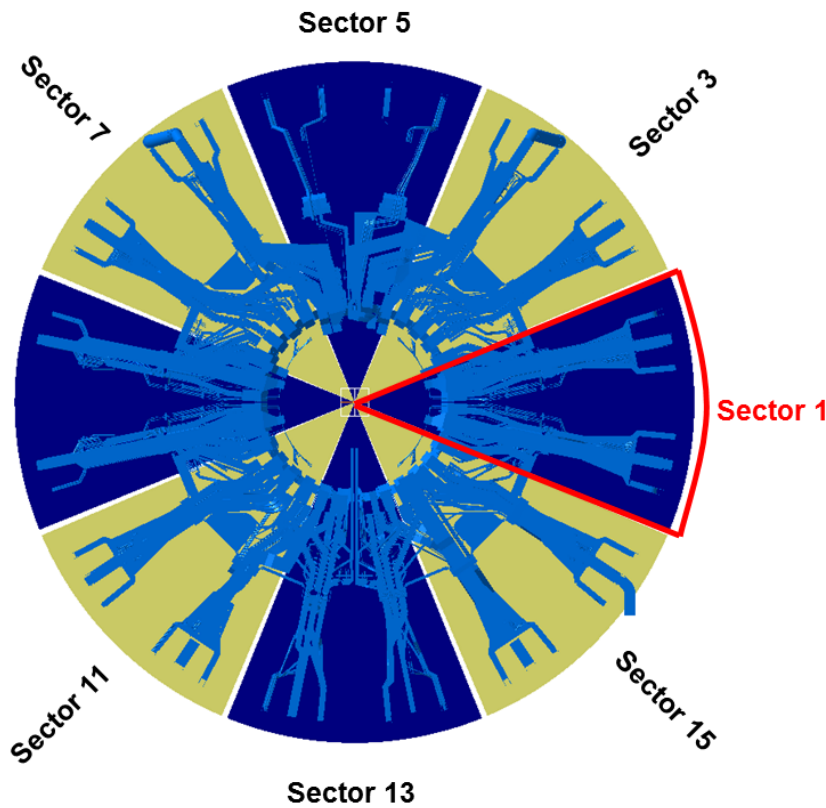
WP2: Adding New Volumes to Baseline Geometry

Adding Middle Services –S1 Supports



WP2: Adding New Volumes to Baseline Geometry

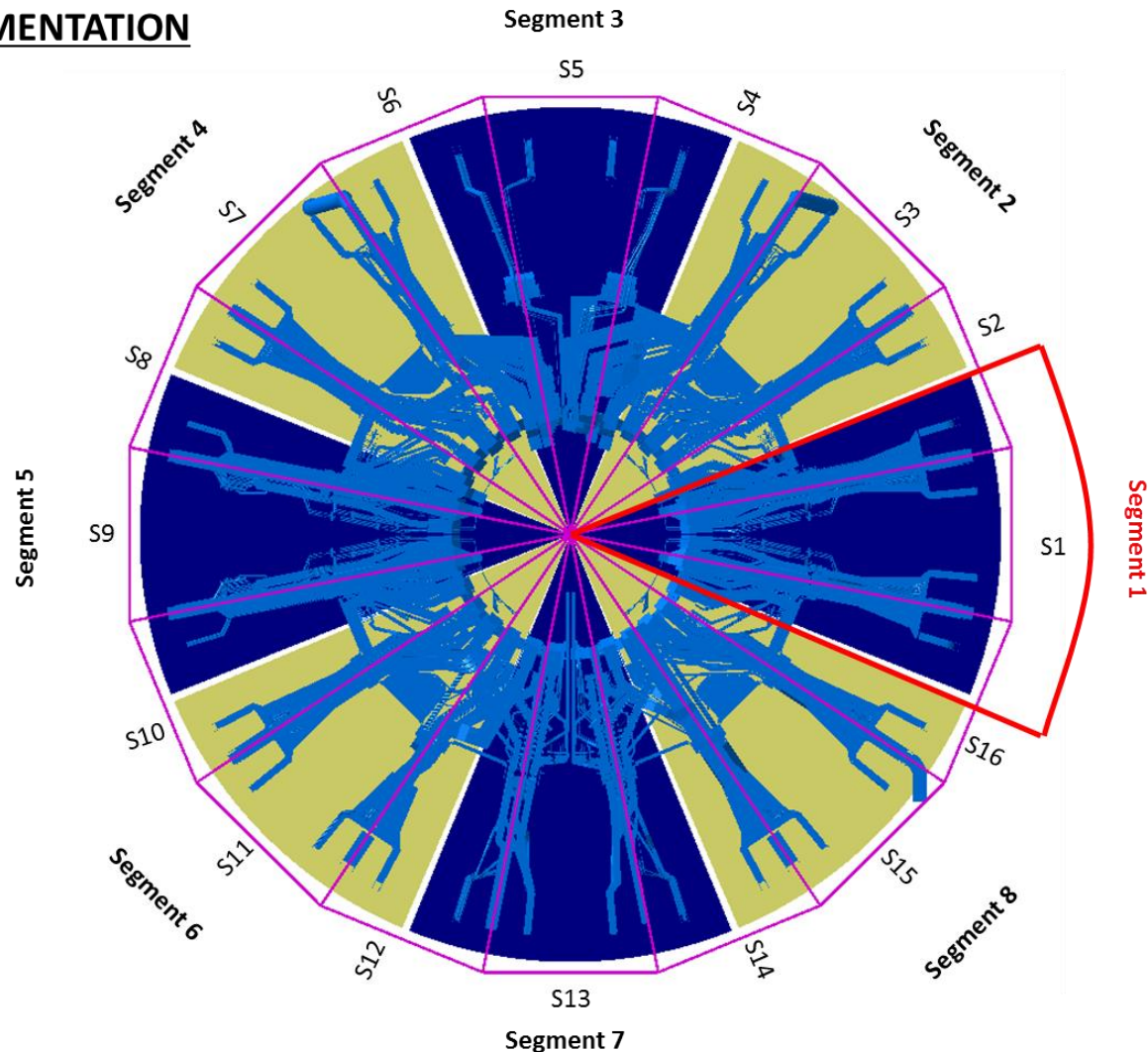
Adding Middle Services –S1 Supports



WP2: Adding New Volumes to Baseline Geometry

Adding Middle Services –S1 Cables

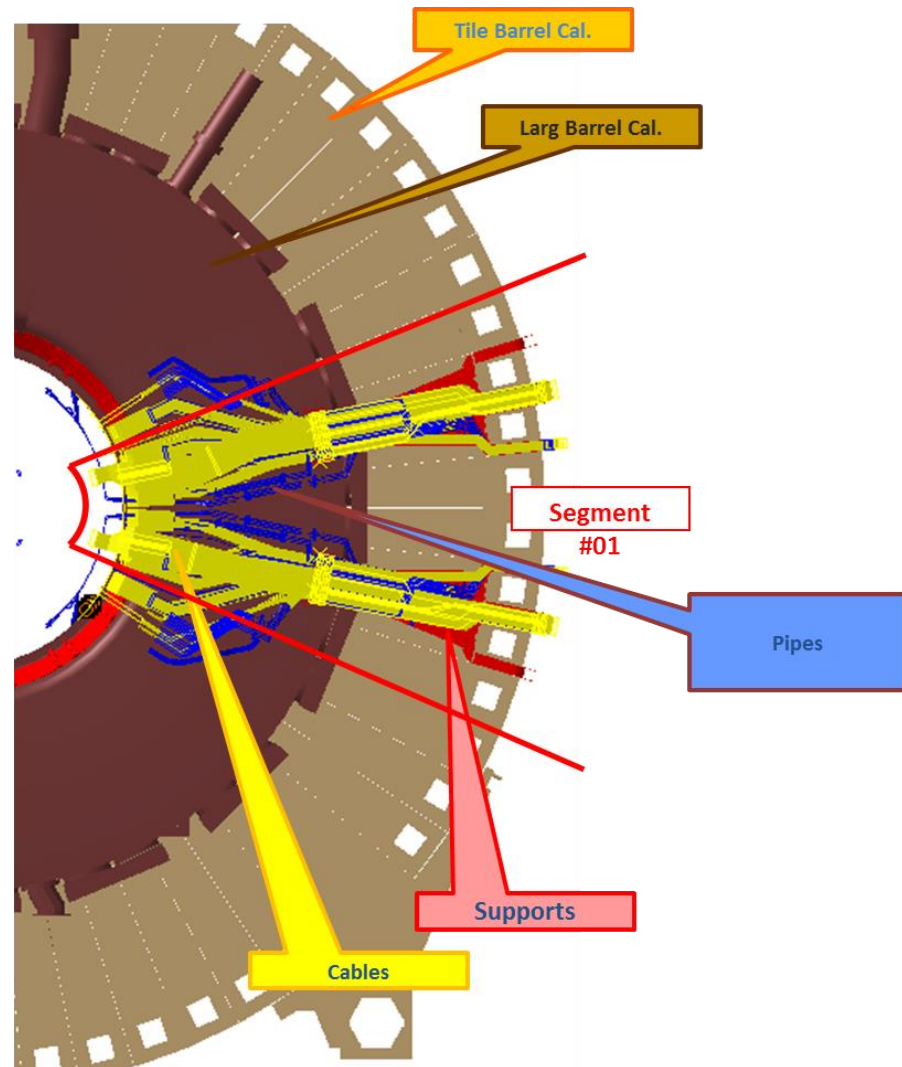
SEGMENTATION



WP2: Adding New Volumes to Baseline Geometry

Adding Middle Services –S1 Pipes

GROUPING

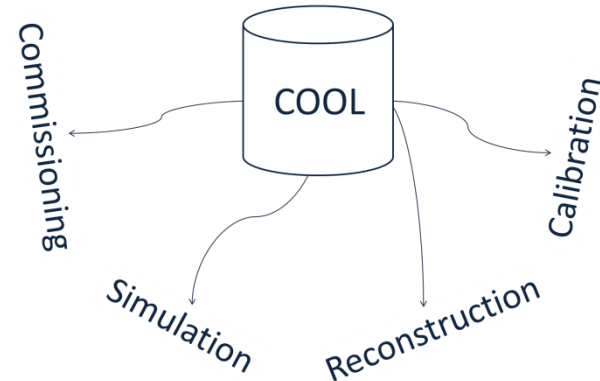
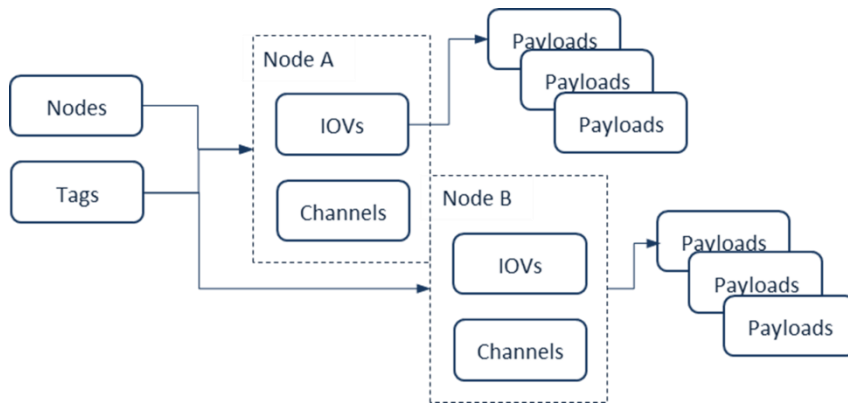


WP3: Development of COOL Tag Browser tool

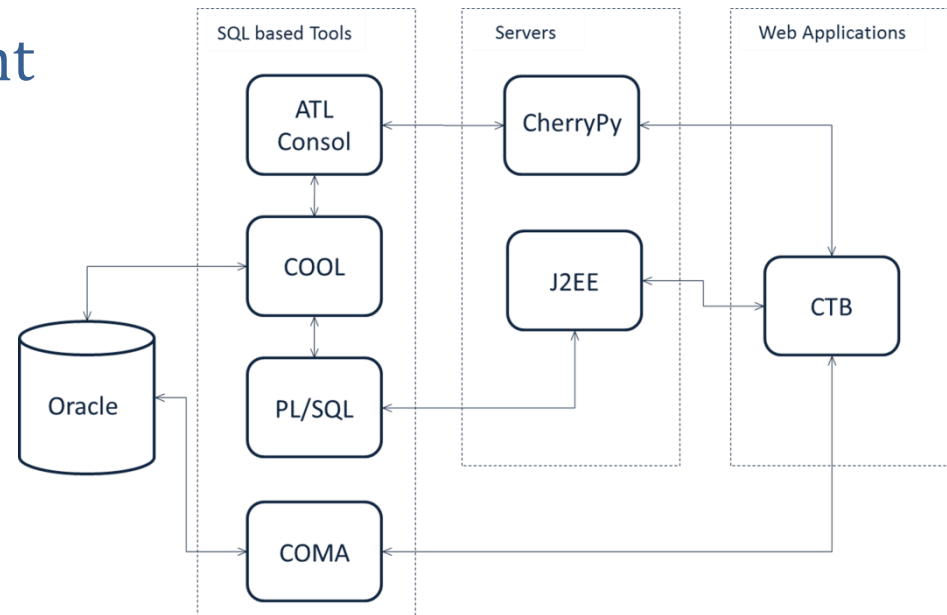
- 10 Releases have been produced
- R10 is now official version /1.7k Java/Php strings
<https://atlas-coolbrowser.web.cern.ch/atlas-coolbrowser/>
- R11 is now development version /2.3k Java/Php strings
- 1 paper has been written
- 1 participation in International Conference:
 - CHEP2013 Amsterdam, Holland

WP3: Development of COOL Tag Browser tool

- ATLAS COOL Database



- Database Management



WP3: Development of COOL Tag Browser tool

• Browsing Hierarchy

1st level: for navigation through the schema, DB and folders

```
SCHEMA
├─ ATLAS Subsystems
│   └─ {CALO, CSC, DCS, GLOBAL, INDET, LAR, MDT, MUONALIGN,
│       PIXEL, RPC, SCT, TILE, TRIGGER, TRT}
├─ COOL Databases
│   └─ COMP200
│       └─ {Folders}
│           └─ {Description, Channel}
```

2nd level: for navigation through the global Tags

```
Global Tag
└─ {Description, Status, Hierarchy}
```

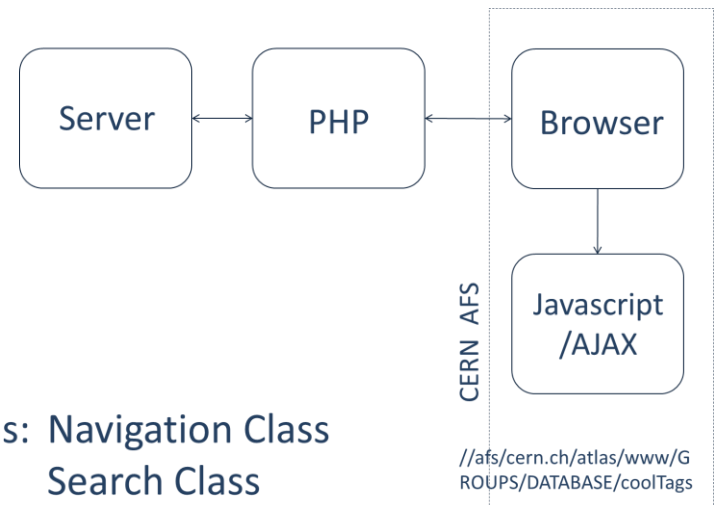
3rd level: for navigation through the Leaf Tags

```
Leaf Tag
└─ {Description, Status, Channels}
```

4th level: for navigation through the Channels

```
Tag Channel
└─ {ID, Insertion Date, IOV, Time Span, Data}
```

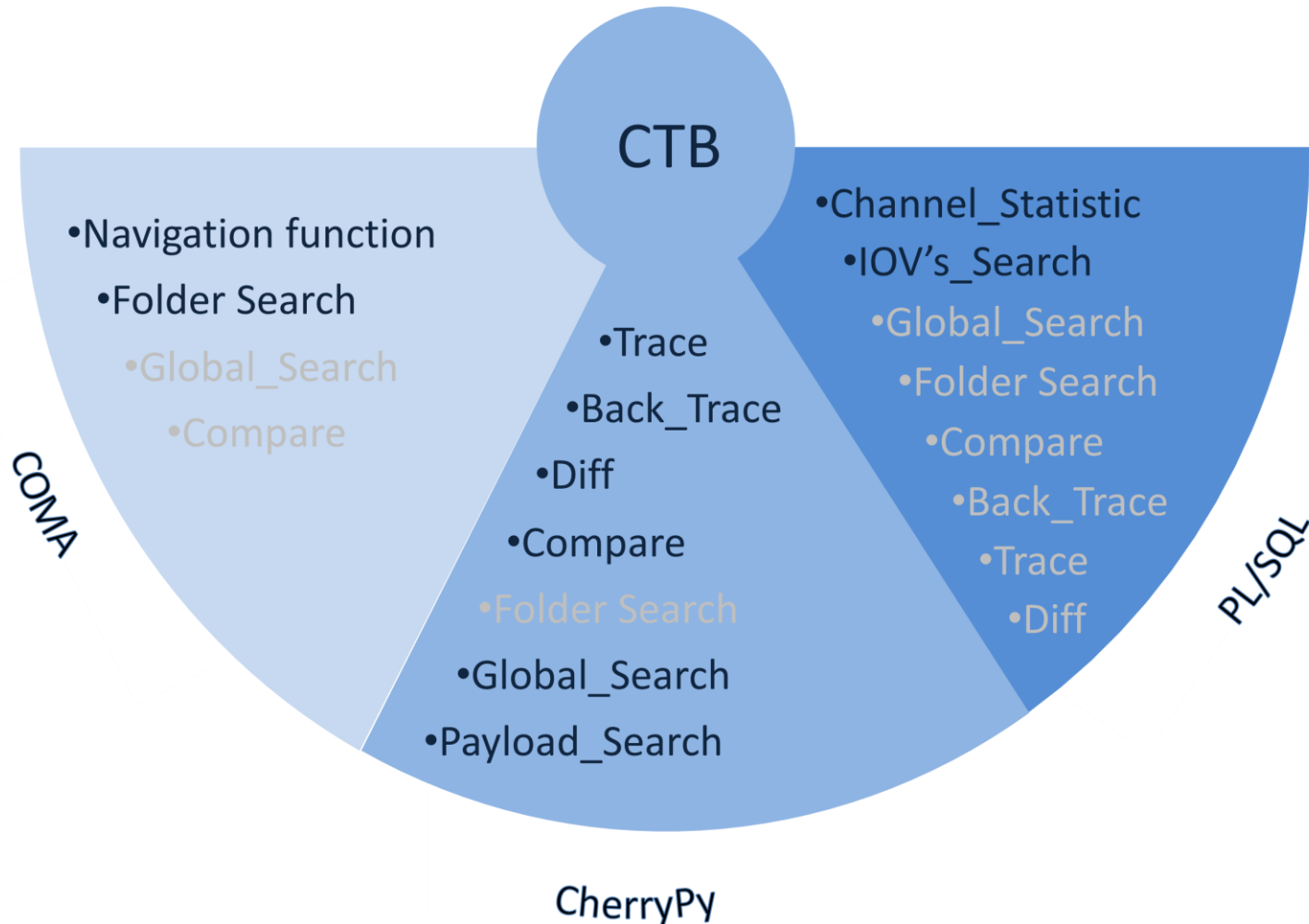
AJAX-based configuration with several Php and Javascript modules



- Php functions: Navigation Class
Search Class
- Javascript functions: Visualization Class
User Interface Class

WP3: Development of COOL Tag Browser tool

- CTB R11 Concept / Base Functionality



WP3: Development of COOL Tag Browser tool

- CTB R11 Application

The screenshot displays the CTB R11 Application interface. At the top, there is a navigation bar with a hamburger menu icon, the text 'CALO', and a breadcrumb path: 'COMP200' > '/CALO/Ofi/Noise/CellNoise'. Below the navigation bar, there are several control elements: 'ONLINE' and 'OFFLINE' status indicators, a 'DIFF' button, a search input field, and checkboxes for 'Trace' and 'BackTrace'. The main area is a tree view of tags. The left sidebar lists various categories: CALO, CSC, DCS, FWD, GLOBAL, INDET, LAR, MDT, MUONALIGN, PIXEL, RPC, SCT, TGC, TILE, TRIGGER, and TRT. The main tree view shows a list of tags under the path '/CALO/Ofi/Noise/CellNoise', including: CaloOfiNoiseCellnoise-REPP-06, CaloOfiNoiseCellnoise-UPD4-01, CaloOfiNoiseCellnoise-UPD4-02, CaloOfiNoiseCellnoise-UPD4-06, CaloOfiNoiseCellnoise-UPD4-03 (highlighted), CaloOfiNoiseCellnoise-UPD4-05, CaloOfiNoiseCellnoise-tile_filter, CaloOfiNoiseCellnoise-UPD1-01, CaloOfiNoiseCellnoise-UPD4-07, CaloOfiNoiseCellnoise-REPP-03, CaloOfiNoiseCellnoise-REPP-04, CaloOfiNoiseCellnoise-UPD1-00, CaloOfiNoiseCellnoise-tile_nofilter, CaloOfiNoiseCellnoise-REPC-00, CaloOfiNoiseCellnoise-REPP-02, CaloOfiNoiseCellnoise-UPD4-04, and CaloOfiNoiseCellnoise-REPP-01. At the bottom of the interface, there is a status bar with the text 'Active Tag's', 'Current : COMCOND-BLKPA-RUN1-06', and 'CurrentES : COMCOND-ES1PA-006-05'.

WP3: Development of COOL Tag Browser tool

- CTB R11 Application

☰
CALO
COMP200
/CALO/Ofi/Noise/CellNoise

General

Name: CaloOfiNoiseCellnoise-UPD4-06

DataBase: COMP200

Schema: CALO

Folder: /CALO/Ofi/Noise/CellNoise

TimeStamp: run-lumi

ServiceType: 71

Clid: 1238547719

TypeName: CondAttrListCollection

Insertion Time: Wed, 31 Aug 2011 15:46:46 GMT

Locked/Unlocked: 🔒

Trace

/CALO/Ofi/Noise/CellNoise
/CaloOfiNoiseCellnoise-UPD4-06

BackTrace

/COMCOND-BLKP-005-05
/CALO-COM-054-00
/CaloOfi-upd9-00
/CaloOfiNoise-upd9-00
/CaloOfiNoiseCellnoise-UPD4-06
/COMCOND-BLKP-005-06
/CALO-COM-054-00
/CaloOfi-upd9-00
/CaloOfiNoise-upd9-00
/CaloOfiNoiseCellnoise-UPD4-06
/COMCOND-BLKP-005-07
/CALO-COM-054-00
/CaloOfi-upd9-00
/CaloOfiNoise-upd9-00
/CaloOfiNoiseCellnoise-UPD4-06
/COMCOND-BLKP-005-08

Channels

Channel ID	Number Of Iovs	IovBase
0	664	run-lumi
1	655	run-lumi
2	658	run-lumi
3	657	run-lumi
16	656	run-lumi
32	651	run-lumi
48	36	run-lumi
Total: 7		

48

Object ID	Since	Until
objectid:94348	140370	147413
objectid:94354	147413	149235
objectid:94360	149235	150807
objectid:94366	150807	152068
objectid:94372	152068	152160
objectid:94378	152160	152345
objectid:94384	152345	152728
objectid:94390	152728	152874

IOV per Channel

Highcharts.com

Active Tag's

Current: COMCOND-BLKP-RUN1-06

CurrentES: COMCOND-ES1PA-006-05



Thanks for the Attention

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www.cadcam.ge