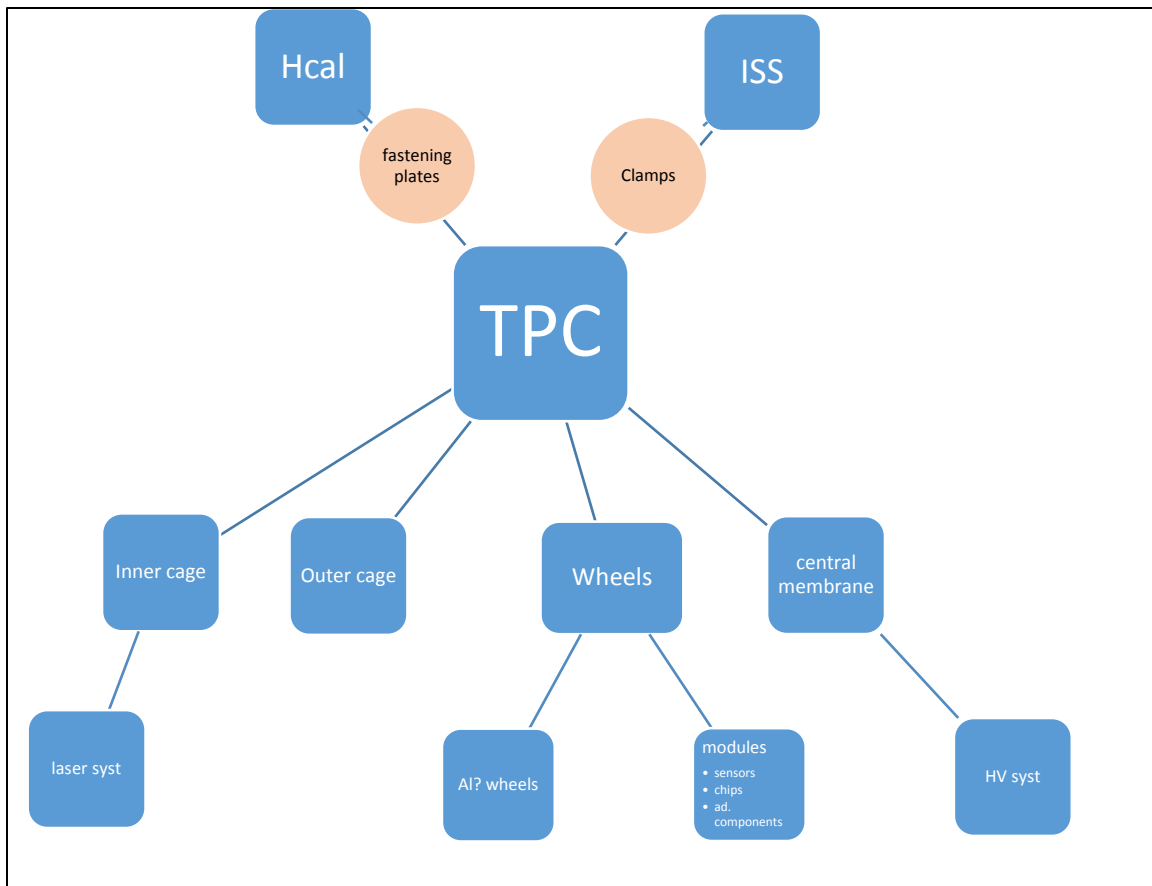


Existing WBS

1.2		Time projection Chamber (corrected by R.Settles)		
1.2.1		Mechanics		
	1.2.1.1		inner fieldcage	
	1.2.1.1		outer fieldcage	
	1.2.1.3		central membrane	
	1.2.1.4		endcap sectors and mechanics	
	1.2.1.5		laser system	
	1.2.1.6		gas & cooling system	
	1.2.1.7		TPC assemble & test	
	1.2.1.8		transport fixtures/shipping	
	1.2.1.9		TPC management	
	1.2.1.10		Prototypes & engineering Models	
1.2.2		Electronics		
	1.2.2.1		Prototypes & engineering Models	
	1.2.2.2		Frontend electronics	
	1.2.2.3		Data transfer	
	1.2.2.4		Readout board/assymby	
	1.2.2.5		FEE power and power switching	
	1.2.2.6		Mounting, cooling, interlocks	
	1.2.2.7		Slow controls	
	1.2.2.8		Engineering Workstations	
	1.2.2.9		Final debug & test / shipping	
	1.2.2.10		System design Documentation	
	1.2.2.11		TPC FEE Project Management	



TPC fabrication process.

TPC description:

A volume of gas¹ limited by an inner cylinder (inner field cage²), an outer cylinder (outer field cage) and two end plates. In the middle of the cylinder stays a membrane under high voltage (~50kV), a specific cable brings the HV. The end plates are like bicycle wheels where detecting modules are inserted. The detecting modules are ..., their number, their differences. The components of a module.

Are the wheels equipped with modules before to be assembled with the cages?

Are the cages one piece or do we have half-cylinders connected to the central membrane?

If not, how is the central membrane installed?

What is assembled where? What is assembled in Kitakami at the assembly hall on the surface? Is the TPC in when the central yoke ring is lowered in the cavern?

Can we consider that the cages, the wheels, the modules, the central membrane are produced independently and that they are assembled together in Kitakami? They are then transported independently, cases have to be built to protect them, the transportation and the cases have to be costed.

¹ Inlet and outlet size, pressure control, flux control, temperature control.

² What it is made out, its assembly

What about the testing?

Mechanical pieces are looked at and possibly surveyed.

The modules, detectors plus their electronics, are probably assembled on their fabrication site, burnt out and tested. Equipment to test these modules have to be built. What is the test composed of? How long does it take? How many people are needed? Modules are arranged in cases to be shipped. They are probably tested again when received in Kitakami before to be inserted in the wheels.

Independent items:

Two identical AI (?) wheels received from manufacturer. They are surveyed. They have targets to be surveyed after installation.

The inner cage. Can it be bought from manufacturer with a price estimate? Should the prototype be extrapolated? Then how works the extrapolation with diameter, length, thickness? Should the fabrication be detailed to estimate the price with procurements and assembly manpower?

The prisms for the laser are installed on the inner cage. Window for the laser.

Laser system, installation and propagation of the light from where.

Outer cage idem. Do we need to have a possibility to enter physically in the TPC already installed?

The modules, fabrication, tests, mounting, tooling.

The wheels with modules, mounting on the cages, tooling.

When are the end plates cabled up to the patch panels? After the wheels assemblage or after assembling the complete TPC.

Tooling for the insertion in the calorimeter, surface or cavern?

Testing after assembly, gas system, low and high voltages, acquisition. Without field.

Interfaces:

- Fastening the TPC to the HCal. What are the pieces? the assembling, the tooling to manipulate the TPC and hold it during the fastening. Damping?
- Fastening the ISS to the TPC, pieces, tooling
- Thermal insulation from ECal and ISS
- Bringing the HV in
- Bringing the low voltage in. Cooling the cables?
- Bringing the control
- Drawing the data out
- Where to interface it? Patch panels, data concentrators?
- Cooling, bringing in and out CO2 pipes