Manpower and space requirements for ILD

2015/1/13

Y. Sugimoto

@SiD meeting at SLAC

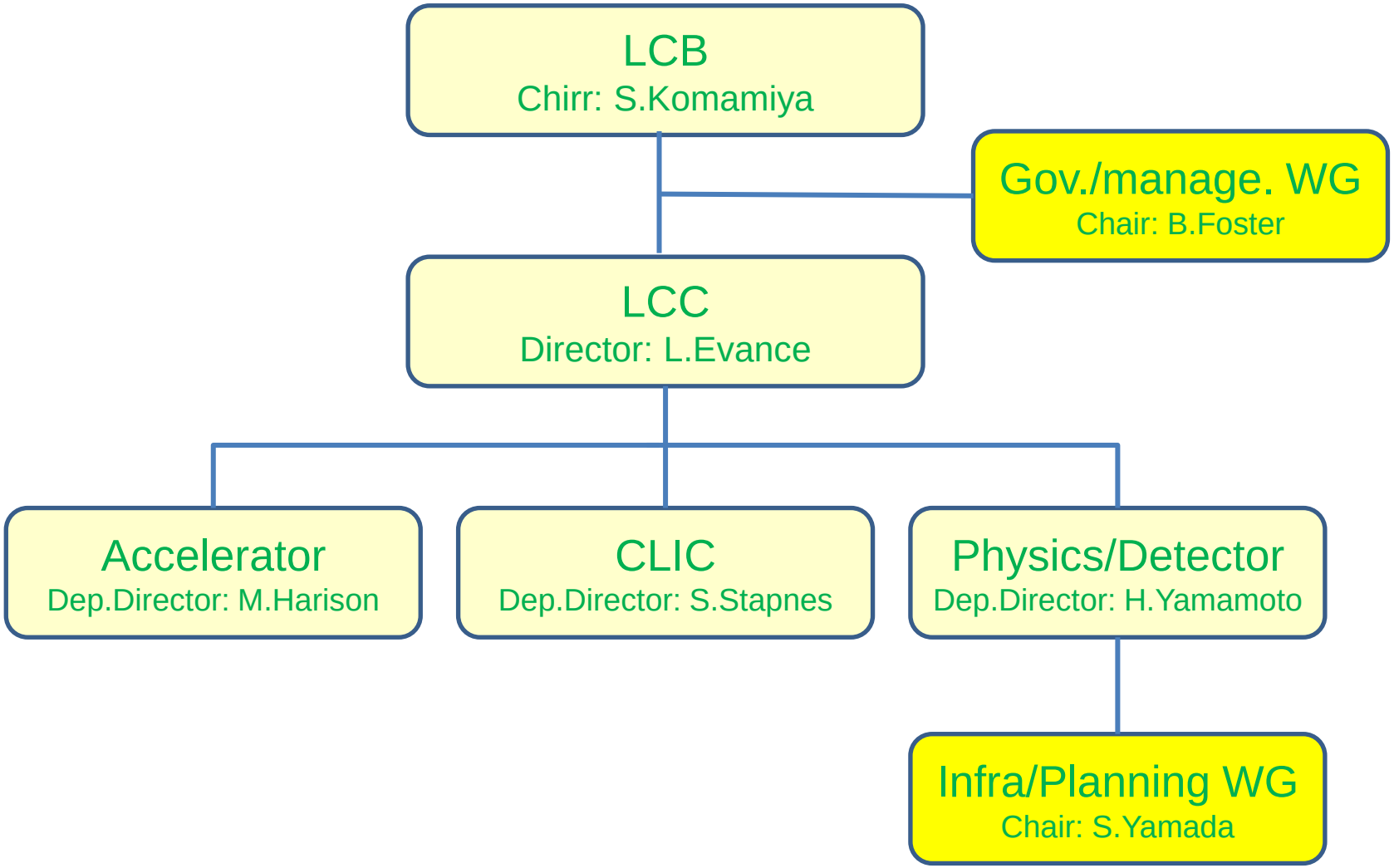
MANPOWER REQUIREMENT (+MEXT REVIEW)

Survey in ILD

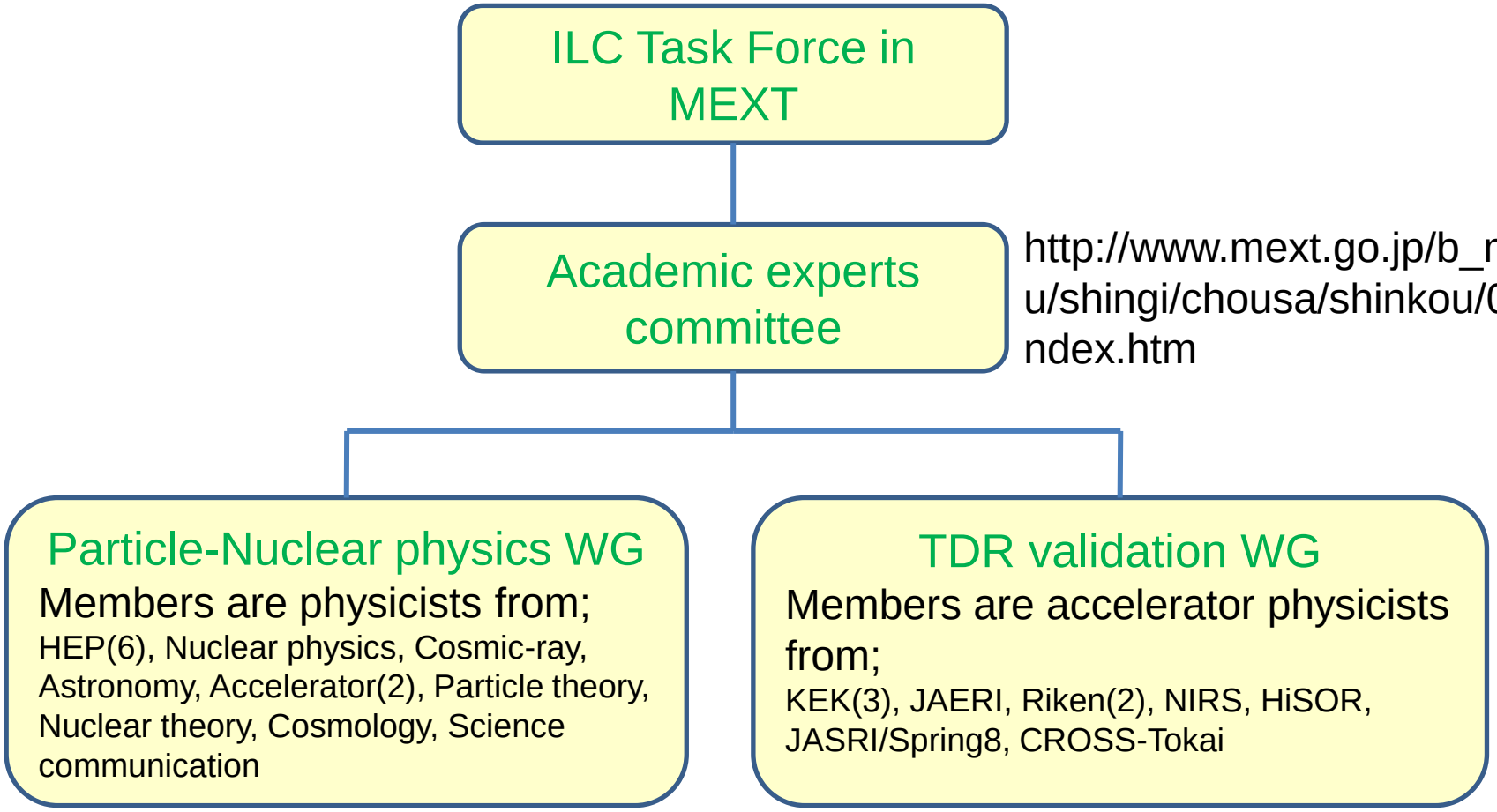
- In ILD, we have been surveying resource requirements
  - In each phase : preparation (4 years), construction, operation
  - In each sub-system
  - In each area (for human resource) : home institutes, main campus, IP campus

- This survey has two-fold purposes
  - Input to a LCB subcommittee on governance and management (Chair: B.Foster) through ILC Infrastructure and Planning WG (Chair: S.Yamada)
    - Number of people on-site
    - Requirements on campus / facilities
  - Input to the MEXT TDR validation WG
    - Budget and human resource needed for preparation (R&D), construction, and operation
    - These numbers for detectors will not be shown in 5 min presentation in the next WG meeting on Jan 26th (these numbers for Acc and CFS will be reported), but we might be asked to show these numbers at any time

WG under LCB


LCB
Chirr: S.Komamiya
Gov./manage. WG
Chair: B.Foster
LCC
Director: L.Evance
Accelerator
Dep.Director: M.Harison
CLIC
Dep.Director: S.Stapnes
Physics/Detector
Dep.Director: H.Yamamoto
Infra/Planning WG
Chair: S.Yamada

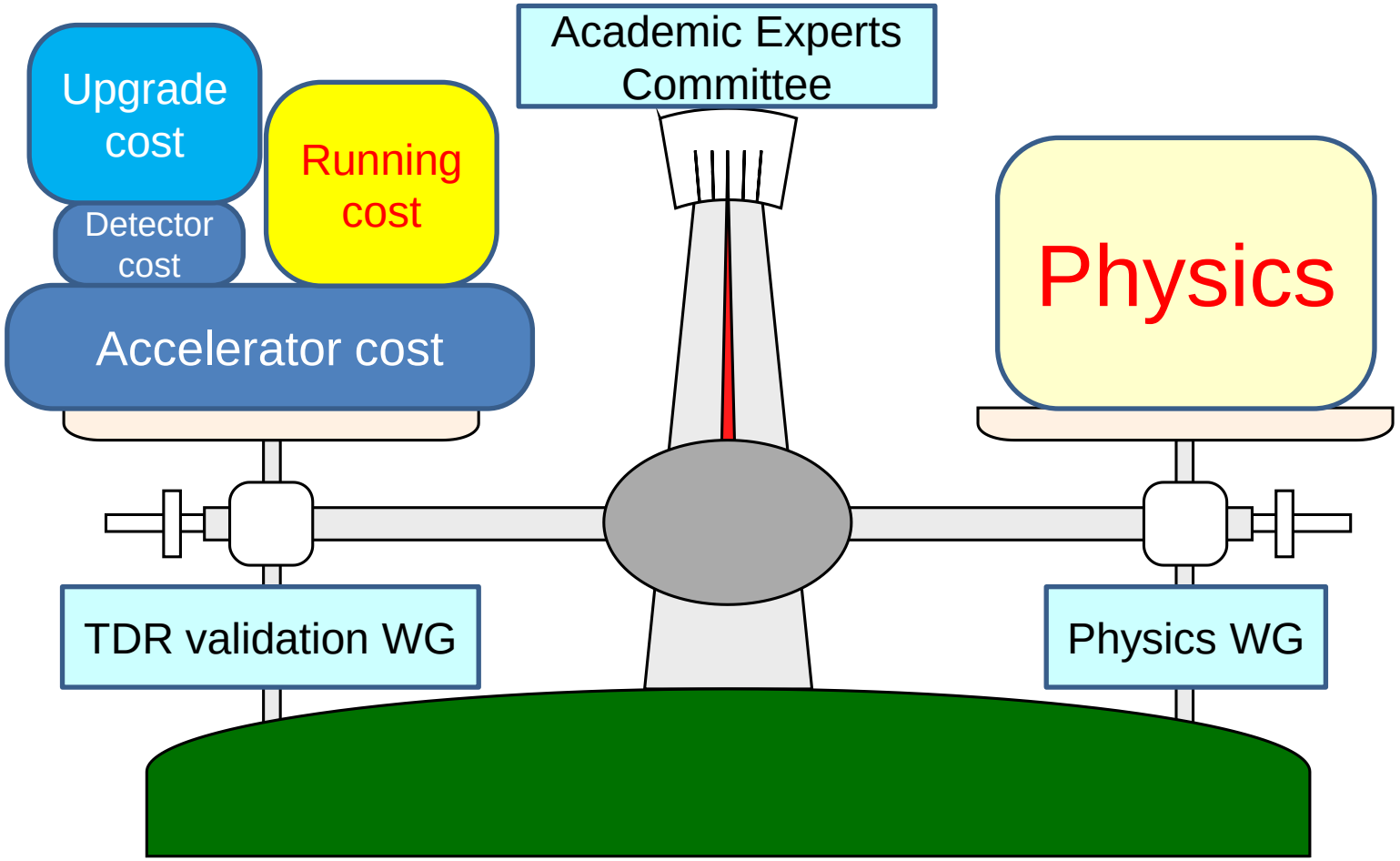
Committee under MEXT



We need information from detector groups

What MEXT wants to know

- Investment
- Profit



Status of the survey in ILD

- Each sub-system group (including physics analysis) has been asked to show their estimate on budget and human resource requirements in each phase / area
- In the construction period, timeline of the human resource requirement was made according to an assumption of the construction schedule (next slide)
- Still temporary numbers are given for several sub-systems
  - Magnet (Yoke and coil)
  - Common engineering
  - SET/ETD
  - FCAL
  - Resource requirements in preparation (R&D) phase
- Not estimated yet
  - Global DAQ
  - Running cost (Y10)

Assumption of ILD construction

- Timeline
  - A tentative time line was drawn based on the schedule in TDR (Figure 14.10. in Vol.3-II) and recent CFS study
  - Assembly hall is assumed to be built in 2 years from ground breaking

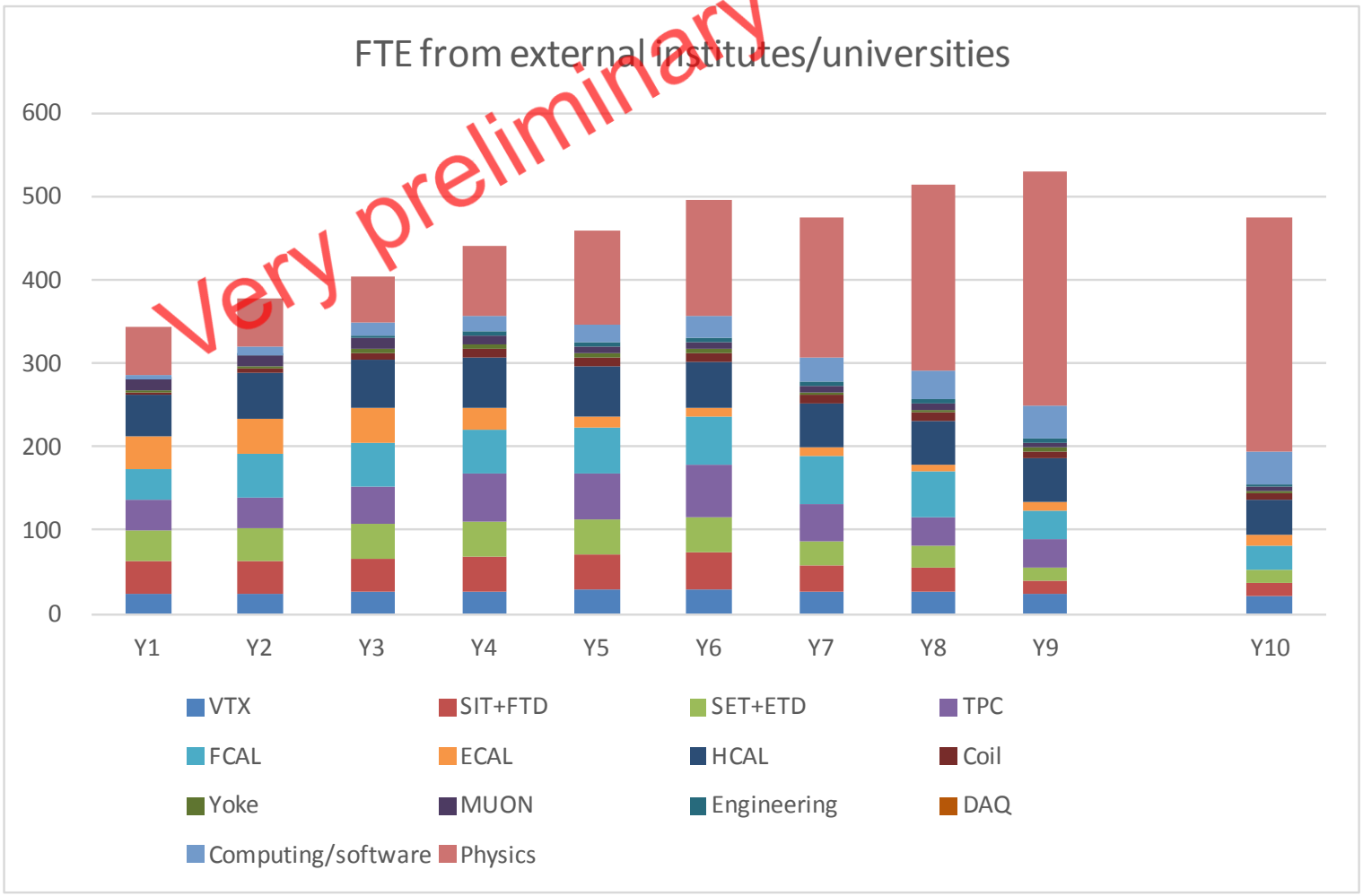
ILD assembly timeline for Hybrid option (CMS style assembly))

Sub-detector	Y-3				Y-2				Y-1				Y1				Y2				Y3				Y4				Y5				Y6				Y7				Y8				Y9				Y10			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Detector Hall													Excavation/Utilities																																							
Assembly Hall													Construction																				Extention																			
VTX													TDR				Construction off site																				Assembly on site				Ins											
SIT													TDR				Construction off site																				Assembly on site				Ins											
FTD													TDR				Construction off site																				Assembly on site				Ins											
TPC					TDR												Construction off site																				Assembly on site				Ins											
FCAL					TDR												Construction off site																				Assembly on site				Ins											
ECAL (Barrel)									TDR												Construction off site												Ass. On site				Install															
ECAL (End cap)									TDR												Construction off site								Ass. On site				Install																	
HCAL (Barrel)									TDR																								Ass. On site				Install													
HCAL (End cap)									TDR																Construction off site				Ass. On site				Install																
Coil					TDR				Bid				Modules construction off site								Modules const. off site/assembly on site												Ins								FM															
Iron Yoke					TDR				Bid				Modules construction off site								Modules construction off site/ring assembly on site																																			
Muon det									TDR																Construction off site								Ass. On site				Install															
DAQ													TDR				Construction off site																Assembly on site								Commissioning								Operation			
Computing																					TDR				Bid				Delivery on site																							
Physics/software																																																			
	Simulation																				TDR				Simulation																											

Ins: Install
FM: Field mapping

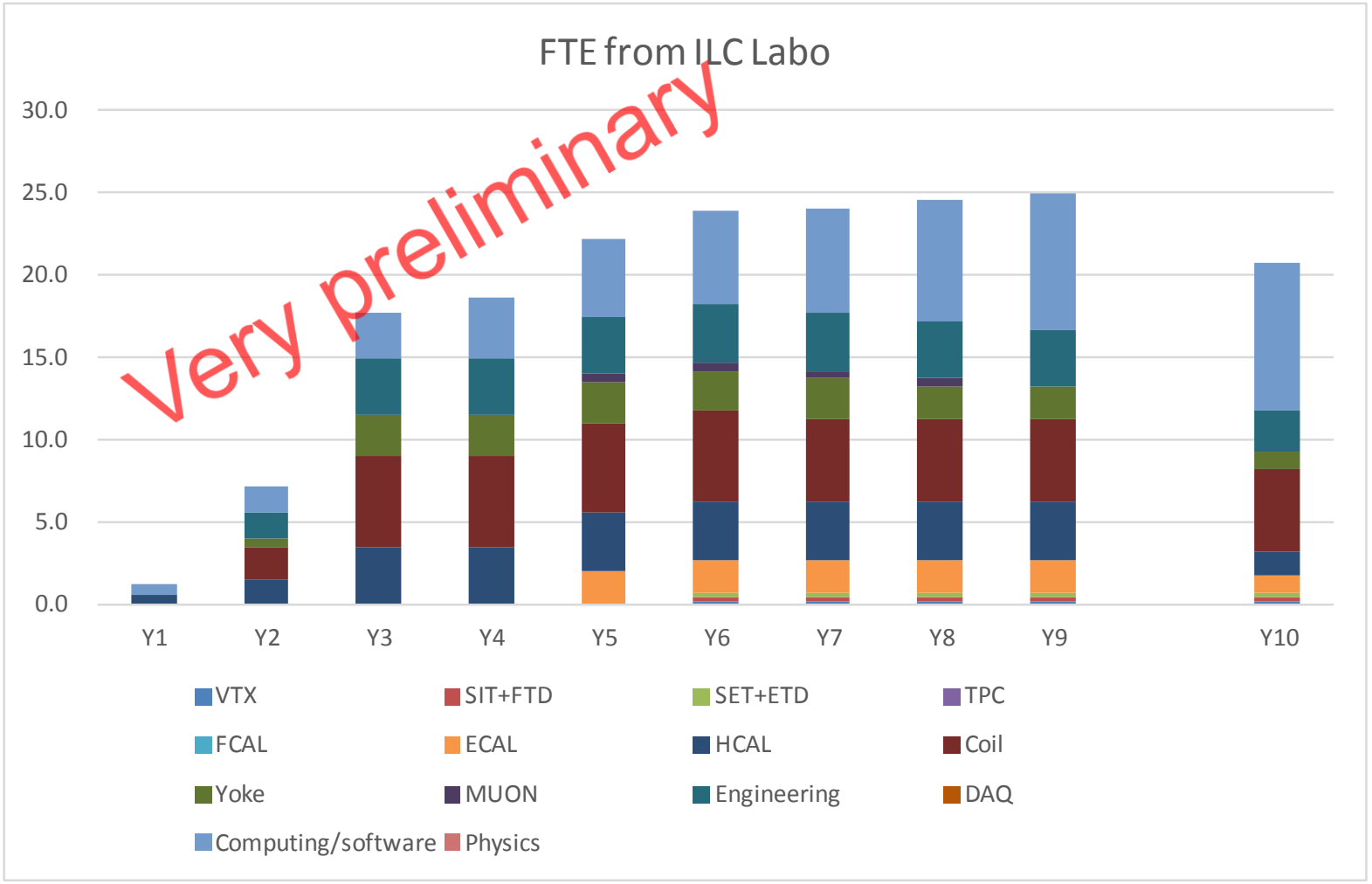
Detector lowering
Detector commissioning
Accelerator commissioning
Ready for physics run

FTE from external institutes



(Students are not included)

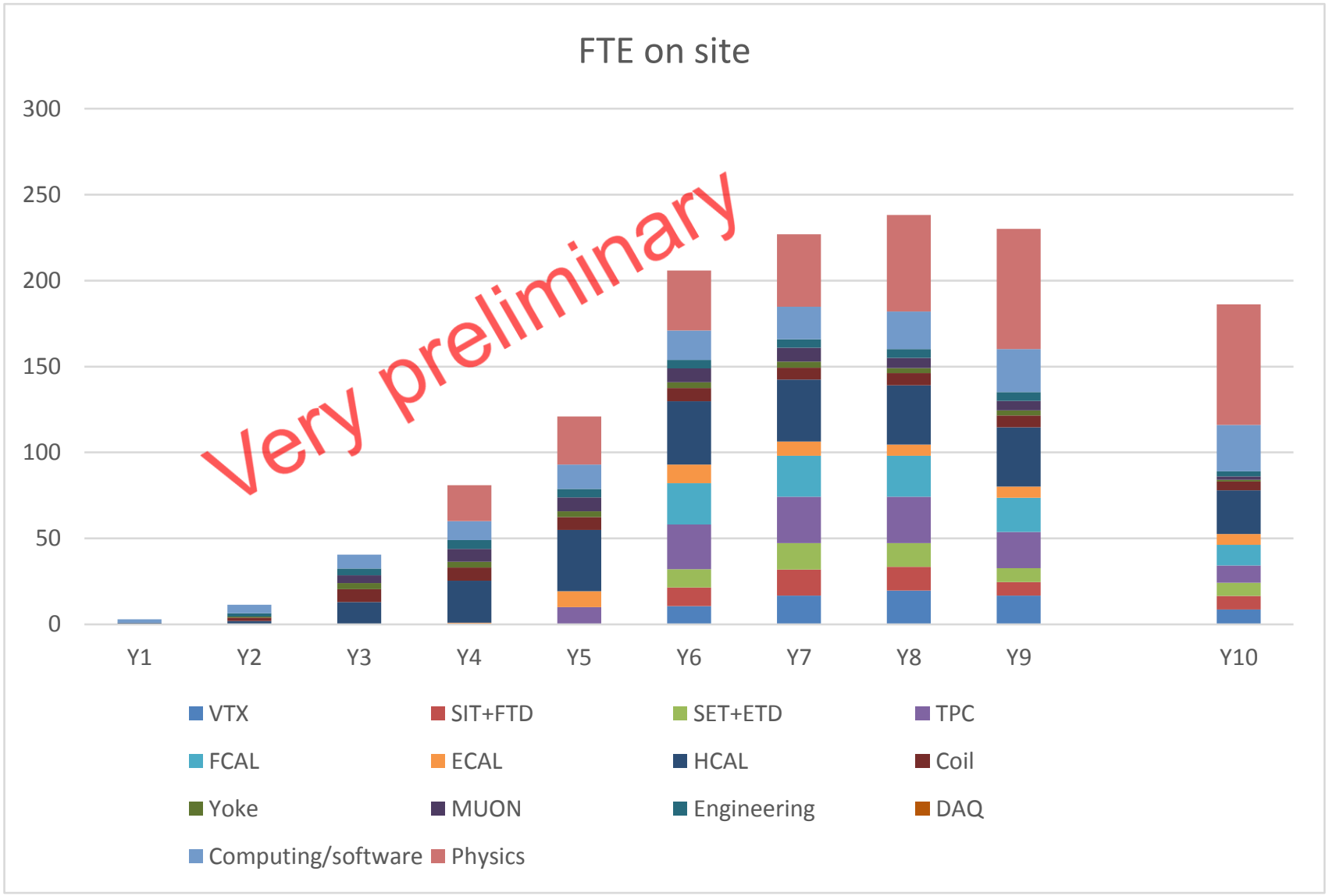
FTE from ILC Lab.



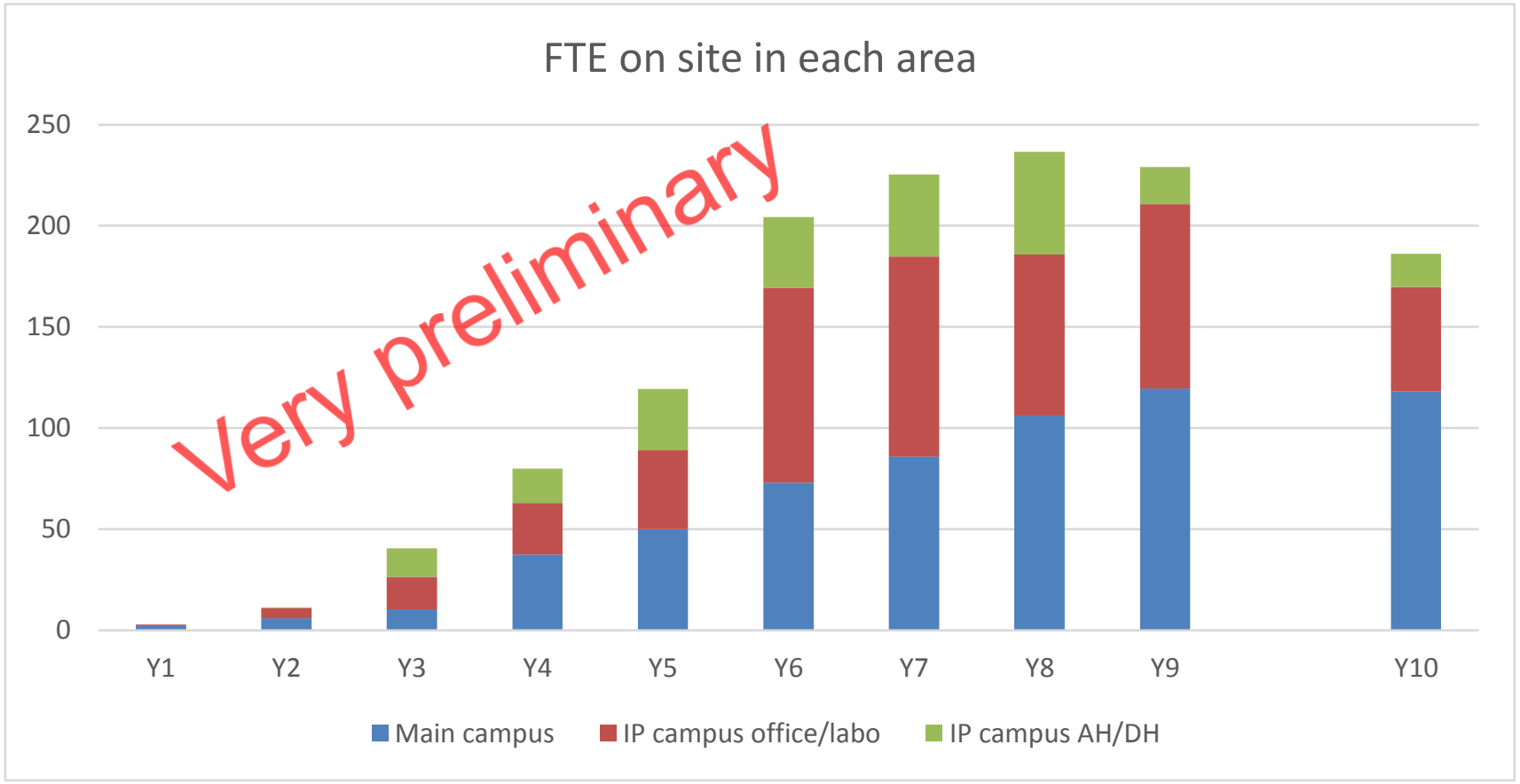
FTE in each area on site

- Assumption
  - There are main campus near Shinkansen station and satellite campus near (above) IP (IP campus)
  - In IP campus, there is a main building which includes office rooms, laboratories, and clean rooms
  - ILD construction scenario:
    - VTX, SIT, and FTD are installed into the inner support tube (L~8m) in a clean room, and installed into ILD as a “Inner Si tracker” in the detector hall
    - TPC MPGD modules are installed into the end-plate in a clean room, and whole TPC is installed into ILD in the detector hall
    - Calorimeter/Muon-detector modules are tested in a laboratory at IP campus, and installed into ILD in the assembly hall

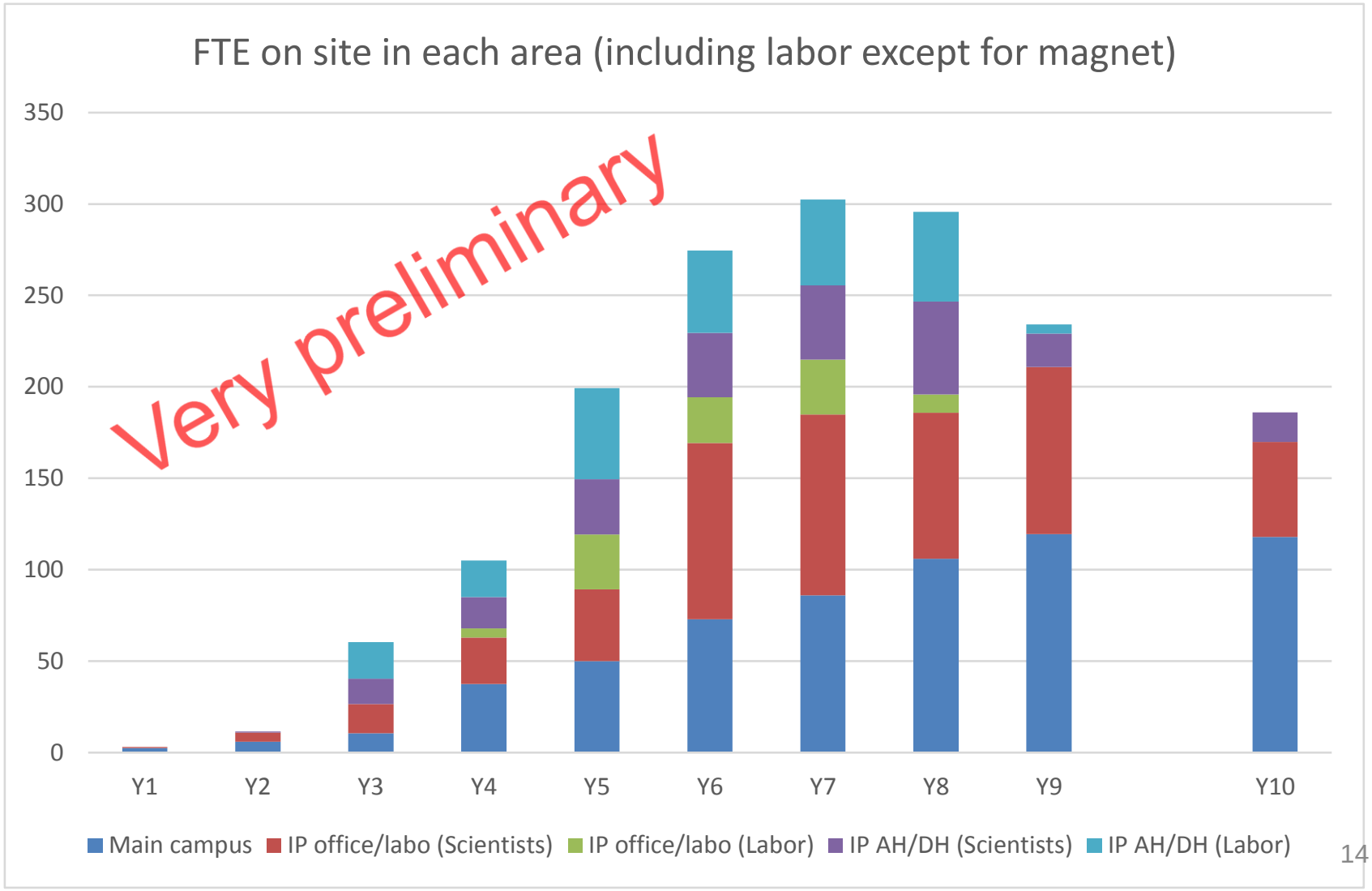
FTE of scientists on site



FTE in each area on site



FTE in each area on site including “Labor” except for magnet



Some issues

- Conversion of manpower to cost
  - In TDR, only “Labor” is converted to cost, and in-house employees such as professors are not converted to cost
  - In accelerator, all scientists in-house is converted to cost
  - If we (physics/detector) do the similar way, the cost becomes enormous
  - At present, we do not try to convert in-house manpower into cost

ILD construction	Person*Year	MILCU
M&S		387
Labor (Temporary employee)	1400	130
In-house scientists	4200	550

TDR validation WG meeting

- In next TDR validation WG meeting on Jan.26th, detector issues will be discussed
- But the allocated time is only 5 min.
- We have prepared 3 page presentation (+ back-up slides), and sent it to MEXT on Jan. 6th
  - Resource issues are not discussed in the slides except for the number of signatories in LOI
  - But we should be ready to answer on these issues when asked

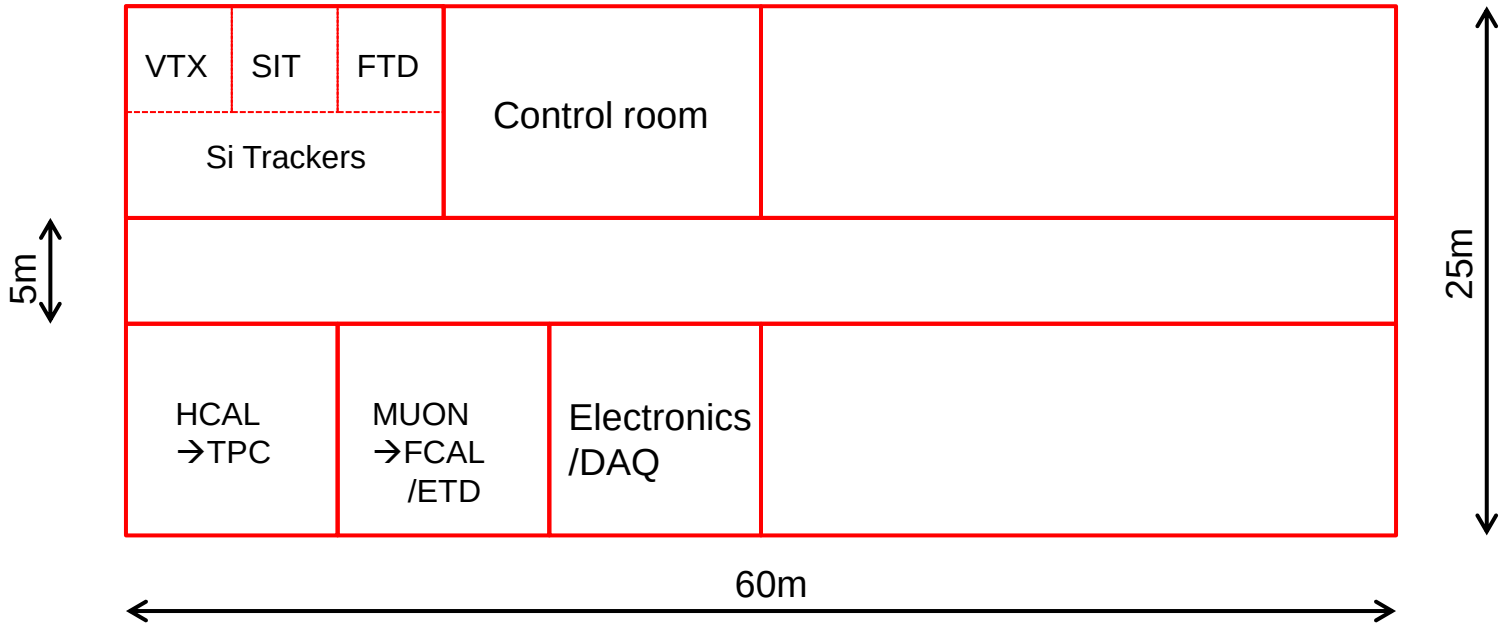
SPACE REQUIREMENT

Space requirements of ILD

- We have not made this kind of survey in ILD yet
- My tentative guess is as follows
  - IP Campus building
    - Laboratory and clean room
      - Sub-detector assembly & test before installation / maintenance
      - Control room
      - ~1/2 floor of 25mx60m building
    - Office
      - Rooms for 70~140 persons
      - 3.5mx5.8m x35 rooms (2~4/room) → ~1 floor
  - Main Campus
    - Office:
      - Rooms at least for 120 persons
      - 3.5mx5.8mx60 rooms (>2/room)
      - The site should have extra space (land) to build additional office building later if necessary

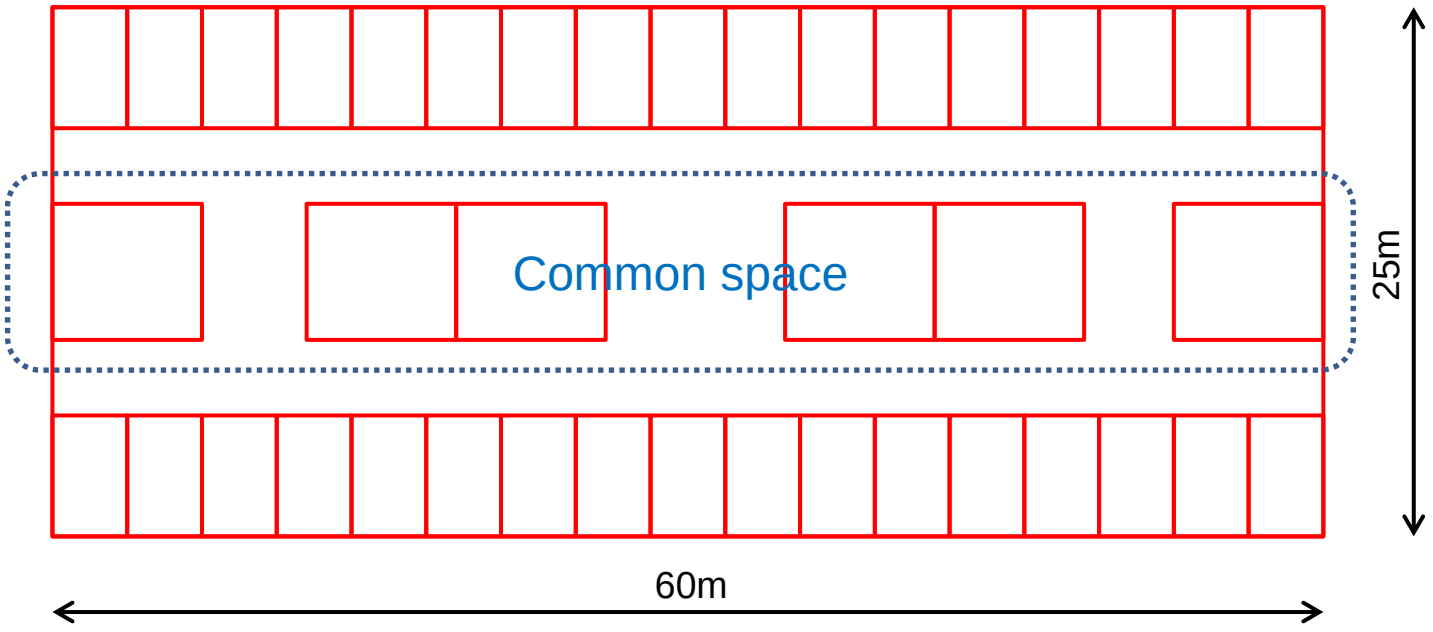
Laboratory space

- Because of difference in installation schedule, the same space can be used by different sub-detectors;
  - HCAL → TPC
  - ECAL → Si trackers
  - MUON → FCAL, ETD



Office space

- It seems ~34 office rooms can be put in a floor with meeting rooms, rest rooms, elevators in common space



SUMMARY

Summary

- Our guess on the human resource requirement of ILD is;
  - 20 – 25 FTE from ILC labo.
  - ~500 FTE from external labo./university
  - Among them, 70 (running period) – 140 (construction period) FTE are working at IP campus, and >120 FTE are working at Main campus
  - If students are taken into account, these numbers would increase
- Space requirement of ILD in IP campus building (25x60m^2) would be;
  - ~35 office rooms and several meeting rooms (~1 floor)
  - ~0.5 floor for a control room and laboratory (clean room) space
    - Each sub-detector group should study the process of construction and maintenance in detail to get more reliable number (by when?)

BACK-UP SLIDES

Resource need in R&D phase

- Assumption in TDR validation WG
  - After approval of the ILC project, 4 years are necessary for the preparation to get ready for construction
- We can expect larger amount of budget in this preparation period
- We are requested to clarify budget and human resource needed in this period
  - A rule of thumb; 10 – 20% of construction cost/manpower
  - But we should try to estimate by ourselves
  - Estimate of each sub-detector will not be disclosed: ILD R&D cost as a whole

- What happens on detectors in this period
  - R&D
  - Proposal
  - Technology choice
  - Detailed (construction ready) design
  - Industrialization
  - TDR of sub-detectors