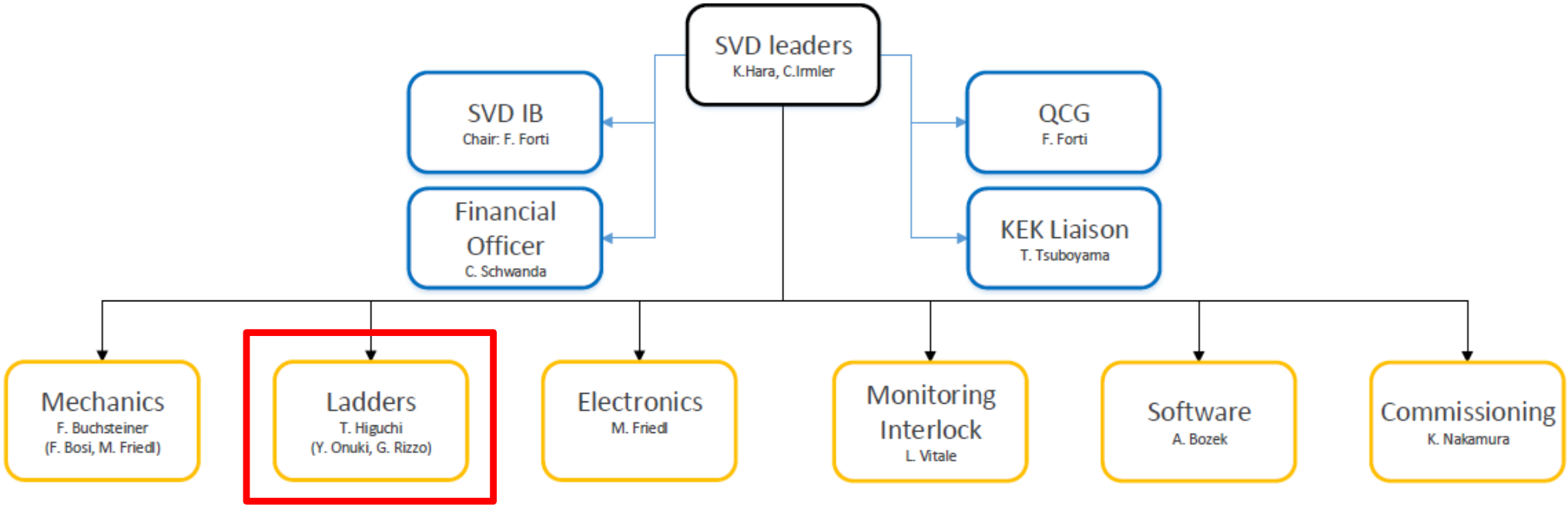
Issues in the Ladder Assembly and Formation of the Ladder Subgroup

T. Higuchi (Kavli IPMU (WPI))

Ladder Subgroup



- **Responsibility**
  - The ladder subgroup is responsible to assemble the ladders with the quality uniform compatible with the requirements.

Major Issues in the Ladder Subgroup

- **Definition of the target assembly precision**
- **Interface with the IR concerning the ladder mount**
- **Several kinds of stress tests and aging tests**
  - Stress from end-rings, gravity sag.
  - Thermal cycling.
- **Beam test**

Urgent Action Items Aside

- **Assembly of the class-C/B ladders**
  - Demonstration of the assembly procedure completeness
  - Survey of hidden big surprises by them
    - Mechanical surprises … surveyed by class-C assemblies.
    - Electrical surprises … surveyed by class-B assemblies.
      - We need more experience of electrical ladder behavior.
- **Set of the explicit date of the class-A qualification**
- **Assembly of the class-A ladder strictly before the date**

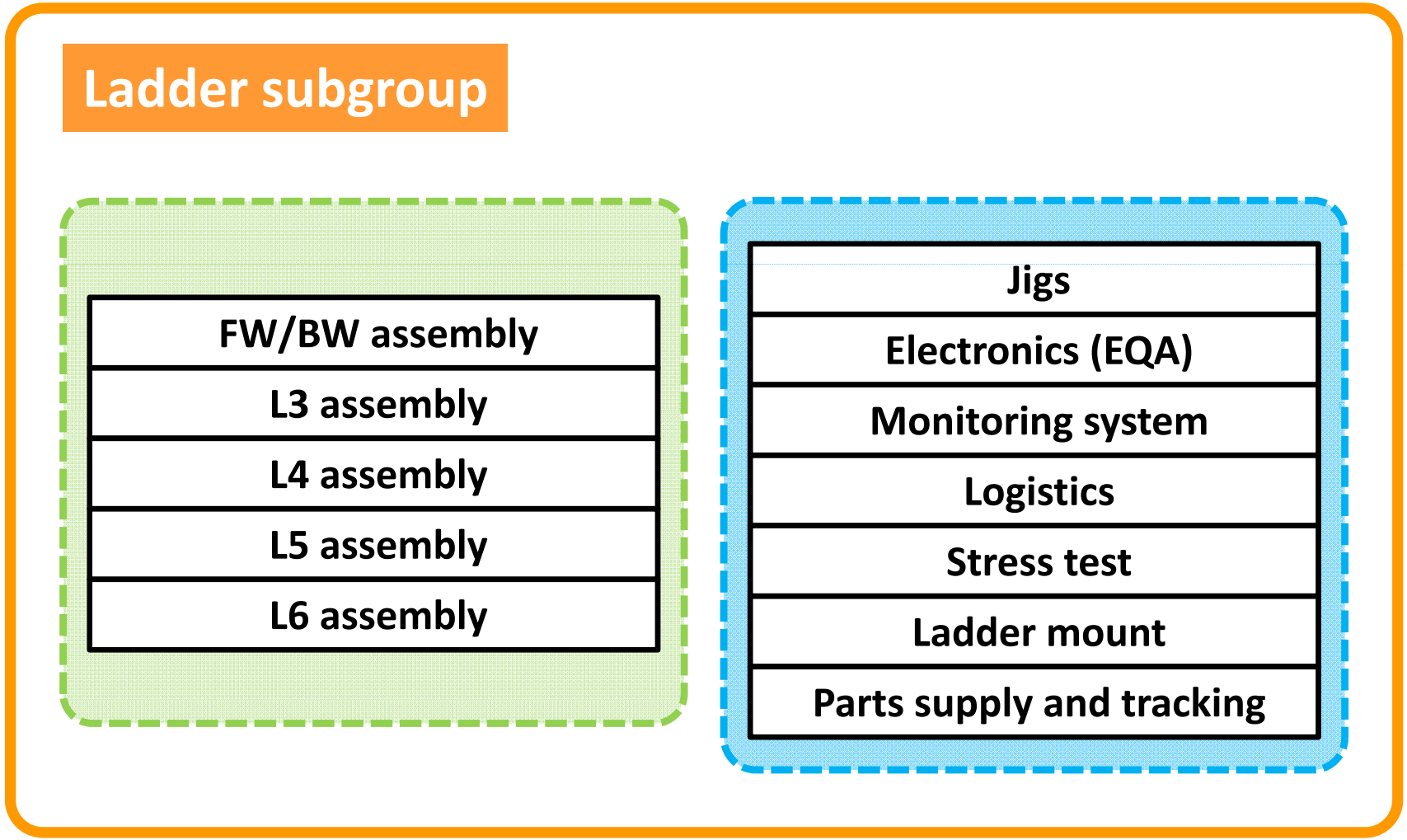
Responsibility of the Coordinator

- **Initial tasks**
  - Define quantitative requirements with the QCG.
  - Form task-specific teams in the subgroup.
  - Settle the class-A qualification date explicitly.
  - Build big milestones from each team's milestones.
- **Continuous tasks**
  - Collect surprises happened in the class-C/B assemblies and update the milestones accordingly to the surprises.
  - Allocate ladder items (parts) to each assembly site.
  - Dispatch ad-hoc studies to the team(s).
    - Studies from the PA taskforce for example.

Responsibility of the Coordinator

- **Miscellaneous tasks**
  - Request the group management to provide up to date grand milestones and schedule.
  - Encourage communications among the teams.
    - Quantitative requreInterface between teams must be quantitative
  - Collect each team's weekly status and summarize it to the management.
  - Host meetings with subgroup specific dedication.
- **Please add more…**

Task-Specific Teams in the Subgroup



One-man team is possible.

Breakdown of the Team Task

FW/BW, L3, L4, L5, L6

- Ladder assembly facility
  - Sufficient performance
  - Well considered backup system
- Global assembly procedure
  - Flowchart and Manuals
  - Completion of the Class-D/C
- Jig production
  - Precision measurement of the products
- Gluing control
  - No over/underflow of the glue
- Bonding control
  - Efficiency: > 99%
  - Pull force: μ>5gw, σ>0.2μ
- Wrapping control
- I/F between Pisa ↔ L4-L6
- Storage
  - Sufficient storage space
  - Anti-electrostatic storage
- Quality assurance
  - Precision measurement of the assembled ladder

Jigs

- Share of the redesigned drawing

Electronics (EQA)

- Setup
  - Dark box, crate, APVDAQ, PC …
- Parts level EQA
  - Definition of the “good” parts
- Step-wise EQA
  - Feedback to the WB quality
- Post-assembly EQA
  - Definition of the “good” ladder

Monitoring system

- Involvement into the ladder

Logistics

- Container
  - Jig design
  - Pickup at the ladder mount
- Shock monitoring
- Ambient condition monitoring
- Transfer
  - Car, jet, hand, …
  - Paper works

Stress test

- Vibration
  - Vibrator readiness
  - Program: frequency, time, …
- Thermal cycling
  - Climate chamber readiness
  - Program: temperature
  - Dry air control
- Cooling effect
  - Cooling system readiness
  - Deformation monitor
- Gravitational sag
  - Supporting jig

Ladder mount

- Mechanical stress
  - SLM performance test
  - Deformation by the end-rings
- Tolerance requirement handling

Parts supply and tracking

- HEPHY DB R&D
- Parts allocation control
- Procured parts check
- Supply schedule control

Private Idea of the Key Names

Advisors	Y.Onuki	G.Rizzo			
QC	TH	Y.Onuki	S.Bettarini		
Ladder	S.Bettarini	T.Baroncelli	K.Kamesh	C.Irmler	Y.Onuki and TH
Jigs	Y.Onuki	F.Buchsteiner	S.Bettarini		
Electronics	M.Friedl (advisor)		Mr./Ms.X		
Monitoring	L.Vitale (advisor)		Mr./Ms.Y		
Logistics	F.Buchsteiner	T.Tsuboyama			
Stress test	F.Bosi				
Mount I/F	K.Nakamura (advisor)		Mr./Ms.Z		
Parts	[HEPHY]	[KEK]	T.Morii (allocation control)		

Sorry for the same names repeatedly.