Riunione Mu2e Italia
9 Ottobre 2023

Introduzione

Agenda

16:00 Introduzione (SDF 25’+10’)

16:35 FEE e Mezzanine Board (Stefano M 10’+5’)

16:50 Attività in corso e in programma a Sidet (Ivano 10’+10’)

17:10 DIRAC (Franco 10’+5’)

17:25 Cooling (Fabrizio 10’+5’)

17:40 Cristalli curvi (Vincenzo 10’+5’)

17:55 Organizzazione prossime riunioni (5’)

Nella prossima riunione cercheremo di coprire alcuni argomenti rimasti scoperti: preparazione dello spostamento dei dischi, database e software del calorimetro, analisi in corso,...

Argomenti piu’ legati al management possono essere trattati in riunioni dedicate tra i senior del gruppo

Outline

- Report dalla riunione di Commissione 1

- Highlights dal collaboration meeting

- Status report su temi di interesse generale:
    - collaboration list
    - case a Fermilab
    - assicurazione negli USA

Highlights dalla riunione di commissione 1

Sez. & Suf.	MISS				CON				ALTRICONS				SEM				TRA				PUB				LIC-SW				MAN				INV				APP				SPSERVIZI				TOTALE			
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	406				191				11				0				15				0				3				42.5				29				261.5				20				979			
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	299.5				176.0				11.0				0.0				6.0				0.0				0.0				33.5				0.0				238.5				20.0				784.5			

Le assegnazioni sono andate direi bene:
- tutti gli **sblocchi sub judice** richiesti sono stati **concessi**
- le **riassegnazioni** al 2024 sono passate **senza tagli**
- le assegnazioni per gli **extracosti** sono state fatte al **100%** per le cose documentate e ritenute indispensabili (es. telaio per sollevamento dei dischi, strumenti per test di tenuta del cooling a Sidet) mentre altre più generiche e che potrebbero essere coperte dai laboratori sono state date al **50%**
- le assegnazioni per le **missioni** superano la media per FTE dello scorso anno anche scalando il contributo per lo spoke person): sta a noi ora usarle al meglio!
- è stata riconosciuta l'importanza di un'attività di R&D per **Mu2e-II** per mantenere viva un'attività sperimentale e formare dei giovani. Le assegnazioni sono circa il **50%** di quanto richiesto ma è un buon inizio!
- alcuni finanziamenti (in particolare quelli relativi a cristalli curvi) sono stati concessi al 100% ma sub judice all'attivazione dei **common funds**. Non c'è motivo di pensare che questo non avvenga nel 2024.

Highlights dal collaboration meeting di Mu2e

L’introduzione di Bob Bernstein (doc-db 46880) contiene un’ottima sintesi delle novità più importanti:

- update della **schedula**: ulteriori ritardi del DS riducono ulteriormente il tempo di presa dati (se non slitta lo shutdown per PIP-II)

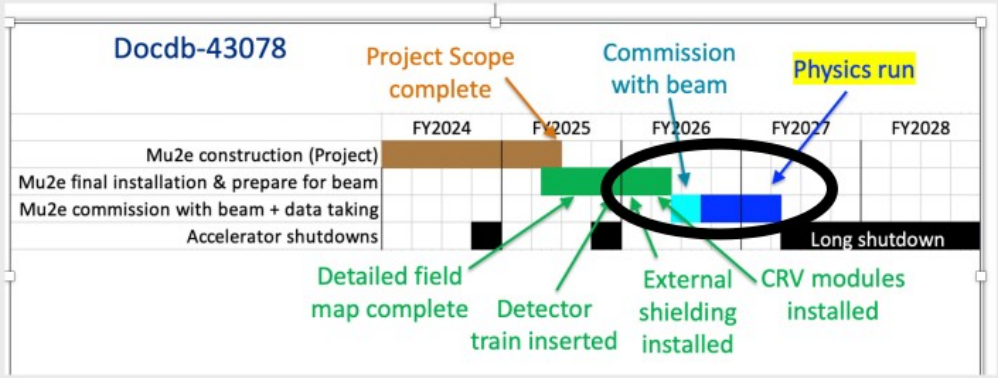
- nuovo **organigramma** in vista dell’inizio delle operazioni

- report di altri comitati creati dall’EB su **DAQ**, **mappa del campo magnetico** (impatto sulla schedula)

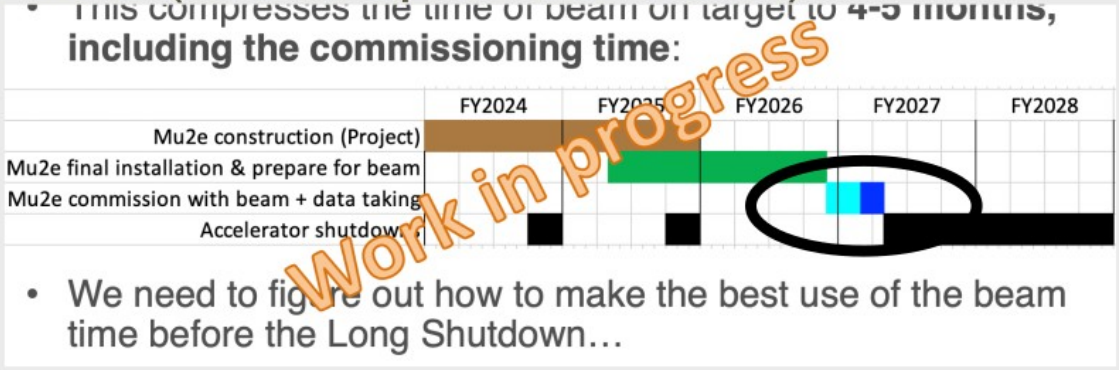
- **shutdown dell’acceleratore**: possibili ritardi nel commissioning del fascio per Mu2e

Update della schedula

- before: 11 months of beam time



- after: 4-5 mos (this is up to last week)



Dal talk di Karen Byrum (Mue project):
early project completion date is **Dec 2025** (does not include schedule contingency).
We anticipate the **early completion date will likely slip** due to completion of PS/DS magnets

All other Mu2e sub-systems are expected to finish their scope on time and budget

Update della schedula

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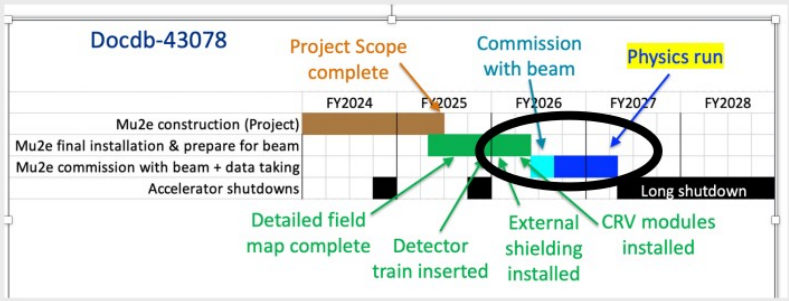

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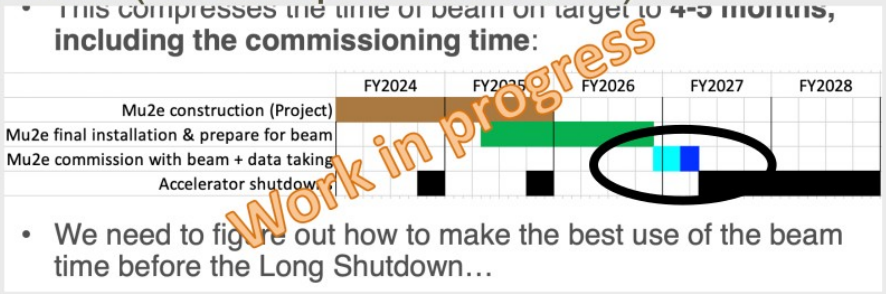


Dal talk di Karen Byrum (Mue project):
The **Lab Director** has said that she is fully committed to delivering beam to Mu2e for commissioning and a data run prior to the PIP-II shutdown!!
• Program planning: **PIP-II shutdown** will be **revisited quarterly**
• Shutdown date will be **updated late this year/early next year**

La **deputy director** for Science and Technology and Chief Research Officer, **Bonnie Fleming**, è venuta a rispondere alle nostre domande e, per quanto possibile, a rassicurarci sulla ferma volontà di fare avere a Mu2e una quantità di dati per il Run 1 che garantisca una pubblicazione

Organigramma di Mu2e per le operazioni (≠ progetto)

Production of Physics Results

Operation of the experiment

Physics Results:

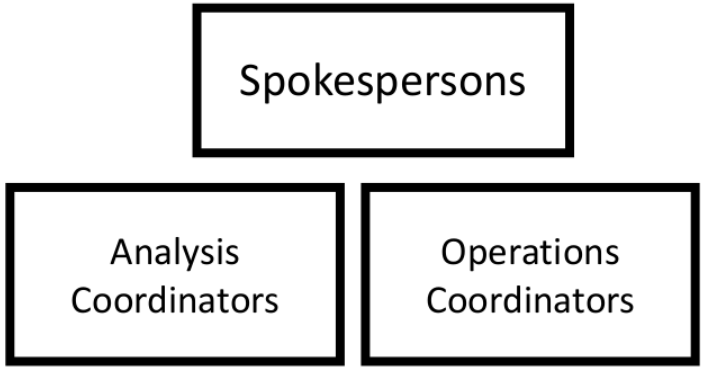
- *Characterize and understand the apparatus*
- *Calibrations, Alignment, Efficiency measurements*
- *Determine the fitness of the data for science*
- *Process the data*
- *Simulate relevant physics processes and detector*
- *Identify and prioritize physics analysis topics*
- *Conduct and review analyses; draw conclusions*
- *Publish results and present at conferences*

Operation:

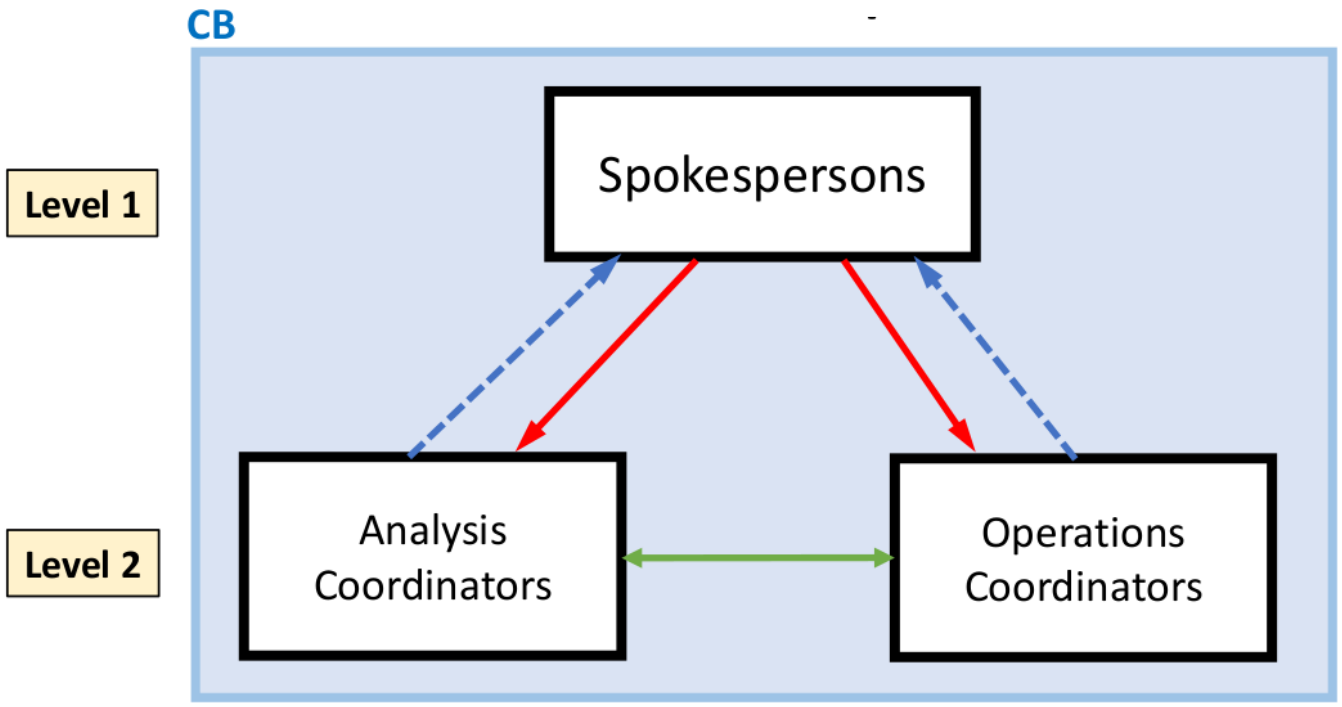
- *Complete installation; commission the apparatus*
- *Check the proper functioning of all systems*
- *Specify and confirm beam conditions*
- *Establish and confirm triggers and detector readout*
- *Monitor detector performance*
- *Check environmental conditions*
- *Record and log data (including conditions)*
- *Ensure the safety of all personnel and detectors*

Questa suddivisione guida la **definizione dei ruoli** a partire dai livelli più alti

Per ogni posizione **1 senior + 1 junior**
In carica per 2 anni rinnovabili
Con rinnovo sfalsato di 1 anno



Organigramma di Mu2e: Collaboration Board



How we indicate roles:

lines of authority

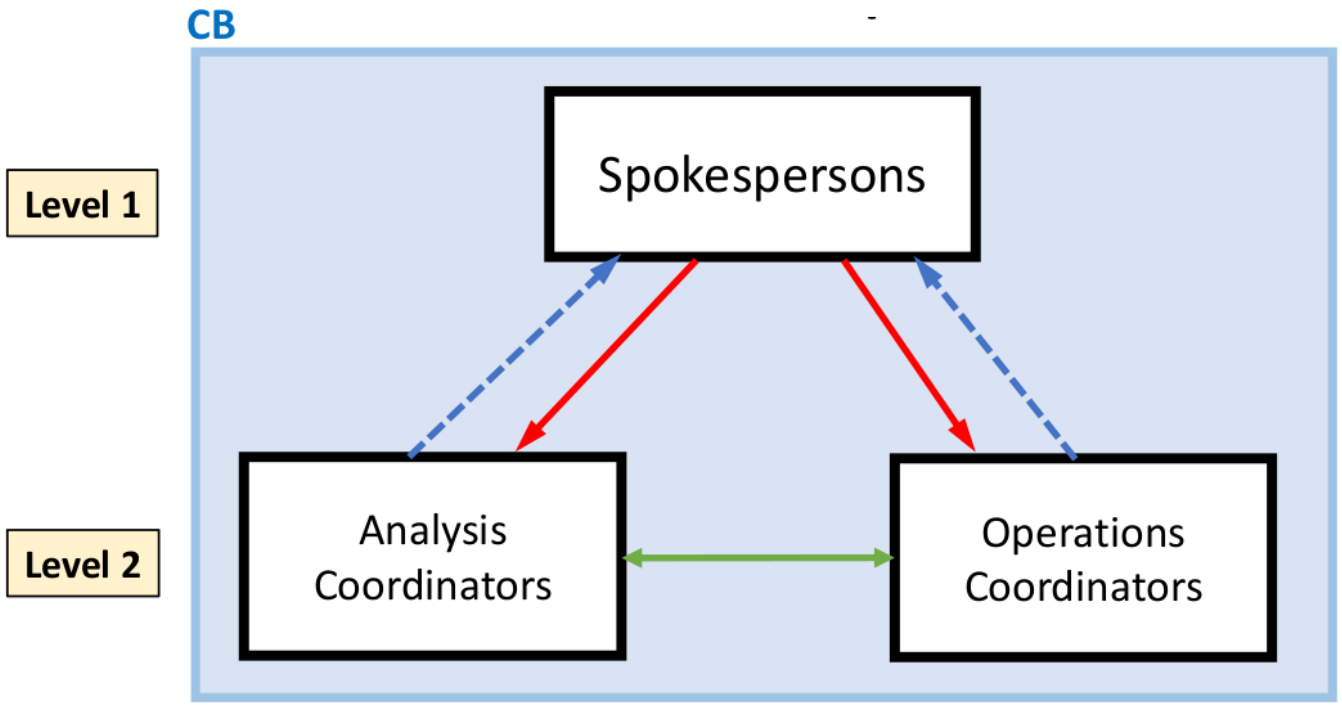
reporting lines

everyday communication

Collaboration Board (CB):

- *Meet or talk to each other often*
- *Execute Run Plan*
- *Ensure smooth data taking and processing*
- *Ensure timely publication of physics results*

Organigramma di Mu2e: Collaboration Board



How we indicate roles:

lines of authority

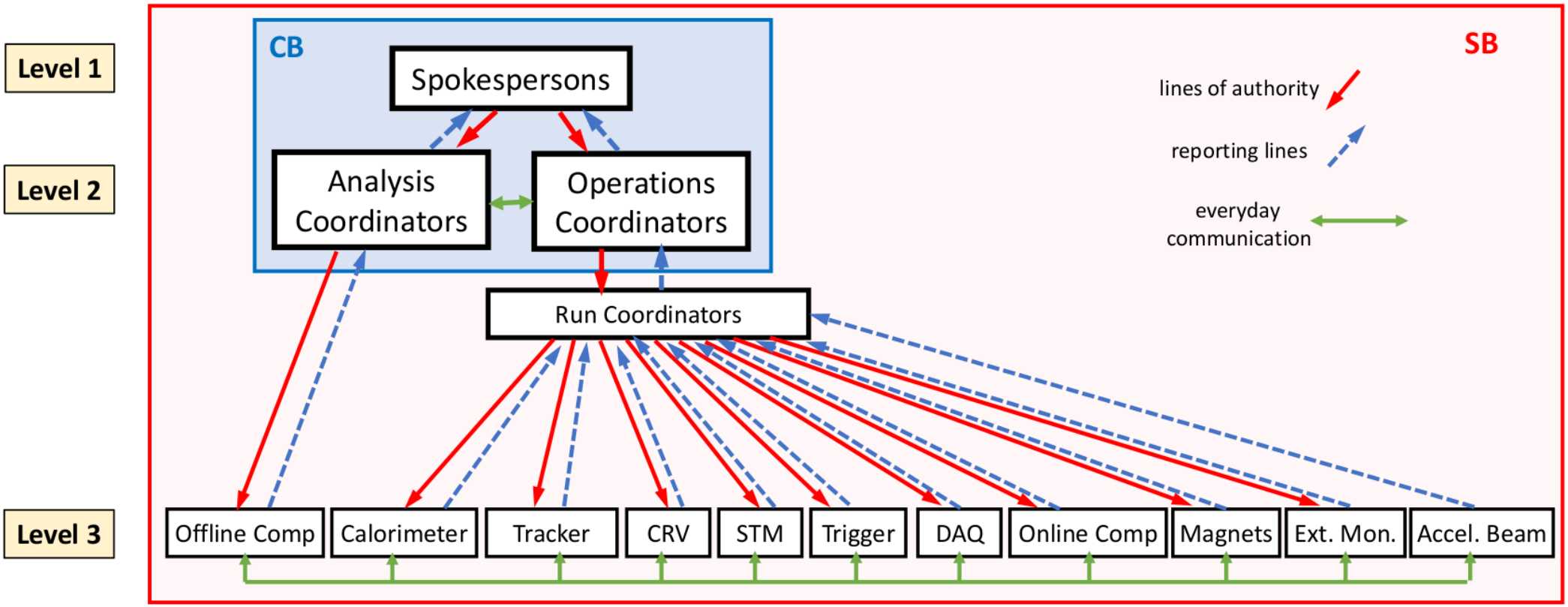
reporting lines

everyday communication

- **Operation Coordinator + deputy** : *2* years renewable *(default is 2; can be changed as we learn)*
- **Analysis Coordinator + deputy** : *2* years renewable *(default is 2; can be changed as we learn)*
  - ✓ At least one of the Operation coordinator(s) must be resident at FNAL **Full commitment**
  - ✓ For Physics coordinators, it is not essential to be at FNAL **Full commitment**
  - ✓ Deputies share with the coordinators the roles, *act as substitutes when needed*
  - ✓ At least one of the OPSCO or PHYSCO ***should not be from FNAL***
  - ✓ ***It will be useful to make up a system with staggered changes for renewal***
- **Selection criteria for Analysis/Operations Coordinators**
  - ✓ Open search from the Spokes + volunteers write to the spokes … present CV and proposed working plan
  - ✓ Physics/Operations coordinators choose their deputies in consultation with Spokespersons
  - ✓ Deputy can be young members but it is not mandatory.
  - ✓ Early Career members can be coordinators; probably pair with more senior people

Alcuni ruoli richiedono la **permanenza a Fermilab**
Per molti si richiede un **impegno al 100%**
Compresenza di **senior** e **junior** (early career)

Organigramma di Mu2e: System Board



The **Operations Coordinators** are responsible for the proper operations of the detector and related infrastructure. They take a long-term view.

Systems Board (SB): *(includes CB)*

- *Each subdetector has a leader or primary person.*
- *Hold "weekly" discussion on status of running*
- *Discuss long-term change of plans/goals*
- *Appoint ad-hoc task force for "big" problems*

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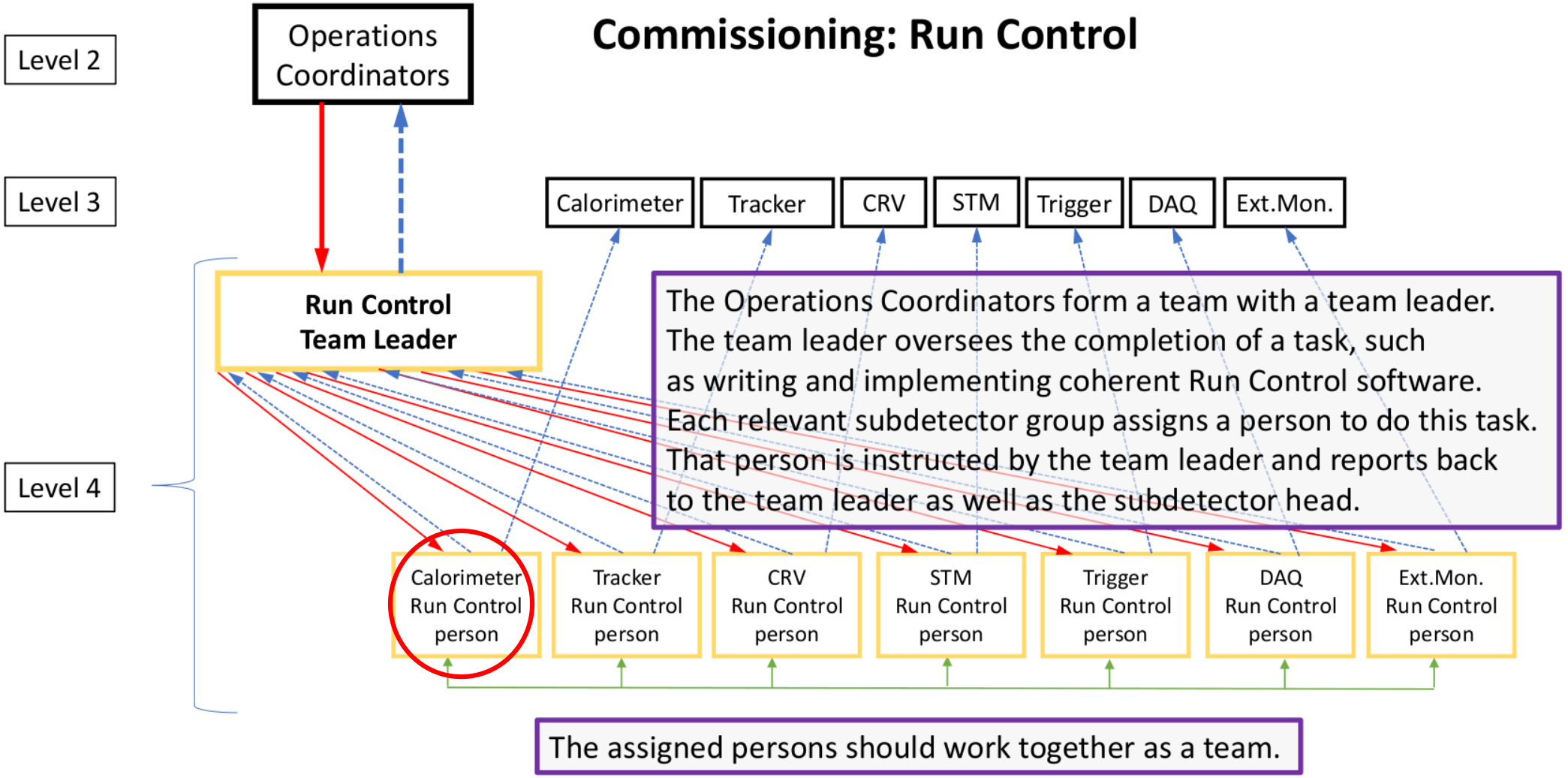
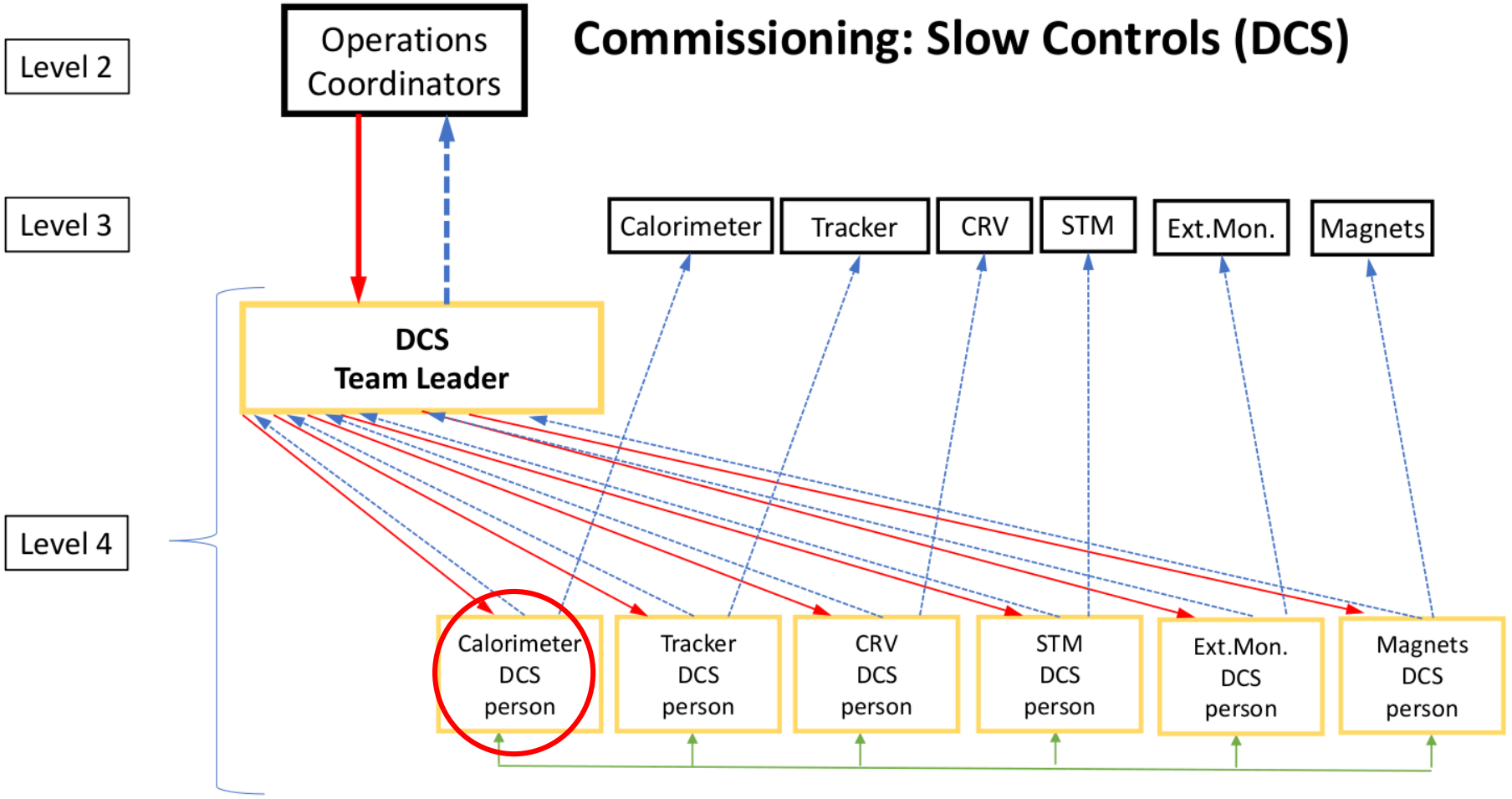
- **Selection criteria for Systems Board**
  - ✓ SB roles: ***2*** years renewable (deputy if needed)
  - ✓ Presence at FNAL not 100% needed, % will increase with time. **Participation at SB meeting**
  - ✓ Selected by Spokes, OPSCO or PHYSCO, in consultation with Project L2 when appropriate

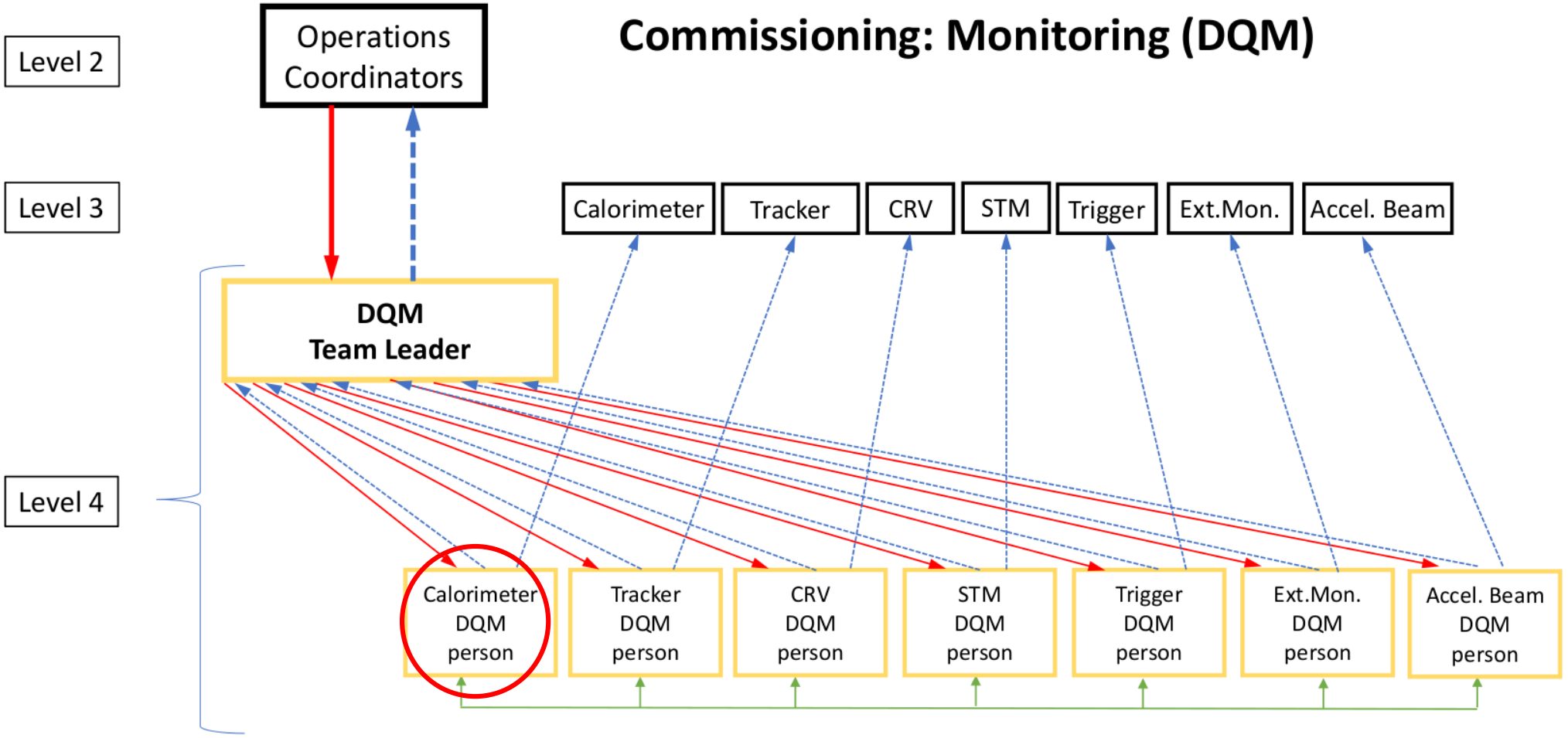
Organigramma per il Commissioning: Run control



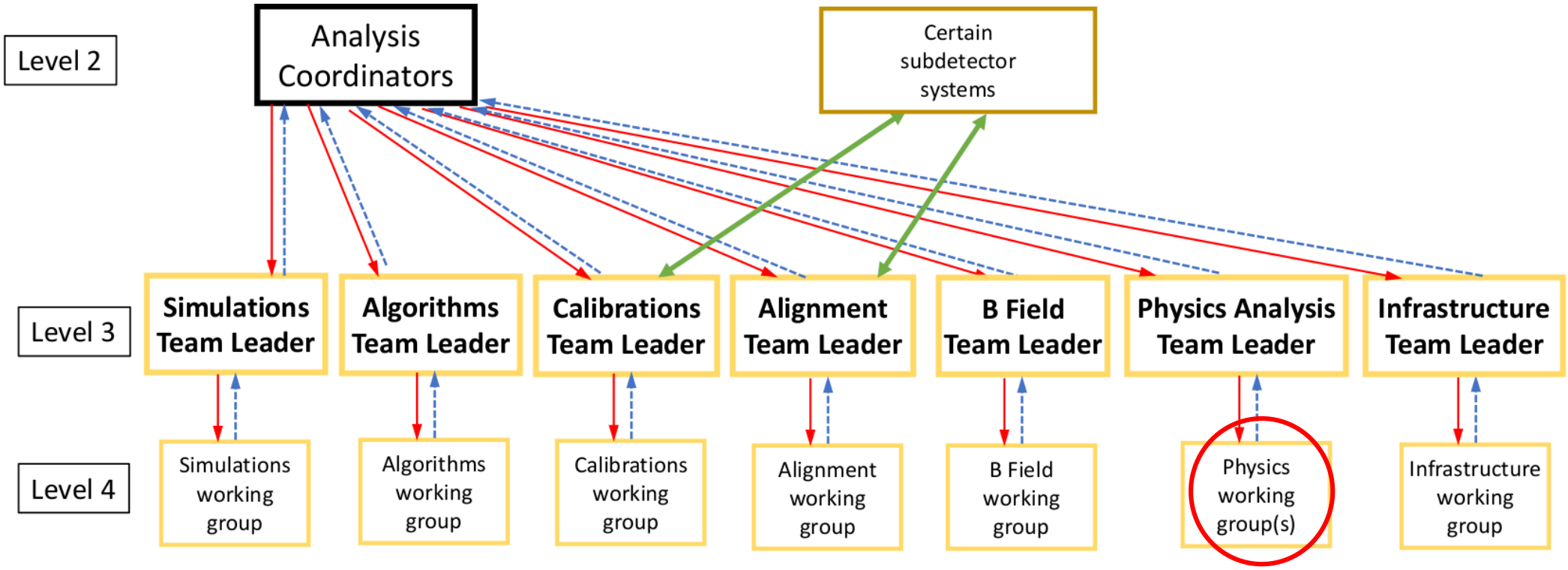
Organigramma per il Commissioning: Slow control



Organigramma per il Commissioning: Monitoring



Organigramma per l'analisi



Criteri per il riempimento dell'organigramma

- Spokespersons will appoint people to top-level boxes. (Some details follow.)
- People appointed to one level will help select the people for the next lower level.
- Important to strike a balance between FNAL and University (i.e., non-FNAL) people.
  - e.g. 2 Analysis Coordinators
  - e.g. 2 Operations Managers
  - e.g. 2 Run Coordinators
- Certain roles connecting to the lab are best filled by FNAL people (e.g. Tech. Coord.)
- Set requirements to be onsite functionally.
- They should not be unduly restrictive or burdensome – avoid exhausting the talent!

❑ **LEVELS below SB** → They should be selected by the SB – BOX leaders. *Expect young members to fully populate this level in 2024.* Ramp-up in higher level position is welcome along time and upon commitment.

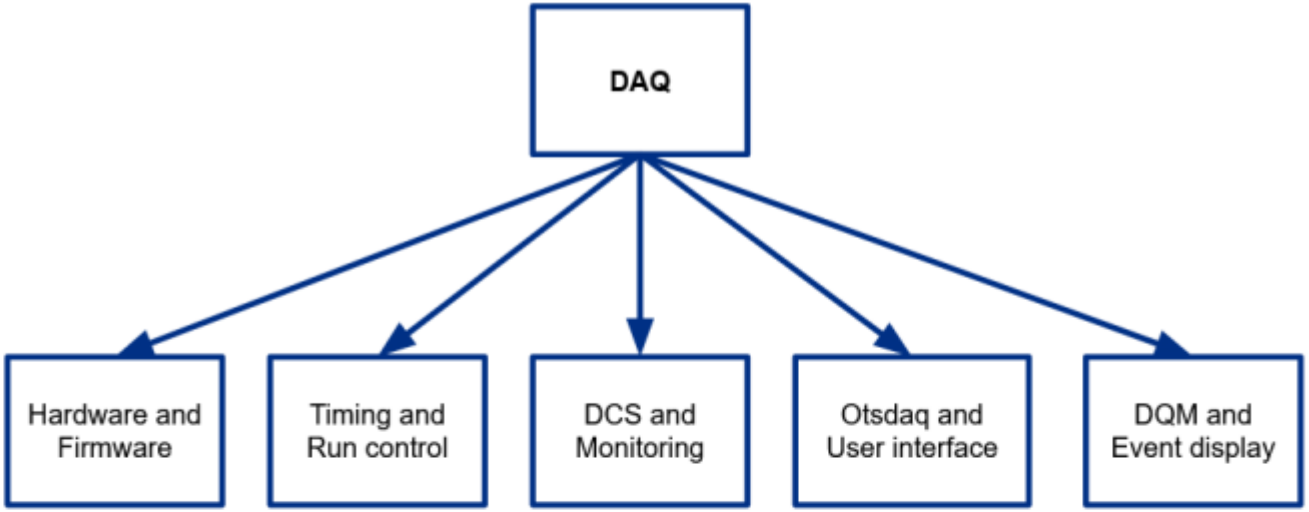
Prossimi passi:

1. Discuss in the EB.
2. Spokespersons will conduct a vote of this proposal by the collaboration. They are providing the details.
3. Spokespersons will start to fill SB positions in October. Fill in the CB by November. (They will help fill in remaining SB positions.)

Report dal DAQ committee

Organization

- We recommend groups within the DAQ structure:



- **Hardware and Firmware**: install, characterize and maintain the DAQ hardware (e.g. fibers, servers, routers,...); produce and maintain the ROC, DTC and CFO firmwares.
- **Timing and Run control**: provide and maintain the timing distribution system; monitor and recover loss of lock; develop and maintain CFO run plan, and subsystem loopback and timestamp synchronization; develop and commission event accounting strategy.
- **DCS and Monitoring**: develop and maintain subsystem operation and monitoring (EPICS), develop rack and DAQ monitoring; develop interface with accelerator controls.
- **Otsdaq and User interface**: develop and integrate online databases, spot calibration procedures, run numbering scheme; develop procedures/mechanisms for multiple users; commission subsystem configuration; commission event building and data integrity; customize data taking / otsdaq user interface (with input from the collaboration).
- **DQM and Event display**: Develop and commission sub-system DQM plots and metric performance; develop, integrate and maintain online event display.

Raccomandazioni dal DAQ committee

1. Establish a centralized DAQ & Trigger group

2. Build/Deploy at least 1 (and preferably 2) full readout chains onsite at FNAL in accessible building → HORIZONTAL TEST by winter

3. Increase effort/staffing of DAQ activities
   - Core Group Needs:
     - 2-3 Postdocs (dedicated 50%)
     - 1-2 Senior physicists (dedicated)

     Augment with:
     - 2-3 PhD students
   - Technical/Engineering Needs:
     - 1-1.5 FTE of additional software devel expertise
     - ~0.5 FTE of additional engineering (integration/debug)
   - Need a senior person resident and integrated with the lab during the leadup to commissioning and during commissioning

4. Software/Release restructuring

Report dal B Field committee

Thanks to the tight specifications on the DS coils and our ability to take details like helical coils and busbars into account, the difference between what we predict through direct calculation and what the actual field will be is at the level of a few times 10^{-3}.

This is small enough that the quality of data we take will not be impacted.

As far as the physics goals of Mu2e are concerned (i.e., obtaining as much physics-quality data as possible), mapping the magnetic field can be postponed until after Run 1.

Magnetic materials like rebar in the shielding blocks complicate our understanding of the magnetic field even after a detailed map has been carried out.

They should be avoided, if possible, especially at the downstream end of the experiment.

Per pubblicare la misura occorre una precisione della conoscenza del campo $O(10^{-4})$:
Il campo del DS **va misurato** e **monitorato** continuamente con delle **sonde NMR**

Shutdown dell'acceleratore

- Startup for the next run will be significantly delayed
- Best guess is that Muon Campus beam startup will be in March 2024
- If this schedule holds, we'll get approximately 3 months of beam time before the 2024 Summer shutdown
- The three high priority items will get immediate attention once beam is available
- It is likely that many of the items on our studies list will get very little or no attention during the next run.

1. Shielding measurements for the shielding assessment
   - Significant discrepancies between shielding model and measurement data may take a long time to resolve.
   - Necessary for Muon Campus Shielding Assessment
   - Shielding Assessment approval takes a year or longer
2. Commission M3 beamline extinction monitor
   - Evidence from g-2 running that beam extinction from the Recycler Ring is not as good as expected
   - Long lead time to improve Recycler extinction if required
3. Troubleshoot M4 beamline profile monitor issues
   - Only beam instrumentation for most of the M4 beamline
   - Required for autotuning software that keeps beam properly steered onto the Mu2e proton target
   - Long lead time if replacement is required.

The delayed startup for the next run could have serious impacts.

Argomenti di interesse generale (I)

- Lista della collaborazione
  L'IB ha chiesto ad ogni istituzione di mandare la lista dei suoi membri: abbiamo concordato di mettere come RSF sia i ricercatori che i tecnologi per non creare disparità
  L'IB ha chiesto anche la lista dei membri dal PhD in su con la frazione di tempo e l'attività, per valutare il man power disponibile

Laboratory Physicist	PL
Laboratory Physicist Foreign	PLF
Physicist Industry	PI
University Physicist	PU
Research Scientist (USA)	RSU
Research Scientist (non-USA)	RSF
Postdoc (USA)	PDU
Postdoc (non-USA)	PDF
Engineer	E
Technician	T
Graduate Student	SG
Undergraduate Student	SU

Argomenti di interesse generale (II)

- Case a Fermilab
  I contratti verranno prorogati fino a fine dicembre. Fino alla fine del progetto (Dicembre 2025) si puo' continuare così. Per dopo si dovrà probabilmente far riferimento ai Common Funds che partiranno comunque nel 2024
- Assicurazione USA
  Stefano M. ne ha fatta una a pagamento e proverà a farsela rimborsare. Il progetto potrebbe rimborsare quella di chi lavora sull'istallazione del calorimetro. La survey sulle esperienze non ha per ora trovato molti riscontri...

EXTRA SLIDES

Ruolo degli Operation coordinators

Stefano & Bob

Description for responsible party: OpsCo

- **Coordinator** : 1(2)-years renewable; ***here we will have to see if two years is sustainable, "burn-out" job***
- **Responsibilities :**
  - ✓ **Complete installation and commissioning of apparatus**
  - ✓ **Check the proper functioning of all systems**
  - ✓ **Specify and confirm beam conditions**
  - ✓ **Establish and confirm triggers and DAQ readout**
  - ✓ **Monitor online detector performance**
  - ✓ **Check environmental conditions**
  - ✓ **Records and log data (including conditions)**
  - ✓ **Ensure the safety of all personells and detectors**

- Interface with DAQ coordinator to ensure that online data are collected and with Online infrastructure coordinator to ensure that all DAQ nodes, crates and infrastructures are properly working
- Interface with the Offline Coordinator to ensure that all collected data, flagged good from Online DQM, are propertly stored and reconstructed.
- Interface with the SubDetector leads to ensure that the detectors are fully functioning and integrate their DQM and their interlock/alarm strategy in the running operations.
- He/she is coadiuvated in carrying out the program by the RunCoordinators (RunCO).

- **He/She will work with the spokes to complete the team sub-structure.** ***Adapts with needs and availability***

Ruolo degli Analysis coordinators

Stefano & Bob

Description for responsible party: AnaCo

- **Analysis Coordinator** : *2* years renewable
- **Responsibilities :**
  - ✓ **Determines the fitness of the data for science results:**
    - → final data quality monitor
    - → final preparation and tuning of reconstruction and trigger algorithms
    - → Study, plots and parametrize detector and physics performance
  - ✓ **Control calibration, alignment and efficiency techniques and their measurement:**
    - → Controlling the quality of the in-situ calibration data sets
    - → Carrying out Data-Simulation comparison with feedback to reconstruction/simulation teams
  - ✓ **Identify and prioritize physics analysis topics:**
    - → creates/organizes dedicated working groups if/when needed
    - → Identification of the data sets necessary for the analysis teams
    - → Defines analysis strategy
  - ✓ **Conduct and review analysis; draw conclusions**
  - ✓ **Publish results**

- Interface with Offline and Simulation coordinators for tuning the analysis modeling and to assure that all needed datasets (data/MC) are available. The same for final DSTs/Python/Root analysis output
- Interface with Operation and Offline coordinators to check that selected trigger paths work properly

- **He/She will work with the spokes to fully define the details of the TEAM SUB-STRUCTURE:**
  - → **ALGORITHM, PERFORMANCE, CALIB,SIMULATION, PHYSICS TEAMS …** ***adapts with needs and availability***.