PIP-II Integrated Quality Assurance

Breakout Session

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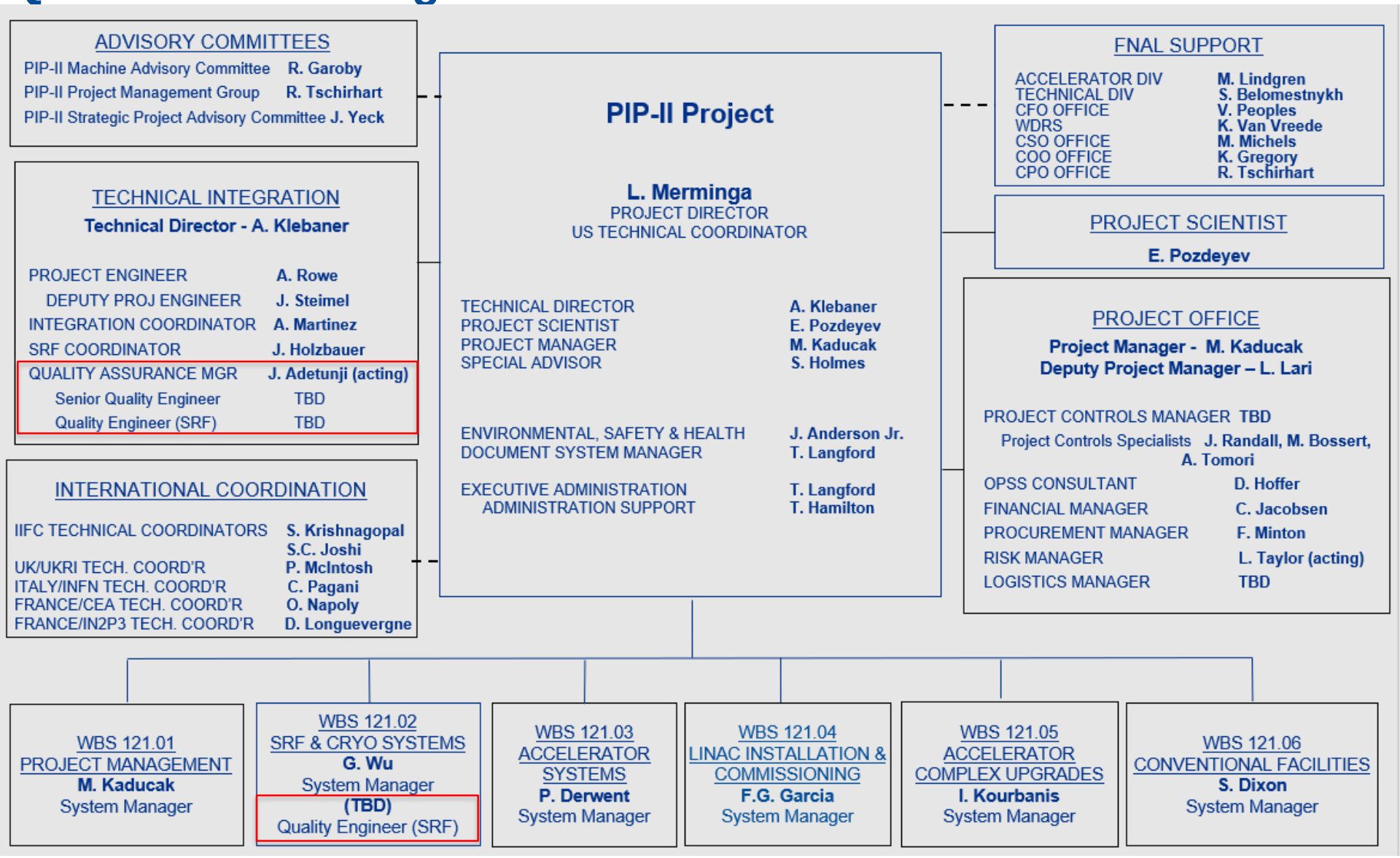
About Me:

- Jemila Adetunji – Quality Assurance (QA) Manager
  - 15+ years working in various quality roles
    - 9 years in Consumer Goods and Manufacturing/Operations
      - Quality Management / ISO Program Maintenance
      - Quality Assurance / Quality Control
      - Consumer Quality
      - Supply Chain
    - 3.5 years in Technological Services
      - Quality Assurance / ISO Program Implementation & Maint.
      - Quality Planning
      - Project Quality
    - 4.8 years at Fermilab
      - Quality Management: Fermilab QA Department Head
      - Project Quality : SLI-UUP QA Manager, Mu2e QA Manager, General 413 Project Quality Support

QA in the PIP-II Organization



Quality Assurance Roles and Responsibilities

Charge #6

- In the PIP-II Project –
  - The Project Director has overall accountability for Quality in the Project and relies on the PIP-II QA Manager to guide the development, implementation, assessment, and improvement of the QA Program.
  - The L2 Managers are responsible for developing and implementing QA procedures tailored to their specific systems and ensuring expectations are communicated and are consistent.
  - The L3 Managers are responsible for identifying tests, inspections, and acceptance criteria to ensure that all necessary procedures are developed and documented.
  - The Partners are responsible for ensuring their QA Plans are consistent with the PIP-II QA Plan, and adhering to their QA Plans as well as other applicable Project requirements.
  - All personnel are responsible for consistently adhering to the PIP-II QA Plan and Project requirements.

Quality Assurance in PIP-II

- Quality Assurance is a management system to plan, perform, assess, and improve work.
  - We should never just *assume* that the things we buy or build will meet specifications – despite previous experience.
  - Building an experiment that achieves our objectives requires quality and verification to be fully integrated into the design, procurement, fabrication, transportation, and in-kind contribution processes from the beginning.
  - QA requires investment in resources (money, time, and people), therefore, it must be adequately integrated in Project planning from the beginning.
    - It costs more to build a substandard product than one that meets requirements.
    - Early detection of issues saves money and time.

Quality Assurance in PIP-II

Charge #6

- Design in quality and reliability from the beginning.
- Just like safety, everyone is responsible for quality.
- Quality Assurance is integrated into all aspects of the Project.
  - QA Manager participates in Integration Meeting, L2/L3 Meetings
- QA expectations shall be defined and communicated to Partners, vendors, and subcontractors.
- Everyone implements quality whether they are aware of it or not.
- QA is more effective when -
  - It is planned at the beginning (Preliminary Design Review deliverable)
  - Managed throughout the project lifecycle
  - Processes are documented and understood
  - Lessons learned are captured, evaluated, and shared
  - Roles and responsibilities are communicated and understood
  - Personnel have adequate training and qualifications

Graded Approach

Charge #6

- The level of QA required varies with the Project's complexity and risks.
- The QA program employs progressively more formal criteria depending upon the risk associated with a given activity or deliverable.
  - Higher risk: more formalized documentation, more detailed QC plans, independent reviews, increased/dedicated oversight
  - Lower risk: less formalized documentation, standard QC, sufficient line management oversight
- Each system and subsystem shall evaluate activities, risks, and deliverables to determine the level of quality requirements needed.
- The PIP-II QA Plan incorporates requirements of the Fermilab *QA Manual Chapter 12070 – Graded Approach Procedur*e.

Special Aspects of the PIP-II Project

- PIP-II is the first DOE Accelerator Project with *significant* international in-kind contributions and work is spread across multiple continents in a variety of venues.
  - Transportation of critical components, such as cryomodules will be challenging.
- Critical in-kind contributions from international Partners creates several interfaces.
  - The technical complexity of the project includes five types of cryomodules.
- The Project requires a thoughtful and collaborative approach to roles and responsibilities with Partners.
  - It is imperative to find the right balance of collaboration.
- A collaborative, graded approach to QA will be applied to ensure requirements can be consistently and sufficiently met.

How Does PIP-II Plan to Address these Aspects?

Charge #6

- The PIP-II QA Plan is currently being updated and evolving to ensure quality expectations are clearly defined for effective communication and implementation.
  - Preliminary quality expectations and guidance for Partners have been defined in Appendix I of the updated QA Plan.
- QA is placed in the Technical Integration Group to ensure adequate quality in design and engineering, but also integrated in all aspects of the PIP-II Project such as Procurement and Risk Management.
- A Senior Quality Engineer will be added to the Quality function of the Project.
- There will be dedicated quality resources assigned to the L2 Systems starting with the SRF & Cryo Systems.
- Specific QA and QC guidance for L2s and L3s being developed.
- High-level Fermilab and Partner roles and responsibilities are being defined for various aspects relating to the Project.

Critical Quality Aspects with Partners

- **Communication**
  - PIP-II will define a Communication Plan to highlight how and when information will be transpired within the Project and with Partners, and in which forums.
- **Design / Engineering**
  - Design-related roles and responsibilities for the Project and Partners are being defined.
  - Gathering input from Partners to ensure compliance to International Codes and Standards.
- Configuration Management
  - Design change control approach is defined in the *PIP-II Systems Engineering Management Plan.*
  - PIP-II is developing a process to manage technical, cost, schedule changes with Partner involvement.
    - Expanding the Design Change Request (DCR) Board to include partners
    - Establishing International Change Control Board (iCCB) **BO - Merminga**
  - Configuration Management Plan is under development.

Critical Quality Aspects with Partners

- **In-Process Inspection and Testing**
  - Incoming and in-process inspection/test procedures to be defined by L3s in Quality Control Plans and Travelers.
  - PIP-II will collaborate with Partners to develop Manufacturing Inspection Plans (MIPs) including hold and witness points.
  - L2/L3s integrating routine vendor visits, hold, and witness points in QC Plans
  - Strongly considering PIP-II presence at Partner Institutions.
- **Acceptance Criteria**
  - Acceptance criteria to be defined collaboratively among L2/L3s and Partners with thoughtful planning and consideration of risks associated with Partner deliverables.
- **Nonconformance Reporting**
  - PIP-II will collaborate with Partners to establish how nonconformances will be captured, reported, and managed, including the development and implementation of preventive/corrective action plans.
- **Lessons Learned** Plenary - Adetunji
  - PIP-II has established an approach to incorporate lessons learned.
  - The process will be implemented with Partners to share and capture lessons learned.

Summary

- Quality Assurance and reliability are integral to the Project from the design phase through commissioning and transition to operations.
- Quality Assurance
  - is fully integrated in the PIP-II Project
  - is the responsibility of all members of the PIP-II Project Team
  - framework is being extended to include Partners, e.g. CCB → iCCB
  - expectations are being developed for Partners
  - requirements are being defined for vendors and subcontractors
- The PIP-II QA Plan is aligned with the Fermilab Quality Assurance Manual, DOE O 414.1D, and DOE 413.3B and on track to next phase of updates by CD-2/3a.
- Project quality documentation has been defined and on track to completion by CD-2/3a.
- Quality Assurance is critical to the success of the PIP-II Project.
- Thank you for your time and attention!