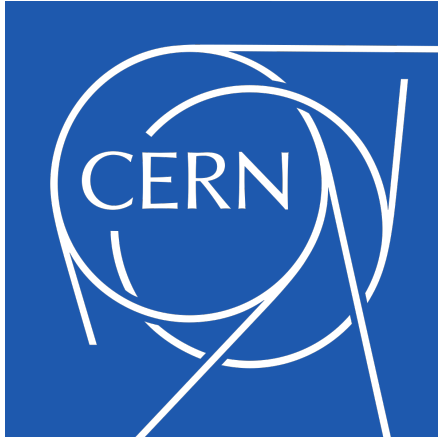




European Organization for
Nuclear Research



University of Tunis El Manar

PROJECT REPORT

Development of LS3 Technical Person Power Monitor Tool

*A Web-Based Solution for CMS Manpower Planning and
Institute Contribution Tracking*

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Engineering Degree

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European Organization for

Nuclear Research

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CMS

Internship Period:

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Acknowledgments

I express my sincere gratitude to my CERN supervisors Michele Bianco and Hussein Chameseddine for their technical guidance and expertise in CMS operations. I thank the CMS Technical Coordination Office, Resource Management team, and LS3 scheduling team for their valuable feedback during development.

1 LS3 Technical Person Power Monitor Tool

1.1 What is the Tool?

The LS3 Technical Person Power Monitor Tool is a web-based application designed to monitor and manage manpower needs for CMS Long Shutdown 3 (LS3) activities. It serves as a centralized platform to track technical resources and coordinate contributions from CMS institutes worldwide.

1.2 Purpose and Goals

Primary Purpose:

- Anticipate demand for technical manpower during LS3
- Facilitate timely calls for resources from Projects and CMS Institutes
- Provide real-time visibility into resource allocation and gaps
- Streamline coordination between central activities and institute contributions

Key Benefits:

- Eliminates manual spreadsheet tracking
- Reduces coordination overhead through automation
- Provides data-driven insights for resource planning
- Improves communication between stakeholders

1.3 Restricted Access and Users

The tool is accessible from CMSonline web pages with restricted access to authorized personnel only:

Current Authorized Users:

- **CMS Technical Coordination Office (TCO)** - Strategic oversight
- **CMS Resource Management (RM)** - Resource allocation decisions
- **LS3 Scheduling Team** - Detailed activity planning
- **Coordinator of P5 Activities** - On-site operations management

Development Team: The tool is being developed collaboratively by CMS Interns and Summer Students, working closely with experienced CMS technical staff to ensure it meets operational requirements.

1.4 Main Functionalities

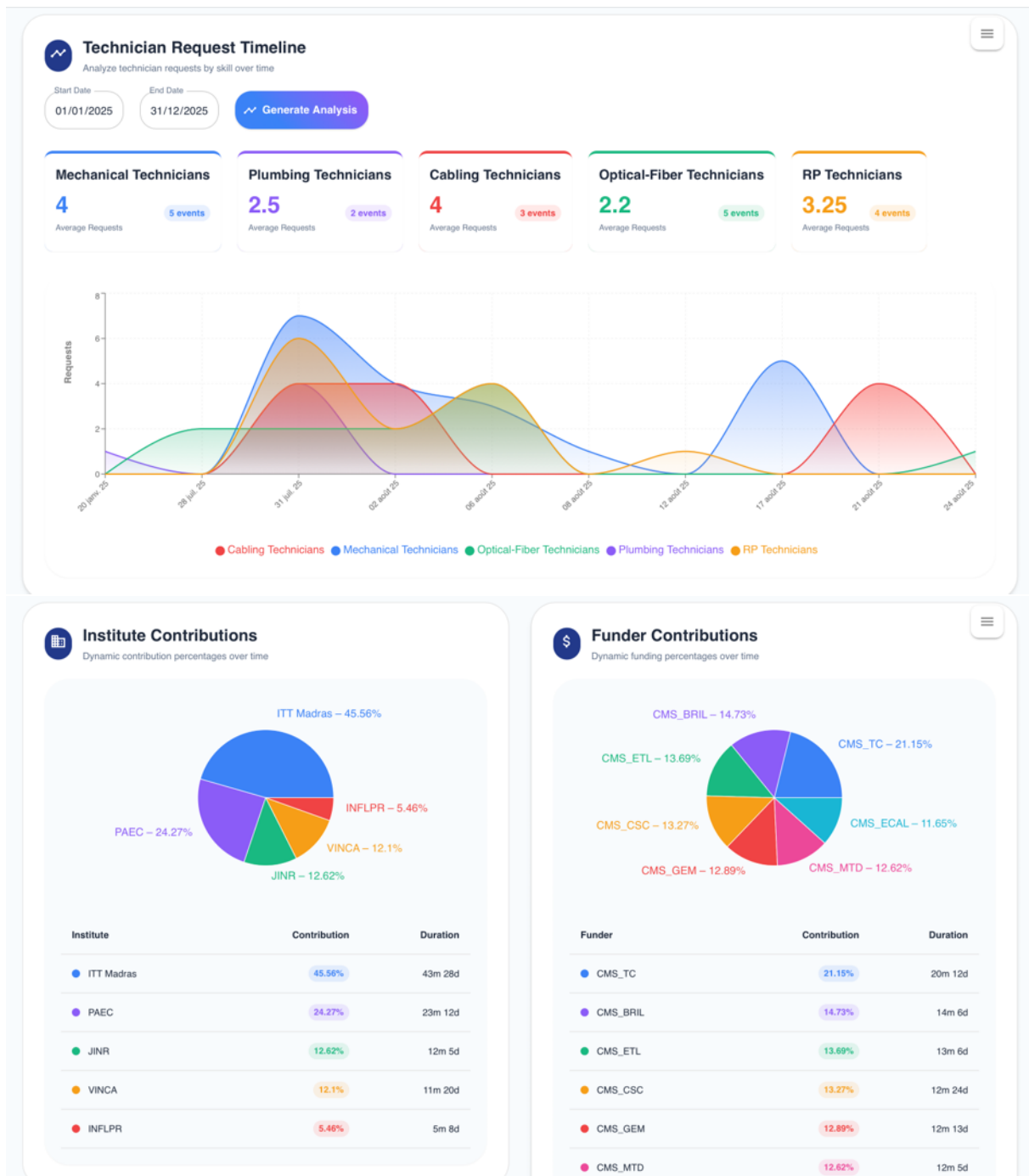
Core Features:

- **Calendar Interface** - Visual overview of scheduled technical activities
- **Resource Tracking** - Monitor technician allocations and availability
- **Gap Analysis** - Identify mismatches between demand and supply
- **Institute Contributions** - Track commitments from member organizations
- **Visual Analytics** - Clear indicators and summary statistics for decision-making

2 User Interface Overview

2.1 Main Dashboard

The dashboard provides an executive overview of all LS3 activities and resource status. Users can quickly assess the current state of manpower allocation and identify areas requiring attention.



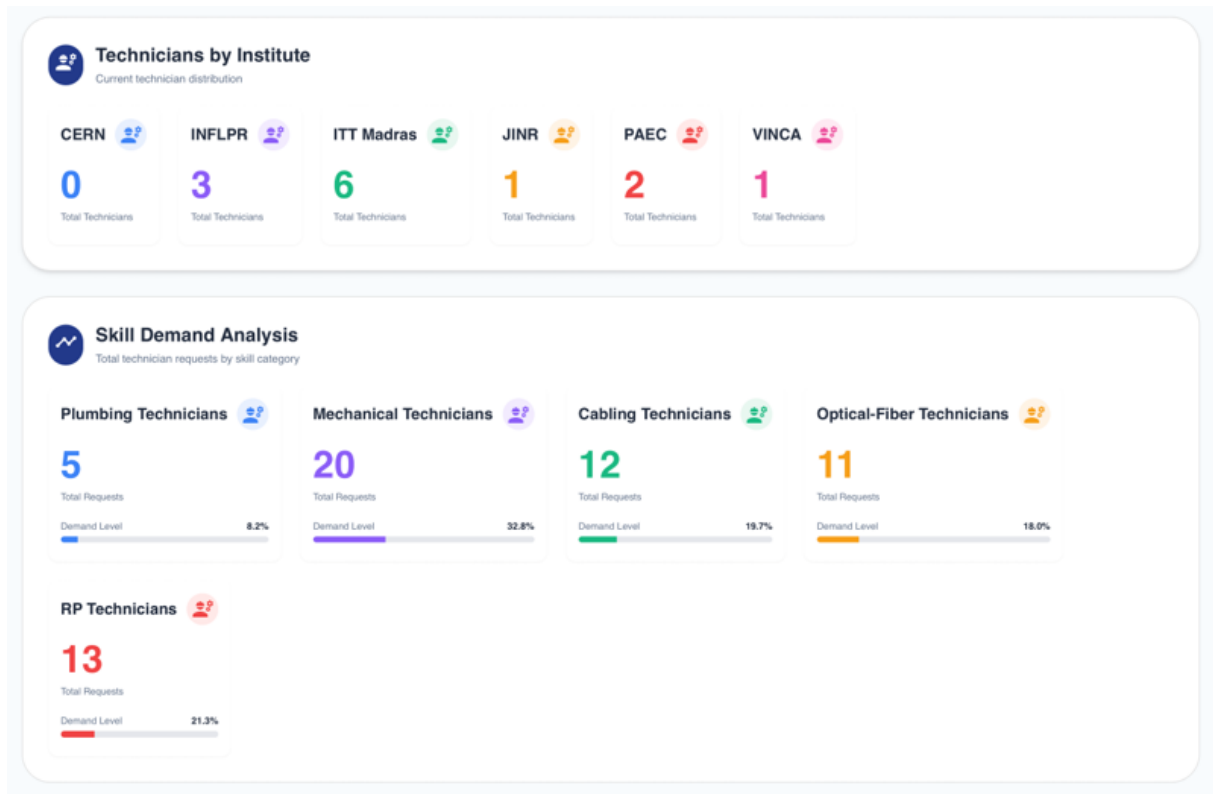


Figure 1: Main Dashboard showing activity overview and key metrics

Dashboard Features: This tool provides the ability to develop and display statistics of anything that might be found useful. Currently, we have the following:

- Technician requests timeline, showing average requests, peak requests, and the variation over time for each skill.
- Contributions from each institute in terms of duration of technicians provided.
- Contributions from each funder (CMS subdetectors) in terms of duration of technicians paid for.
- Total technicians provided per institute
- Demand analysis of each technician category/skill.

2.2 Calendar Management Interface

The interactive calendar allows users to visualize scheduled activities across different time periods and manage resource assignments through an intuitive drag-and-drop interface.

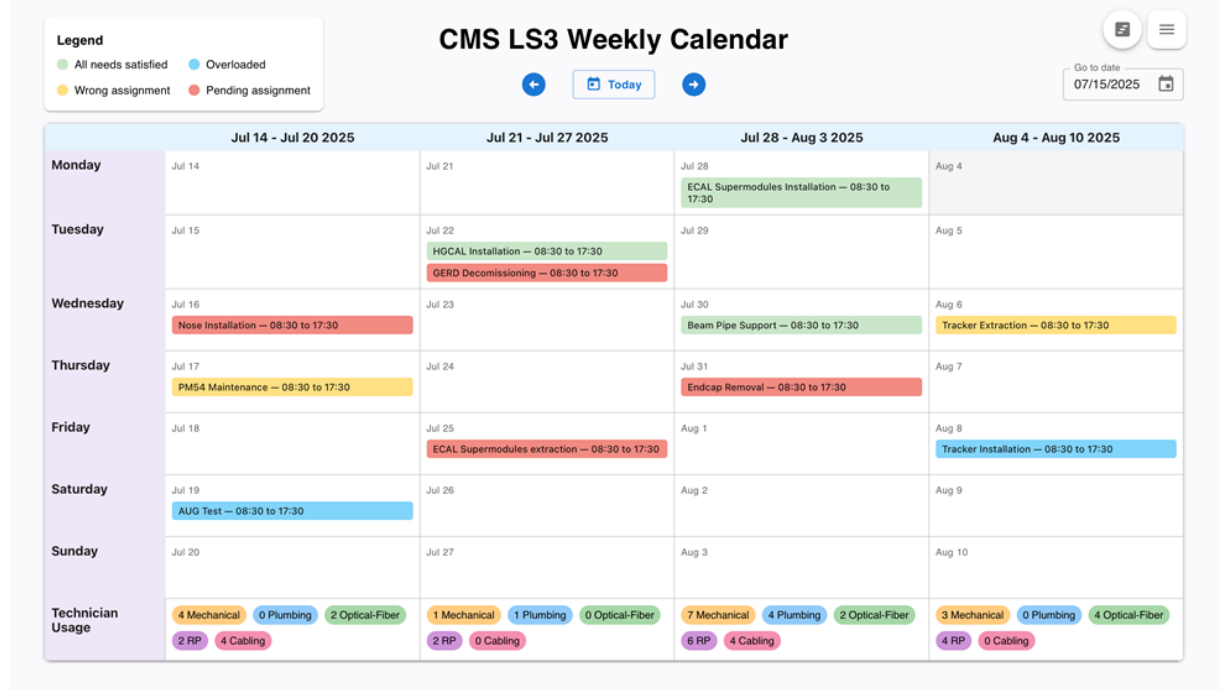
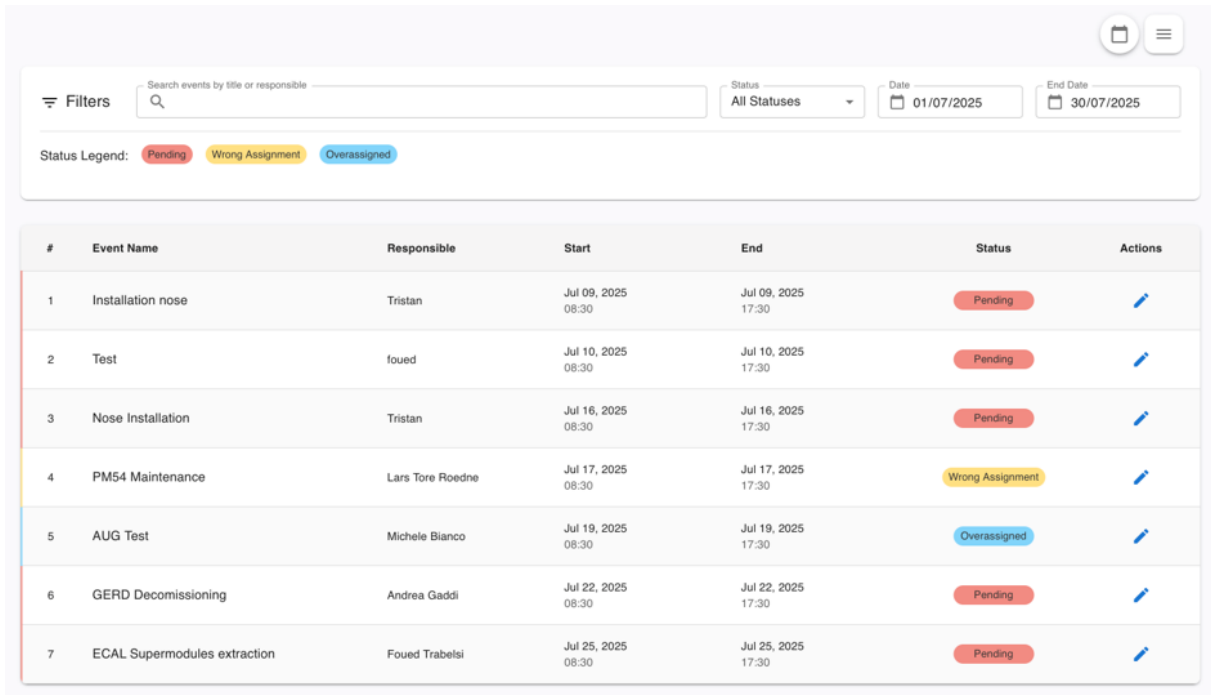


Figure 2: Calendar interface with scheduled LS3 activities

Calendar Features:

- Multiple view modes (month, week, day)
- Color-coded status indicators to imply if requested resources have been assigned:
 - Red – Pending assignment
 - Yellow – Incorrect Assignment
 - Blue – Over-assigned resources
 - Green – All needs satisfied
- At the bottom of each week, a Weekly Technician Usage Summary:
 - Indicates the number of technicians needed per skill
 - An algorithm that summarizes these needs to forecast our weekly technician usage.
- Filtering by activity type, location, or resource requirements
- Integration with personnel availability data

2.3 Table View



The screenshot displays a web interface for viewing a list of events. At the top, there is a header bar with a calendar icon and a menu icon. Below this is a filter section with a search bar labeled 'Search events by title or responsible', a status dropdown menu set to 'All Statuses', and date range selectors for 'Date' (01/07/2025) and 'End Date' (30/07/2025). A 'Status Legend' shows three categories: 'Pending' (red), 'Wrong Assignment' (yellow), and 'Overassigned' (blue). The main content is a table with seven rows of event data. Each row includes an event number, name, responsible person, start and end times, status, and an edit action icon.

#	Event Name	Responsible	Start	End	Status	Actions
1	Installation nose	Tristan	Jul 09, 2025 08:30	Jul 09, 2025 17:30	Pending	
2	Test	foued	Jul 10, 2025 08:30	Jul 10, 2025 17:30	Pending	
3	Nose Installation	Tristan	Jul 16, 2025 08:30	Jul 16, 2025 17:30	Pending	
4	PM54 Maintenance	Lars Tore Roedne	Jul 17, 2025 08:30	Jul 17, 2025 17:30	Wrong Assignment	
5	AUG Test	Michele Bianco	Jul 19, 2025 08:30	Jul 19, 2025 17:30	Overassigned	
6	GERD Decommissioning	Andrea Gaddi	Jul 22, 2025 08:30	Jul 22, 2025 17:30	Pending	
7	ECAL Supermodules extraction	Foued Trabelsi	Jul 25, 2025 08:30	Jul 25, 2025 17:30	Pending	

Figure 3:Table View

Table view Features:

- Displays events with incomplete/wrong technician assignments
- Designed to highlight which events still require actions
- Offering filters:
 - By status (e.g., pending, overloaded, and wrong assignment)
 - By date range
 - By keywords, event responsible, & event names via the search bar

2.4 Technicians Page

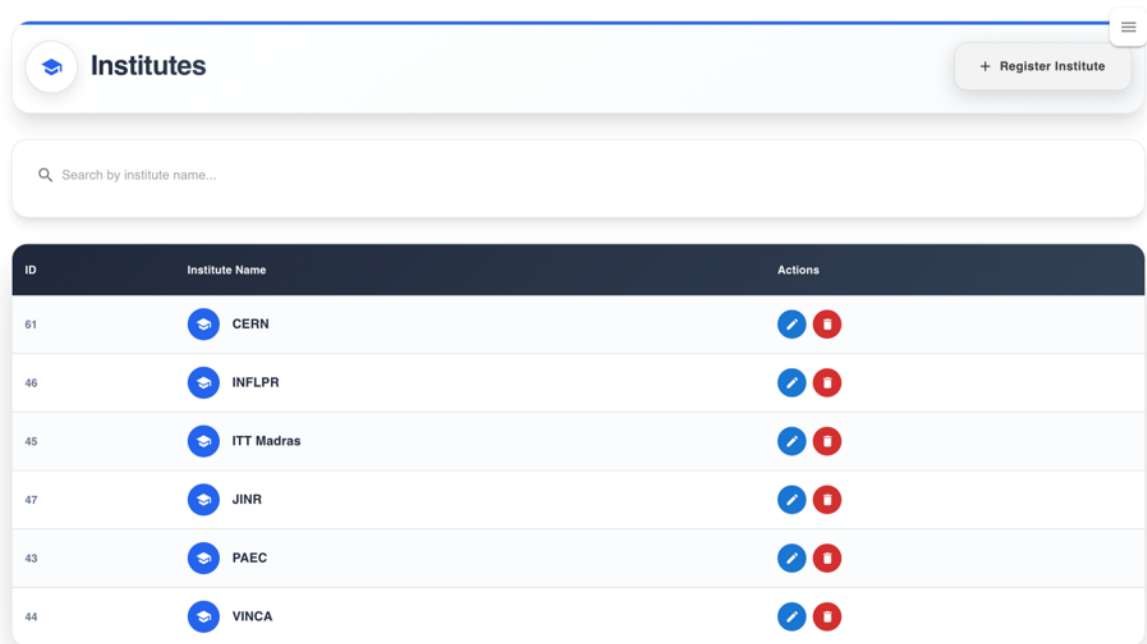
Technicians Management							
Search by name or email... All Skills							
Technician	Skill	Contact	Contract Period	Institute	Funding	Supervisor	Actions
Ali ID: 16688	Mechanical Technicians	2222222 -	31/12/2024 to 29/09/2025	ITT Madras	CMS_TC	Yes	 
Haidar ID: 16410	Plumbing Technicians	+216222453 hayder@gmail.com	31/12/2024 to 29/09/2025	ITT Madras	CMS_TC	Yes	 
Mateo Rossi ID: 10021	Plumbing Technicians	+9617223456 tech_plu_2@example.com	29/01/2025 to 31/12/2025	PAEC	CMS_ECAL	No	 
Sofia Alvarez ID: 10030	Cabling Technicians	+9617123456 tech_cab_1@example.com	01/01/2025 to 31/12/2025	PAEC	CMS_MTD	No	 
Michele Bianco ID: 13622	Mechanical Technicians	0041754110307 michele.bianco@cern.ch	30/06/2025 to 30/07/2025	INFLPR	CMS_ETL	No	 
Noah Schmidt ID: 10031	Cabling Technicians	+9617223456 tech_cab_2@example.com	01/01/2025 to 31/12/2025	ITT Madras	CMS_ETL	Yes	 
Hussein Chamseddine ID: 15874	Mechanical Technicians	+33 123456789 hussein.chamseddine@cern.ch	31/05/2025 to 30/07/2025	INFLPR	CMS_BRIL	Yes	 

Figure 4: Technicians Page

Technicians Page Features:

- All technicians displayed with their respective details
- Ability to edit information, delete technicians, or filter based on words or skills
- Ability to register new technicians with ease

2.5 Institutes Page



ID	Institute Name	Actions
61	 CERN	 
46	 INFLPR	 
45	 ITT Madras	 
47	 JINR	 
43	 PAEC	 
44	 VINCA	 

Figure 4: Institutes Page

Institutes Page Features:

- All institutes displayed with their respective details
- Ability to edit information, delete institutes, or filter based on words
- Ability to register new institutes with ease

2.6 Event Details Captured:

Edit Event

Start Date and Time: 07/22/2025 08:30 AM

End Date and Time: 07/22/2025 05:30 PM

Event Name *: HGCAL Installation

Event Responsible *: Tristan Loic

Additional Comments: This is a demonstration.

Needs

Select Skill: Amount: REQUEST

Mechanical Technicians: 1

Assigned

Assign Technician: Click to select technician...

ASSIGN

Mechanical Technicians (1)

Hussein Chamseddine (ID: 81)

DELETE CANCEL UPDATE

Figure 4: Event Page

Event Details Captured:

- Event start date & time – end date & time
- Event Name
- Event Responsible
- Additional Comments

2.7 Technician Planning:

Needs

The screenshot displays a user interface for technician planning. At the top, there is a section titled "Needs". Below this title, there are two input fields: "Select Skill" and "Amount". The "Select Skill" dropdown menu is open, showing a list of skills: Mechanical Technicians, Plumbing Technicians, Cabling Technicians, Optical-Fiber Technicians, and RP Technicians. To the right of the "Amount" field, there is a button with up and down arrows. Below these fields, there is a list of technician requests. Each request is represented by a colored bar with a corresponding skill name and a quantity. The requests are: Mechanical Technicians (pink bar), Plumbing Technicians (green bar, quantity 2), Cabling Technicians (orange bar), Optical-Fiber Technicians (purple bar), and RP Technicians (purple bar). Each bar has a close button (X) on the right. At the bottom of the interface, there are two buttons: "CANCEL" and "CREATE".

Select Skill

Amount

REQUEST

Mechanical Technicians

Plumbing Technicians

Cabling Technicians

Optical-Fiber Technicians

RP Technicians

CANCEL CREATE

Figure 5: Technician Component

Technician Planning:

- Specify the required technician skills (e.g., Mechanical, Cabling..)
- Define how many technicians are needed for each skill
- Each skill is defined by a color

2.8 Technician Assignment:

Assigned

Assign Technician

 Click to select technician...

Mechanical Technicians

Michele Bianco
ID: 141 Institute: INFLPR

Mechanical Technicians

Hussein Chamseddine 
ID: 81 Institute: INFLPR

Mechanical Technicians

Aisha Patel
ID: 41 Institute: VINCA

Mechanical Technicians

Mohamed

Mechanical Technicians

Figure 6: Technician Assignment Component

Technician Assignment:

- Select technicians from available pool, filtered by skill
- Match assignments according to the defined needs
- Technicians with time conflicts will not appear in the available pool
- Group supervisors are clearly marked with a red icon

3 Conclusion and Impact

3.1 Collaborative Development

This tool represents a collaborative effort between two students. Working closely with my teammate provided valuable experience in pair programming, joint problem-solving, and coordinating tasks in a small, focused development team.

Team Collaboration Highlights:

- Joint development efforts covering both frontend and backend features
- Regular progress reviews and discussions to refine functionality
- Iterative development approach to implement and test features efficiently
- Continuous exchange of technical knowledge and coding practices

3.2 Technical Learning and Growth

Developing this tool provided hands-on experience in enterprise-level web application development within a collaborative environment. The work involved integrating multiple technologies, improving development workflows, and applying best practices in modern software engineering.

Key Learning Outcomes:

- Full-stack web development
- Database design and optimization for complex scientific data
- User experience design for specialized technical users
- Integration with existing CERN infrastructure and security protocols

3.3 Future Impact

The LS3 Technical Person Power Monitor Tool will play a crucial role in ensuring the success of CMS detector upgrades and maintenance activities during Long Shutdown 3. By providing unprecedented visibility into resource planning and allocation, it will help optimize the utilization of technical expertise from institutes around the world.