Project Management Web Tools at the MICE Experiment

Linda R. Coney – UC Riverside
CHEP – May 2012
Outline

- **Intro**
  - MICE – the Muon Ionization Cooling Experiment

- Issues with collaborative work

- Redmine: project management tool

- Solutions: Redmine in MICE
  - Online Group
  - Operations Group
  - Speaker’s Bureau
  - MAUS – Software Group
  - Executive Board

- **Conclusions**
MICE:
Muon Ionization Cooling Experiment

MICE Goals:

- Design, build, commission, and operate a realistic section of cooling channel
- Measure its performance in a variety of modes of operation and beam conditions

...results will be used to optimize Neutrino Factory and Muon Collider designs.
Institutions worldwide are contributing to the demonstration of muon ionization cooling at MICE.
MICE: The Experiment

- The Collaboration:
  - ~150 members, 9 countries, 3 continents
  - Relatively small
  - Universities and labs widespread geographically and across time-zones

- Combination of particle physics and accelerator physics

- Based in the UK
  - Beamline at Rutherford Appleton Laboratory
  - Proceeding in step-wise manner as beamline and detector elements arrive and are installed

- Taking data!
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Collaborative Work

- **The problem:**
  - Communication primarily by phone and email
  - High turnover rate → poor information retention

- **Need**
  - Ability to easily communicate within global collaboration
  - Coordinate between collaborators separated by distance and time
  - Develop schedules
  - Task assignment
  - Develop institutional memory/history

- 1.5 years ago: head of Online Group
- 0.5 years ago: head of Operations Group

- *How can we do better and become more resilient?*
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The Solution:

- Open-source project management tool (like Trac)
- Written in Ruby on Rails
- Why Redmine?
  - Easy for all collaborators to use – undergrads to senior professors
  - Not necessary to be software expert
  - Clean and simple!
- Features:
  - Issue Tracker – with corresponding Gantt chart capability
  - Wiki
  - Document store
  - Online repository viewer
Redmine in MICE: 5 Examples

- Online Group
- Operations Group
- Speaker’s Bureau
- MAUS – Software Group
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Online Group – Overview

- **Information – wiki**
  - Overview of group responsibilities and membership
  - Organize regular meetings
  - Computing info – networking, access, equipment

- **Management tool**
  - Organize group efforts
  - Develop milestones and track progress
Online Group – Meetings

- Agenda
- Call-in info
- Talk upload by group members
- Minutes
- Easy, fast, reliable
- Also Analysis Group
Online Group – Issue Tracker

- Project management tool
Online Group – Issue Tracker

- **Management tool**
  - Add tasks as necessary
  - Any timescale – immediate intervention to long-range milestones
- **Track effort**
  - Function of individual or group effort
  - Aides in assignment of work
  - No confusion on who is responsible for what
- Privatize if contains sensitive info

- Allows universal group participation
- Maintain ability to prioritize
Online – Example Issue

Feature #665

RAL Facilities User Network in Lab7

Added by Coney, Linda 10 months ago. Updated 8 months ago.

Status: Closed
Priority: Normal
Assignee: MacWaters, Craig
Category: -
Target version: -

Start date: 08 August 2011
Due date: 12 September 2011
% Done: 100%

Description
We need access to the Facilities User Network in Lab7 for commissioning/cosmic ray testing of the trackers. Currently we have micenet access for the tracker DAQ - this is not for other network access. Mike Courtfield has approved Antony's plan for getting Facility User access in Lab7 - need to talk with Brit Jeeves of RAL Networking to finalize it. Need to purchase hardware and finish according to Antony's plan.

History

Updated by Coney, Linda 9 months ago

- Due date set to 12 September 2011

Would like to have this working when Alan Bross and Paul Rubinov come back to work on the trackers in September.

Updated by MacWaters, Craig 9 months ago

Port doublers received and request passed to PPD and onto RAL networks. It is out of my hands...

Updated by MacWaters, Craig 8 months ago

This is completed. Just remember to change the connected computer to DHCP to connect!

Updated by Coney, Linda 8 months ago

- Status changed from Open to In Progress
- % Done changed from 0 to 50

Excellent! I told Alan that we now have Facilities User network access in Lab7 and he was happy to hear it. They won't have to go back to Ridgeway to get on the network now! Is it obvious where they plug in? If they are plugging in their laptops, they're already configured as dhcp. Do they need anything else?

Updated by MacWaters, Craig 8 months ago

A white netgear 5 port switch with facility users written on it has been made available for connection. There are a few network cables already up there.

Updated by Coney, Linda 8 months ago

- Status changed from In Progress to Closed
- % Done changed from 50 to 100
Online – Example Issue #2
Bug #638

need new fuse on DAQ rack 1 NIM Crate

Added by Coney, Linda 10 months ago. Updated 6 months ago.

Status: Closed
Priority: Normal
Assignee: MacWaters, Craig
Category: -
Target version: -

Description
wrong kind of fuse is on this rack

History

Updated by MacWaters, Craig 9 months ago

Fuse supposed to be 4Amp on mains supply. 6Amp slow blow is installed yet we’ve still got MCB tripping problem.
Changed controller/fan tray and still problem persists. This did at least allow us to turn this unit on/off at the front as previous controller switch was bust.
Only real issue can now be inrush current due to typical old psu problems like aged capacitors.
Changed power supply for a typical Camac model and all is now ok. Only thing is camac psu has 6 & 24V and old nim had 6/12/24V.
Need to check that none of the modules use 12V. Looking at front as far as I could tell all leds looked good. Think only using 6V line

Updated by Coney, Linda 9 months ago

Due date changed from 10 August 2011 to 19 September 2011
Status changed from Open to In Progress
% Done changed from 0 to 50

Changed due date to 19th Sept. The target guys will need this crate/rack to be working reliably if they want to test the new target after installation in ISIS. Target installation scheduled to begin on 12th September.

Updated by MacWaters, Craig 8 months ago

12V psu voltage was required! Have put the original unit back in that has a slight inrush problem.
Steady state operation is fine for the while. I need to replace this PSU very soon. I have a new NIM crate and PSU in R9.

Updated by Coney, Linda 6 months ago

Status changed from In Progress to Closed
% Done changed from 50 to 100

DONE - Entire crate was replaced with brand spanking new Wiener PS provided by Maurizio last spring.
Looks fine - will test by running DAQ next week.
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Operations – Wiki

Operations Wiki

Operations Meetings
Meetings to discuss issues specifically related to MICE Operations.

MICO Meetings
- Wednesday 14th December 2011 at 16.30 GMT

Other Operations Meetings
- Monday 12th December 2011 at 15.00 GMT
- Run Plan Mtg [22 March 2012]

Running
- Beamline Optics
- Web Whiteboard - list of issues to read before calling experts while running
- Safety
- Fire alarms in MICE hall
- Computing Information
- Control Room (MLCR)
- Rack Room
- Hall preparation list - actions needed in advance of running
- Guide to ISIS Machine physics
- Daily Shift/Run Plans

MICE Shifters
- The Unofficial Guide to being a Shifter
- First shift guide
- Draft comments on Shifter Training

MICE Operations Managers (MOMs)
- Information needed for the next MOM

redmine
- Updating Documentation

Steps of MICE
The definitions of the steps of MICE can be seen in the schedule.

Step 1
- Post-partum information
### Operations – Run Plans

#### Pion Beamline Configurations:

| Particle Species | P at Tgt | p@D1 | p@D2 | p@Tof | Proton Absorber | Q1 | Q2 | Q3 | D1 | D5 | D2 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Ran? | Similar Run(s) |
|------------------|----------|------|------|-------|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|-----|----------------|---------------|
|                  | MeV/c    | MeV/c| MeV/c| MeV/c | mm              | A  | A  | A  | A  | A  | A  | A  | A  | A  | A  | A  | A  | A   | Y              | 3411          |
| Pion             | 158.1    | 152.4| 148.0| 143.4 | 15              | 38.72|38.28|33.52|115.53|250.82|59.71|97.17|130.3|86.05|63.76|95.56|80.51|Y               |               |
|                  | 200      | 195.4| 192.1| 180   | 15 (ideal=5)    | 49.5 |61.8 |43  |147.2|322 |76.7 |127.1|170.5|112.9|104.1|157.3|134 |               | 3607-3609 but w/o D5 |
|                  | 272.42   | 268.67|265.98|263   | 29              | 68.9 |84.9 |59  |203  |443.1|104.8|176.8|237.1|157.2|157.6|238.5|203.7 |Y               | May 2012 Ref Runs |
|                  | 286.3    | 282.6| 280  | 277   | 29 (ideal=20)   | 71.5 |89.3 |62.1|214.1|466 |110.1|186.3|249.8|165.6|167.3|253.2|216.3 |               | 3454,3455      |
|                  | 300      | 296.4| 293.8| 291   | 29 (ideal=20)   | 74.0 |93.6 |65.1|225.3|489 |115.4|195.5|262.2|173.9|176.7|267.4|228.5 |               | 3610 but w/o D5 |
|                  | 316.1    | 312.6| 310  | 307   | 29 (ideal=25)   | 79  |98.7 |68.7|238.7|516 |121.5|206.4|276.8|183.6|187.7|284.1|242.7 |               | 3504,3505      |
|                  | 346.8    | 343.4| 341  | 338   | 29 (ideal=35)   | 86.8 |108.4|75.4|265.2|566.5|133.2|227.1|304.6|202.1|208.5|315.6|269.7 |               | 3457           |
|                  | 367.8    | 364.4| 362  | 360   | 29              | 92.1 |115 |80  |284.1|601 |141.2|241.2|323.5|214.6|222.5|336.9|287.9 |               | 3426,3427      |
|                  | 400      | 396.7| 394.3| 392   | 83 (ideal=64)   | 100.2|125.2|87.1|314.7|654 |153.6|262.8|325.2|233.9|243.9|369.3|315.7 |Y              |               |
|                  | 428.6    | 425.3| 423  | 421   | 83 (ideal=70)   | 107.4|134.2|93.4|343.5|702 |164.7|282 |378.2|251 |262.9|398 |340.3 |               | 3487,3488      |
|                  | 450      | 446.7| 444.4| 442   | 83              | 112.8|141 |98.1|366.2|737 |173.1|295.4|397.5|263.8|277 |399 |358.7 |Y              |               |

#### Muon Beamline Configurations:

| Particle Species | p@Tgt | p@D1 | p@D2 | p@Tof0 | p@Diffuser | Proton Absorber | Q1 | Q2 | Q3 | D1 | D5 | D2 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Ran? | Similar Run(s) |
|------------------|-------|------|------|--------|------------|-----------------|----|----|----|----|----|----|----|----|----|----|-----|----------------|---------------|
|                  | MeV/c | MeV/c| MeV/c| MeV/c  | mm         | mm             | A  | A  | A  | A  | A  | A  | A  | A  | A  | A  | A   | A   | DAQ run # |
| Muon             |       |      |      |        |            |                | A  | A  | A  | A  | A  | A  | A  | A  | A  | A   | A   |               |

E. Coney – CHEP 2012
Operations:
Run Planning in Redmine

- Recent data-taking period to commission new detector and integrate into overall DAQ

- **Use Redmine to:**
  - organize commissioning schedule
  - determine physics plan
  - Keep track of equipment readiness
  - Schedule availability of operations staff

- Evolved over time – input from multiple individuals
  - Initial version implemented by primary experimenter – SciFi Tracker Group
  - Supplemented by MOM, BLOC, Shifters
Operations: Run Planning in Redmine

- **Improved communication**
  - Viewed by Hall contractors – no access during running → need make arrangements

- **Eased scheduling of shifters**
  - Able to check schedule and sign up for available shifts
  - Already know when arrive, what planned, what expecting

- **Provides permanent record**
  - Daily plan shown
  - Beamline configurations clearly shown
  - Next time take data – easy to determine what was done

- **Simplify MOM (MICE Operations Manager) handover** – no doubt regarding what had happened
Redmine & Operations Managers

- **MOM handover**
  - Serve for 1 month – Multiple people/year – high rate of turnover

- **Difficult to develop “positional memory”**
  - Need record of work done, problems solved, problems
  - Paper handoff failed repeatedly

- **Use Issue Tracker – always know what needs attention**
  - Prioritize – high, normal, low
  - Successive MOMs contribute – develops history on each issue

- **Allows intervention by several people while maintaining knowledge of past actions**

- **Use member-only features for sensitive information**
  - Private or public issues
Operations – Documentation

MICE » Operations

Documents

User documentation

Step 1 Post-Partum Action Items
10 September 2010 14:47
Compiled by C. Rogers, these are the action items resulting from the step 1 post-partum meeting.

Luminosity Monitor Operating Instructions
29 September 2011 02:33
Instructions on how to turn on/off lumi.

Shifter Instructions for Running the MICE
18 April 2012 04:25
Operations instructions for shifters and some online plots onto tape.

How to Set the DAQ Spill Gate
30 September 2010 19:24
Describes how to check and adjust the DAQ Spill Gate.

Magnet Checklist
29 September 2011 03:20
Checklist used when turning on any of the magnets.

How to Change the Particle Trigger Counters
12 July 2011 16:49
Operations instructions explaining how to change the Particle Trigger Counters.

Online Monitoring Instructions
06 December 2011 20:35
User instructions describing how to start the online monitoring.

Beamline Magnet Instructions
26 September 2011 23:43
Instructions on how to use the target beamline for testing and operation of the target.

CKOV HV Settings
06 December 2011 21:45
Up to date (as of 1 Dec 2011) values for the HV on each CKOV channel.

Target Operations Checklist
12 December 2011 19:31
Checklist to be used ONLY BY EXPERT to start up & shut down the MICE Target.

Controlled Access Checklist
06 December 2011 23:56
Checklist with instructions on how to prepare for a Controlled Access into the MICE Hall using the MICE Hall PPS, and on how to then return to Target operations after the Controlled Access has been completed.

MICE PPS User Guide
16 May 2012 19:04
Description of the functional operation of the MICE Search and Controlled Entry systems. Includes steps necessary for searches of the MICE Hall and entries using the PPS. Does not specify how to implement effective searches of the MICE areas so MICE equipment can be operated without harm to personnel.

Technical documentation

Luminosity Monitor Manual
28 September 2010 19:19
Detailed description of Luminosity Monitor including motivation for use, design and operation.

Novel Ites Manual
18 April 2012 04:26
Provides detailed information on what the MoveItes script does and explains the filename convention used by the script. The script must be followed by developers creating additional online output plots in the future. Updated 10 February 2010.

Alarm Handler Manual
30 September 2010 19:56
Describes the use of the Alarm Handler and how it is used to monitor and monitor of hardware systems using EPICS.

Old Target Instructions & Manuals
29 November 2011 19:04
ONLY FOR ARCHIVE PURPOSES.
Instructions for operation of OLD target controller system. Includes manual and operating instructions for TS60 programmable delay generator which is no longer in use.
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### List of MICE Presentations

#### Guidelines for Adding Your Own Talk or Poster

A separate page on the wiki has been created for hosting your source files (link) please upload all material there. When linking to your source material in these tables please copy the link generated from that page. Further instructions are available at the hosting page.

#### List of MICE Talks

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<th>Conference</th>
<th>Name</th>
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<th>Date</th>
<th>Title of Talk</th>
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<td>TBA</td>
<td>NOW 2012</td>
<td></td>
<td>Otranto, Italy</td>
<td>8-15 Sep 2012</td>
<td>Progress of MICE, the International Muon Ionization Cooling Experiment</td>
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<td>Kyoto, Japan</td>
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<td>New York, USA</td>
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<td>CERN, Switzerland</td>
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<td>MICE: final goals and steps to completion</td>
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Redmine & Software Group

- Classic use of redmine
- software engineering
- Link in continuous integration
- Issue tracker (ie. bugs)
- Organize meetings
- Online Bazaar Repository Viewer
Redmine & Executive Board

- Used for tracking actions
- Keeping minutes of regular meetings
- Disseminate information to the collaboration
- Easy to use!
Redmine Overall

- Matches well with the detail-oriented engineer/physicist
- Easy to use – widespread participation
- Better information retention and communication
- Allows structured tracking of effort
- Have a searchable record of work
Summary & Conclusions

- Extremely valuable tool for small collaboration
- Enable global cooperation on tasks across the board
- Visit us at mice.rl.ac.uk
MICE: Design

- **MICE is designed to produce a 10% cooling effect on the muon beam**

- Use particle detectors to measure the cooling effect to 1%

- Measurements will be done with muon beams having momentum of 140 MeV/c – 240 MeV/c

**Method:**
- Create beam of muons
- Identify muons and reject background
- Measure single particle parameters $x$, $p_x$, $y$, $p_y$, $p_z$
- Cool muons in absorber
- Restore longitudinal momentum component with RF cavities
- Identify outgoing particles to reject electrons from muon decay
Redmine & Operations Documentation

- **Crucial to maintain up-to-date operations documentation**
  - Run checklists for MOM, BLOC, use of PPS
  - Shifter operations instructions
  - Manuals for detectors, beamline elements, DAQ, C&M, Online Reconstruction, Data Transfer

- Anything related to Operations must be actively maintained