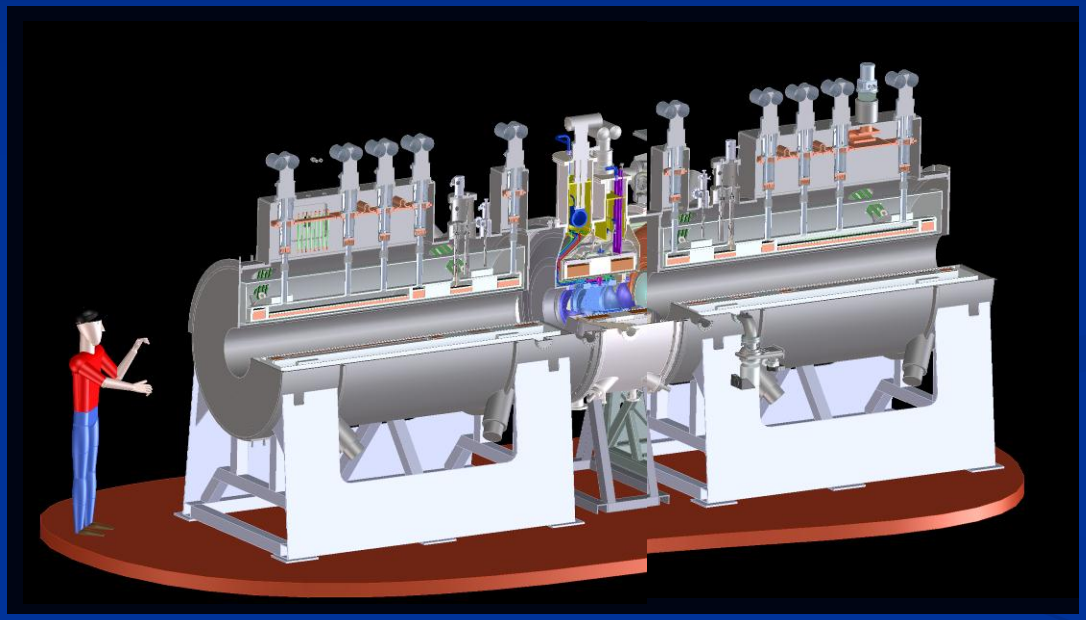
Operations Summary



L. Coney – UCR

MICE CM34 – Oct 2012

Online Updates – New DAQ

Migration from DATE v6.49 to DATE v7.34

- The existing (Date v6.49) Configuration Data Base has been transferred, modified and upgraded in order to be used in DATE v7.34.
- The old equipment list code has been modified in order to be compatible with the changes in the data format and readout loop in DATE v7.34.
- All DAQ machines reinstalled with SL 5.7 and DATE v7.34.

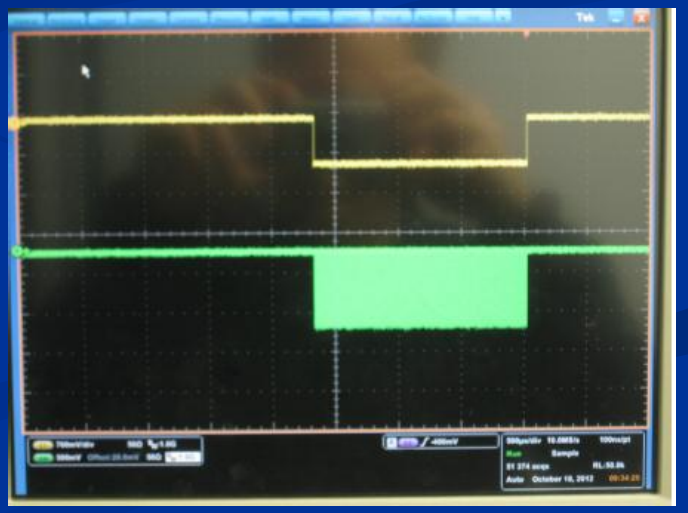
And the old DAQ system was destroyed. No way back...

But not only this...

- Additional modifications of the equipment list code have been made in order have better separation between the DATE implementation of the readout loop (written in C) and the implementation of the code of the MICE DAQ equipments (written in C++).

DAQ

- DAQ
  - New DAQ in place
    - Implemented new acquisition library independent of DATE and EPICS – leads to flexibility and is easy to use
    - Written simple applications for use in the control room
    - Have thin C++ wrapper of EPICS – flexible/easy – also independent of DATE and DAQ hardware
    - Communication with CDB done by Controls & Monitoring (Run Control)
    - At end – interface with DATE
  - New zero suppression of fADCs
  - Very high DAQ rate now possible
  - New pulser trigger available



DAQ

- DAQ can now handle rates above the initial 600 muons/spill goal
- New software/hardware system in place, debugged, tested, and functional
- All that remains on Yordan's Christmas list for the "PID" DAQ is the programmable FPGA logic for the particle trigger
  - And the EMR and Trackers…

Online Systems Updates – C&M

- Been very busy since Glasgow
  - Target
  - Daresbury C&M
  - Spectrometer Solenoid
  - LH2 Monitoring
  - Run Control
  - RF Tuners
  - Auto-SMS notification
  - More system monitoring
  - State Machines

C&M - Target

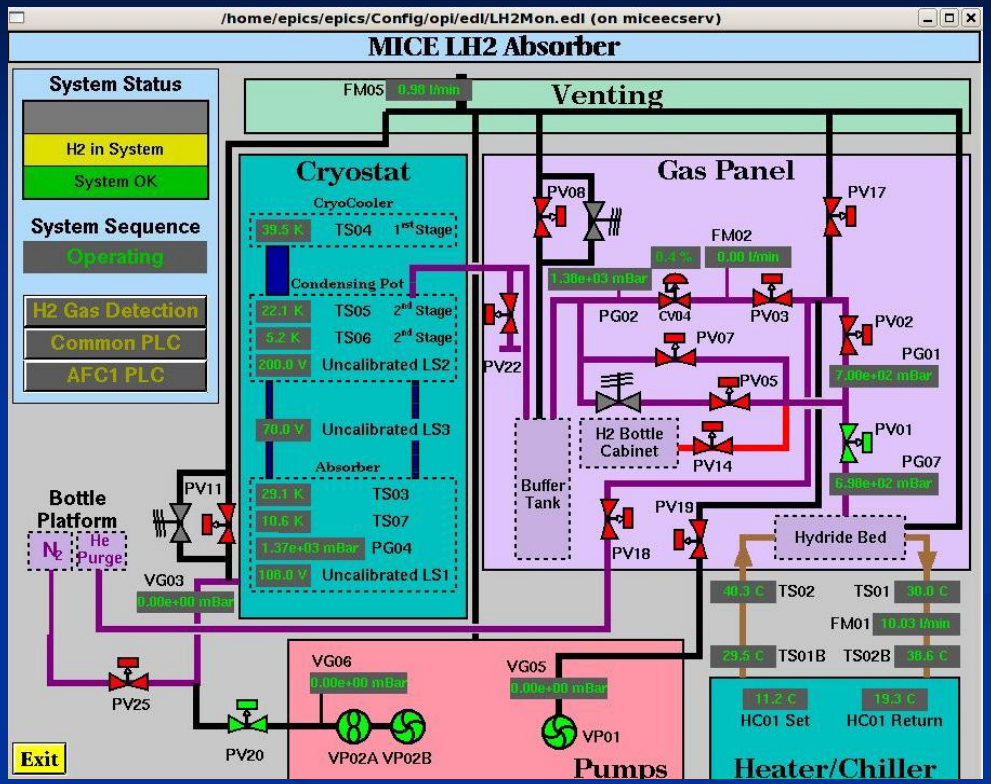
- Rewritten Target C&M system
  - Better EPICS compliance
  - Web interface
  - CDB compatible
  - Online analysis
  - Run priority
  - Root file output
- Making similar changes to Tracker system

C&M

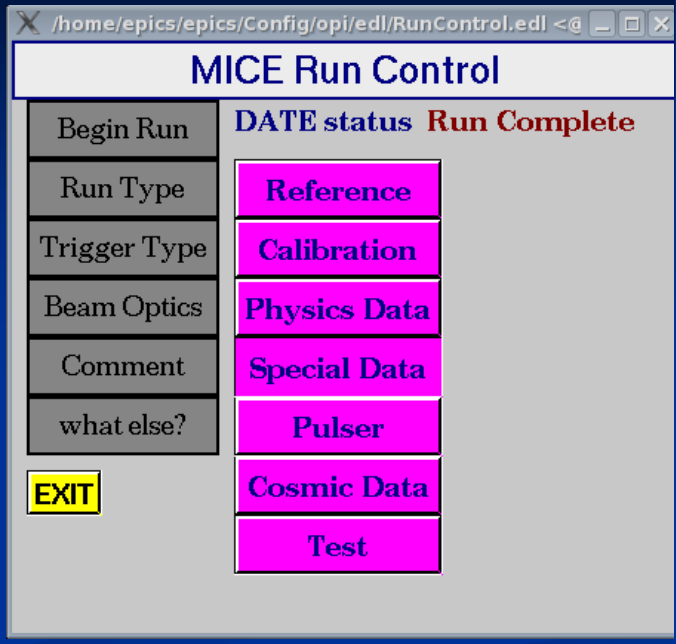
- DL
  - SS standalone system being used
    - Being improved for final SS training
  - FC standalone ready

C&M

- LH2
  - Monitoring
  - Archiving
  - Control expert only
- RF Tuners
  - Resonant frequency depend on geometry
  - Change cavity shape
  - Controls system



C&M – Run Control



- Interfaces with:
  - DATE
  - TargetMon
  - State Machine
  - Environment
  - Standard operation
  - Records all running parameters to CDB
  - Records all meta-data at end of run
  - Verifies readiness of subsystems
  - Sets running parameters
  - Tags run parameters

Elog Changes

- Modifications to improve ease of use and understandability – see Henry for input to new system

Types:

Routine
Warning
Error
Problem Fixed
Reference
Calibration
Other

Test (?)
Safety (?)

Categories:

Hall infrastructure
Shift
Target
Beamline
Cryogenics
LH2
RF
SC Magnets
Detectors and DAQ
Controls and Monitoring
Computing/Grid
Consumables
Control Room
Target R78
Other

Not sure about:
Cooling Channel
Environment
Machine Physics
MOM daily summary (?)
PPS
R9 Testing (?)
Safety
Services

Step IV: Operations & Online

- Moving toward Step IV running
  - Many configurations to test/run
  - Long term running/every opportunity taken
  - All ISIS cycles – every day – Differs from past Operations
  - Develop idea of not-so-remote control room
  - Develop plan for staffing & commissioning of cooling channel
- Develop robust system of Operations
  - Includes all facets of Online Group (DAQ, C&M, Online Reconstruction/Analysis, Infrastructure)
- Goals – next phase of Operations
  - Functional
  - Safe/Secure
  - Reliable
  - Easy to use

Step IV: Operations & Online

- Functional
  - DAQ – incorporate all detectors – improve rate
  - DAQ upgrades
  - All C&M for each element
  - Alarm Handler values set appropriately
  - Add capability to Online Reco/Analysis
  - Automate run infrastructure – Run Control
  - Automatic use – read/write to Configuration Database

- Safe/Secure
  - Incorporated fully commissioned PPS
  - Implemented formal shifter training
  - Updated Operations/Online documentation & instructions
  - Developing comprehensive list of safety-critical maintenance
  - Updating safety paperwork – developing overall system for MICE
  - Using new target controller with all necessary interlocks & BPS
  - Online system security reviewed – improvements made
  - Access limited to micenet

Step IV: Operations & Online

- Easy to use
  - Simplified Ops procedures – single key exchange ISIS
  - MICE control access to Hall
  - Improving Online Reconstruction/Data Quality plots
  - Need add Online Reco for KL/EMR/Accel Analysis
  - Run Control
  - Mature Alarm Handler
- Reliable
  - New OS implemented – automatic updates
  - Automatic/systematic backups in place
  - New DAQ and C&M computers installed
  - UPS coverage for critical systems
  - Developing "stockroom" of spares – crates/computers/etc
  - Automatic write to EPICS Archiver
  - Extensive remote monitoring of equipment/computers/hardware/environment in EPICS
  - Archive of all software – Launchpad repository

Organization & Preparation

- Micemine Run Plan worked well – schedule & plan
- http://micewww.pp.rl.ac.uk/projects/operations/w

Daily schedule

October	Fri 12	Sat 13	Sun 14
estimated hours	noon - 8pm	10- 7pm	10 - 7pm
MOM	Gamet	Gamet	Gamet
Lead shifter	Heidt	Heidt	Hanlet
Shifter 2	Dobbs	Hanlet	Taylor
Shifter 3	Hanlet	Taylor - post training	Dobbs?
BLOC	Coney	Coney	Coney
SOC	See Below	See Below	See Below
Experimenter	Karadzhov/Hanlet	Hanlet	
Aim	Target run-in	Run Control test	Reference Run
	DAQ operation test	CDB	Proton absorber data
	Run Control	Online Plots	D1 scan data ~ 2 hrs
	Reference Run/Online Plots	Reference Run -> archive Online Plots	
	send data -> Janusz	Zero Suppressed DAQ?	pion beam - Q789 OFF
		Proton Absorber Data	
Beam?	Yes - pion beam	Yes	Yes
Additional Personnel	Yordan, Chris Rogers	Durga by phone	

Need New/More Shifters

- Recognized the need for training – now need to implement training
- Difficult to do while running – difficult to properly train w/o running
- Need some training w/o beam but with equipment
- Develop training schedule
  - Corollary – develop training updates when new equipment arrive
  - Need all MOMs able to lead/arrange training
- Sign up more MICE – THIS MEANS YOU!
- Cannot exploit tiny group of (primarily UK-based) dependable individuals
- This becomes even more true for Step IV running

Goals of Running

- Test significant upgrades and changes to both the Online Systems and MAUS software packages – NOT to take data

- Overall Online
  - New OS installed on all MLCR computers
  - New master server, new account setups, new UPSs
- DAQ
  - Final live data test of new DAQ system – upgraded DATE & OS
  - New interface with C&M
  - New DAQ hardware
- C&M
  - Full read/write from CDB
  - Overall system test of Step I Run Control
  - Expert testing/feedback on Run Control
  - New HV user docs
- Software
  - Online test server setup functional
  - New control room branch of MAUS
  - Improved TOF/CKOV online plots

Goals of Running

- DAQ – Yordan's talk
- C&M – Pierrick's talk
- Software – Chris Rogers' talk this morning

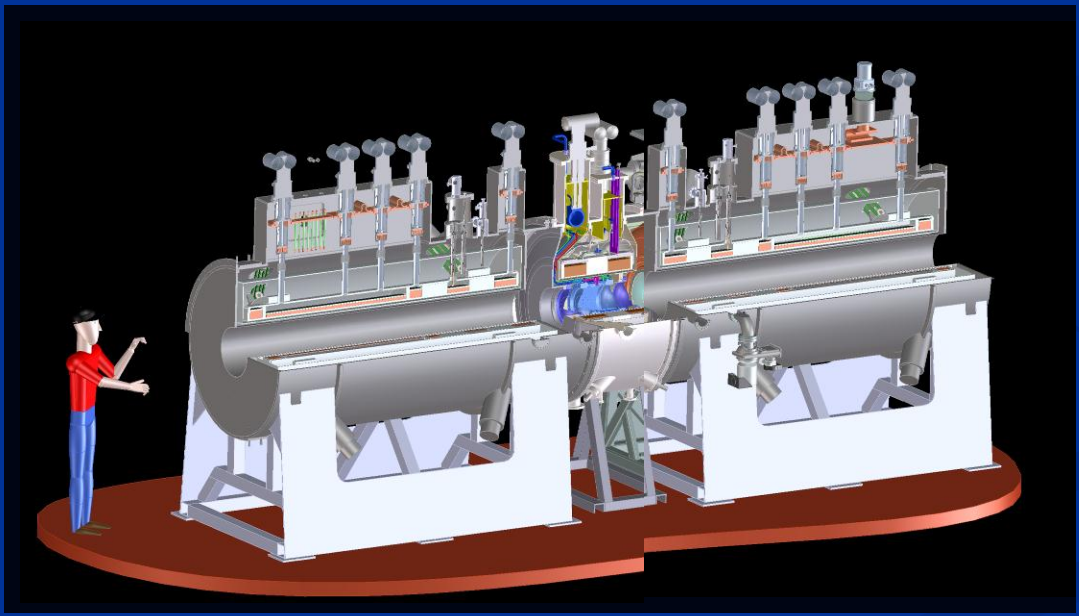
- Mixed results – confirm that we DO need regular running
  - Partially successful
  - Unfortunately – not smooth run – while this was expected due to the many changes, many of the problems were not anticipated
  - No real useful data until Sunday….although this was not the goal of the run

Way Forward..

- We are making progress
  - Previously we were focused on getting the basics going – Implementation of necessary functionality
  - Now – move focus to *reliability*
- Need to ***KEEP THINGS WORKING!***
- Schedule regular 3-day weekend runs
- MAUS – already using "release" system of changes
- C&M
  - need do same with the controls and monitoring code
  - Stabilize applications
  - Development computer/system separate from iocpc1/iocpc2
  - Coordination between C&M developers *must* happen
- DAQ – staged upgrades – especially with new equipment

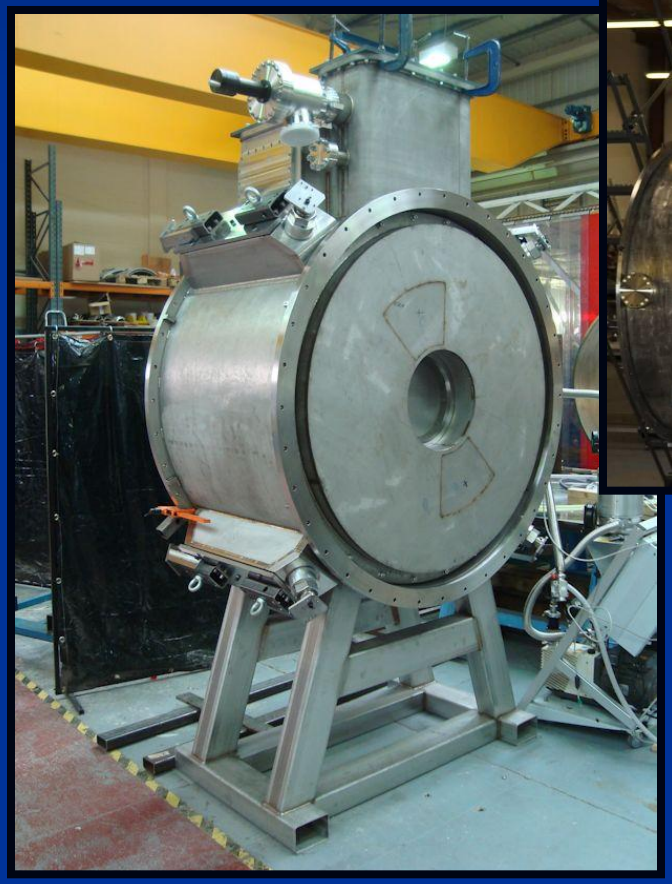
MICE Step IV

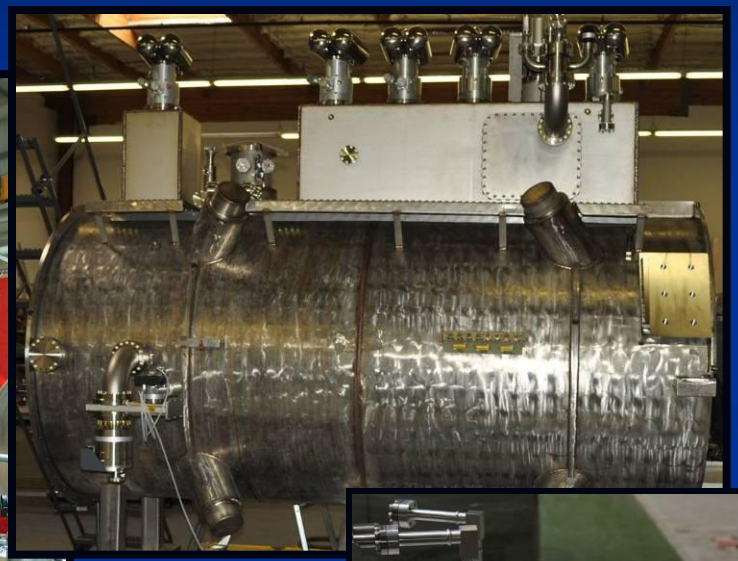
- Includes both Spectrometer Solenoids
- Two trackers installed within the SS magnets
- One AFC (Focus Coil magnet & Absorber)



Step IV Ops – New Equipment…

- We will have much more in the Hall!





Step IV – Operations

- Continue:
  - Pre-run prep
  - Further simplify running
- Improve:
  - Automate procedures → fewer errors
  - Move from spreadsheet → only ConfigDB
  - Increase Online Reconstruction capabilities
    - Complete suite of detectors, Online analysis, Global reco
  - Reduce required number of shifters…

- New equipment arriving – plan for commissioning, support & expertise
- Modify procedures to include SC magnets and LH2 system
- Train shift personnel
  - Develop plan to staff multitude of shifts

Step IV – Operations

- Safety
  - Need understand implications under STFC rules of new equipment
  - Made arrangements to meet with Jane Vickers (ISIS safety) to begin preparation/planning
  - Need understand from experts what each system entails/requires for operation
- PPS
  - Need understand implementation of system with SC magnets and LH2 system
- Hall Access
  - Limited – not every day – scheduled access only
  - Increase efficiency of data-taking
  - Hall search dropped *twice* in 3 days last weekend. Not acceptable.
- Experts must be available

Operations Organization

- Overall Operations Manager
  - Local, familiar with STFC safety and operational systems
  - Provide oversight, link between MOMS, safety responsibility from project manager
- Monthly MOMs
  - On call for 1 month – Daily running duties as now
- MICE Shift personnel
  - Currently 2 shifters for ~8 hour shift
  - Prefer to move to 1 MICE shifter
- Current on-call experts – BLOC, SOC, TROC
- New system-specific experts – 3 per system – not necessarily current MICE
  - Magnet & cryo experts – maintenance of magnet systems, manage cryogens and vac pumping rigs & instrumentation, cooling and powering expert, quench behavior expert
  - LH2 expert – control engineering knowledge, safety procedures

Step IV Operations

- Given current MICE schedule for Step IV equipment and installation…
- We *must* be prepared for 24/7 running in order to get Step IV data before ISIS shutdown in August 2014

- Can our systems handle this?
  - Target ok? Magnets ok?
  - DAQ ok? Controls ok? Datamover ok?
  - Shift coverage ok?

- Another reason to limit Hall access.