Imperial College London

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24 February, 2014

Spokesman's introduction:

Contents:

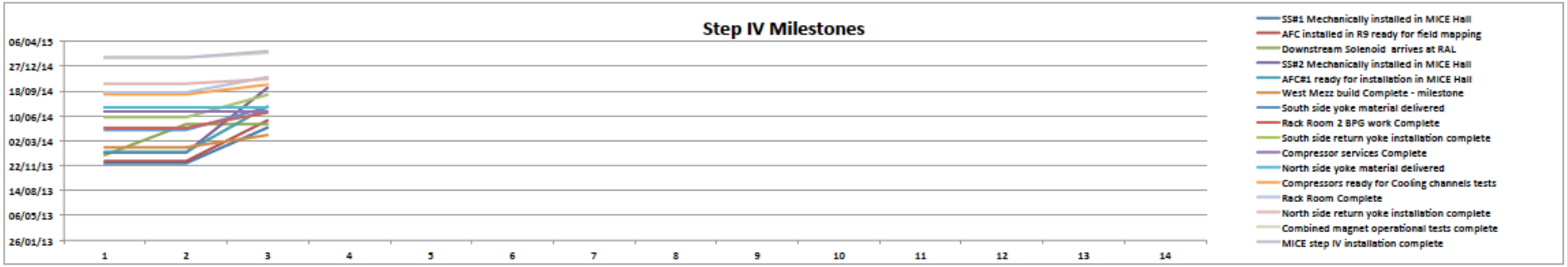
- Progress; snapshot
- Step IV; [progress and] issues
- Step VI; [progress and] issues
- Organisation
- Communication
- Training MICE
- Outreach
- Over to you …

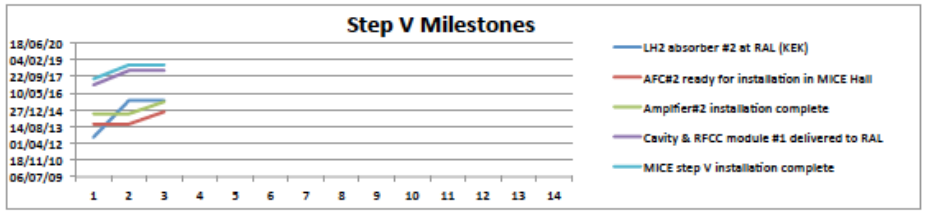
Spokesman’s introduction

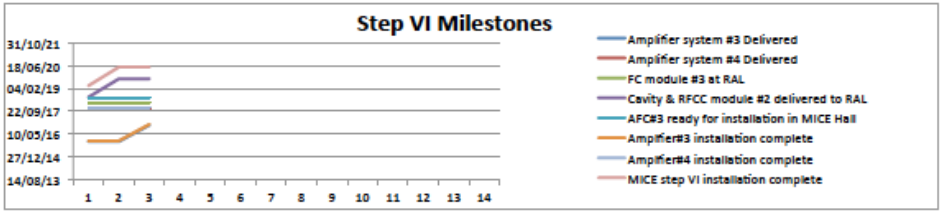
Progress snapshot

	Baseline Date	1	2	3	4	5	6	7	8	9	10	11	12	13
Step IV Top Level Milestones														
SS#1 Mechanically installed in MICE Hall	02/12/13	02/12/13	24/04/14											
AFC installed in R9 ready for field mapping	10/12/13	10/12/13	23/05/14											
Downstream Solenoid arrives at RAL	03/01/14	08/05/14	08/05/14											
SS#2 Mechanically installed in MICE Hall	13/01/14	13/01/14	01/10/14											
AFC#1 ready for installation in MICE Hall	16/01/14	16/01/14	18/07/14											
West Mezz build Complete - milestone	04/02/14	04/02/14	25/03/14											
South side yoke material delivered	15/04/14	15/04/14	15/07/14											
Rack Room 2 BPG work Complete	23/04/14	23/04/14	24/06/14											
South side return yoke installation complete	04/06/14	04/06/14	03/09/14											
Compressor services Complete	30/06/14	30/06/14	30/06/14											
North side yoke material delivered	15/07/14	15/07/14	15/07/14											
Compressors ready for Cooling channels tests	04/09/14	04/09/14	13/10/14											
Rack Room Complete	12/09/14	12/09/14	13/11/14											
North side return yoke installation complete	17/10/14	17/10/14	05/11/14											
Combined magnet operational tests complete	30/01/15	30/01/15	18/02/15											
MICE step IV installation complete	30/01/15	30/01/15	25/02/15											
Step V Top Level Milestones														
LH2 absorber #2 at RAL (KEK)	28/09/12	28/09/15	28/09/15											
AFC#2 ready for installation in MICE Hall	28/10/13	28/10/13	29/10/14											
Amplfier#2 installation complete	26/08/14	26/08/14	26/08/15											
Cavity & RFCC module #1 delivered to RAL	03/01/17	06/03/18	06/03/18											
MICE step V installation complete	26/06/17	28/08/18	28/08/18											
Step VI Top Level Milestones														
Amplifier system #3 Delivered	26/11/15	26/11/15	26/11/16											
Amplifier system #4 Delivered	28/11/17	28/11/17	28/11/17											
FC module #3 at RAL	02/04/18	02/04/18	02/04/18											
Cavity & RFCC module #2 delivered to RAL	26/07/18	06/09/19	06/09/19											
AFC#3 ready for installation in MICE Hall	19/07/18	19/07/18	19/07/18											
Amplfier#3 installation complete	10/12/15	10/12/15	10/12/16											
Amplfier#4 installation complete	08/12/17	08/12/17	08/12/17											
MICE step VI installation complete	03/04/19	14/05/20	14/05/20											

Change since last update	Reduction	Date	No Change	Date	1 - 2 weeks	Date	2 - 4 Weeks	Date	1 -2 months	Date	2+ months	Date	Complete	Date

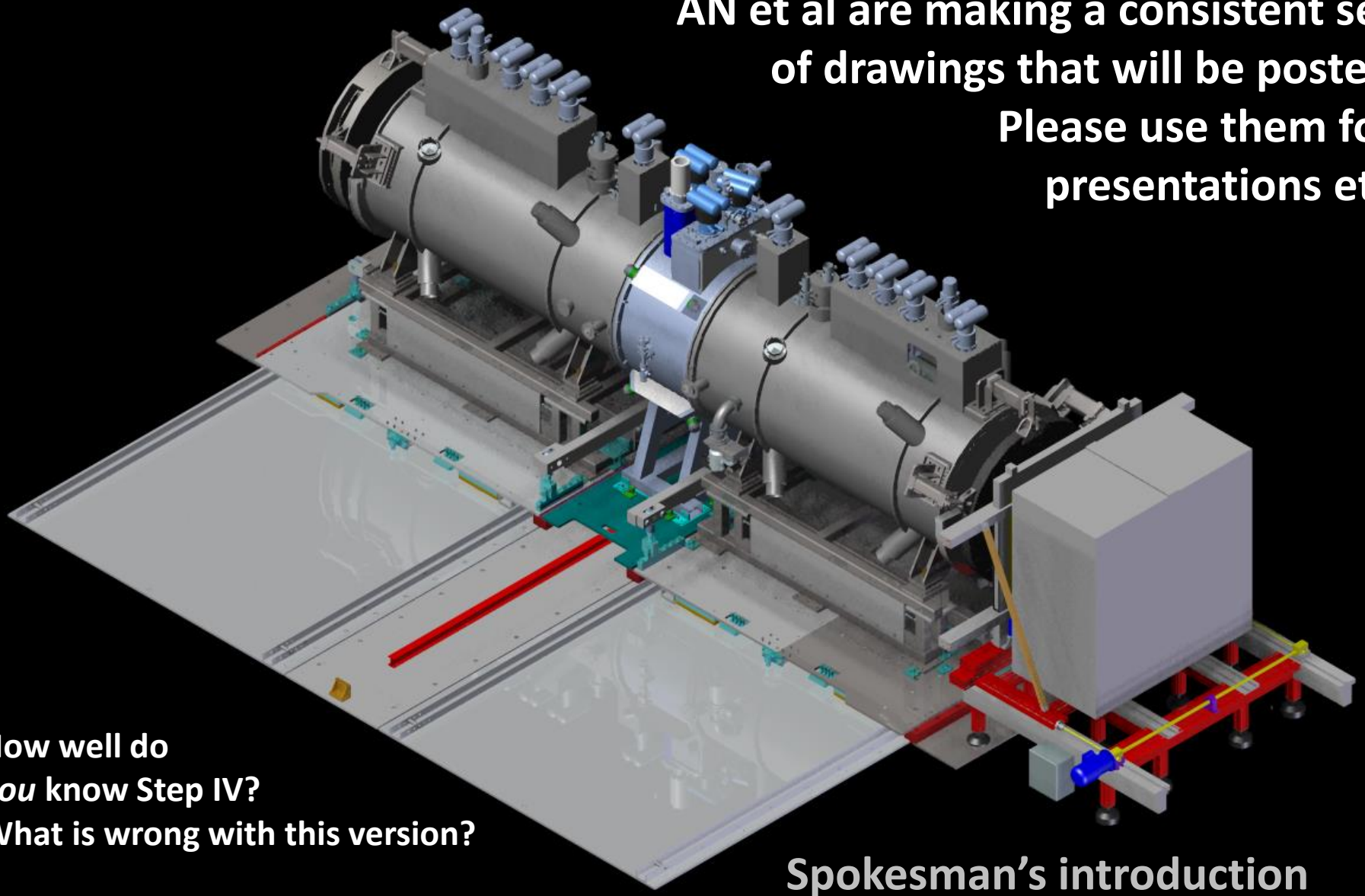






- **In general, good progress:**
  - **But slack being used up**
- **Need to get O&A and S/w&C on a similar footing:**
  - **Needs proper resource analysis**
  - **Will take a little time**

AN et al are making a consistent set of drawings that will be posted. Please use them for presentations etc.



How well do
you know Step IV?
What is wrong with this version?

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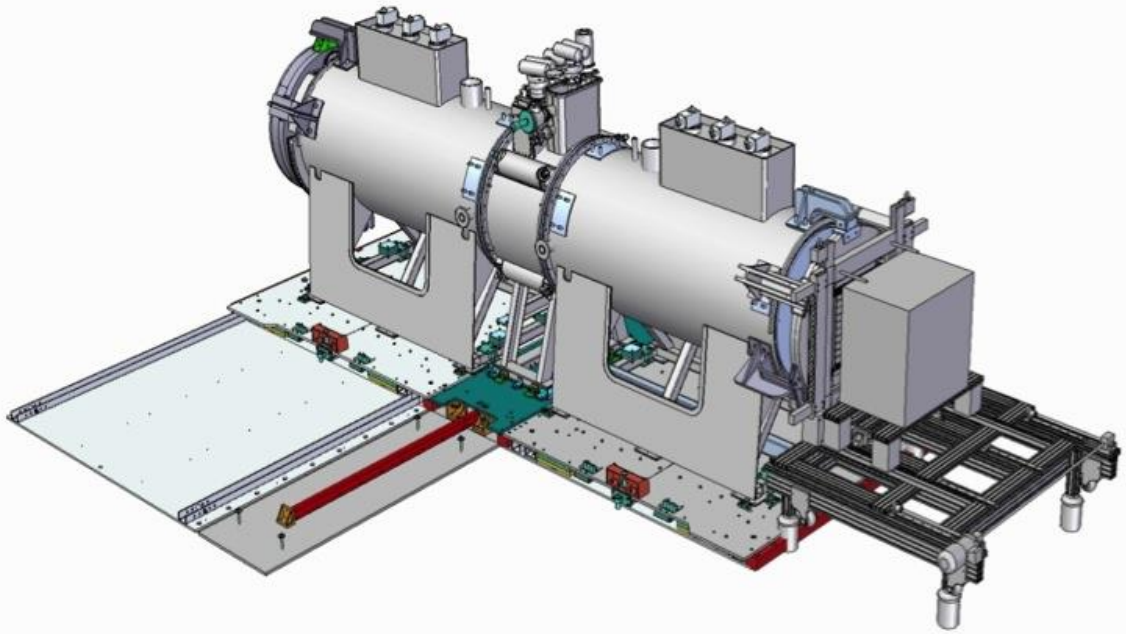
Step IV; [progress and] issues

Step IV:

Spring ´15

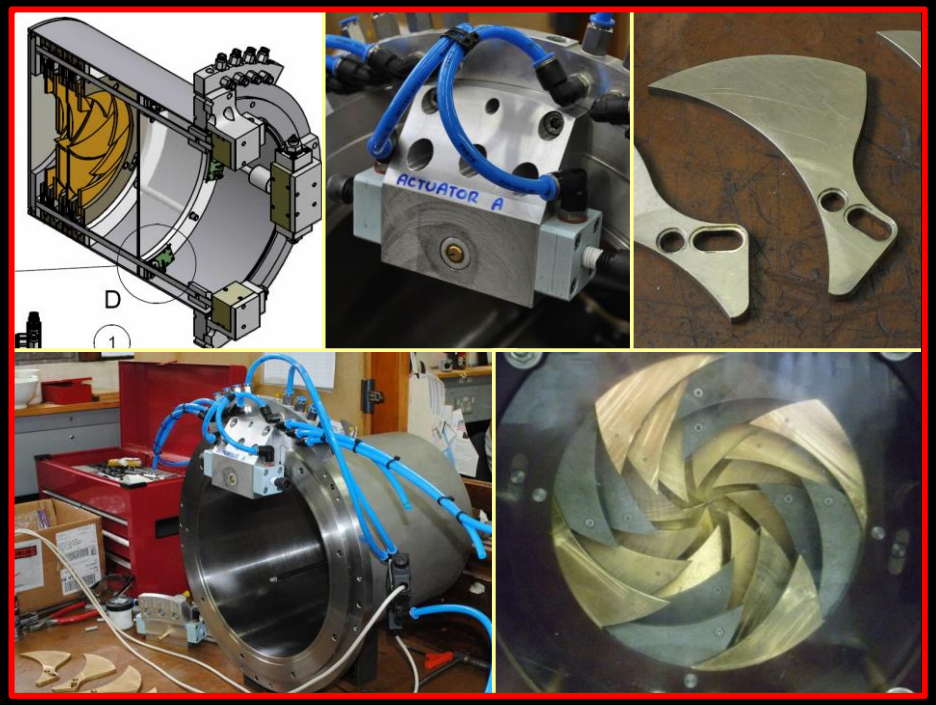


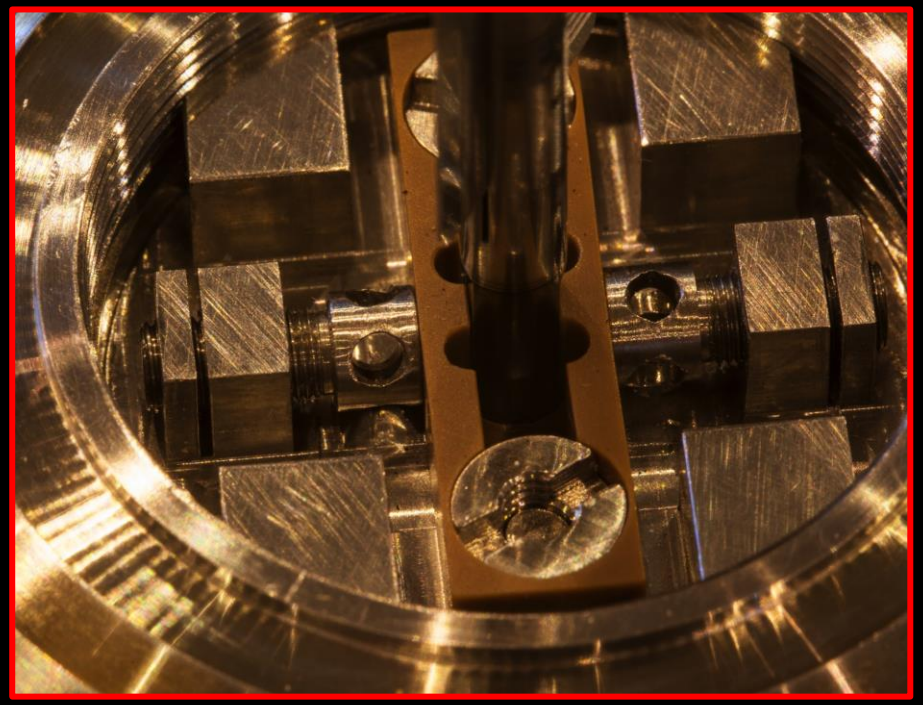
Sub-system	Responsibility
Spectrometer solenoid #1	US
Spectrometer solenoid #2	US
Fibre tracker #1 + #2	Japan, UK, US
Focus coil #1	UK
LH_2 system A	UK
Lithium hydride	US
LH2 absorber	Japan
Diffuser	UK
Virostek plate & TOF cage assy	UK, US
Substation upgrade	UK
EMR	Geneva
(Radiation shutter	*UK)*
AFC Moving platform #1	UK
SS platforms Installation	UK
Partial Return Yoke	UK, US

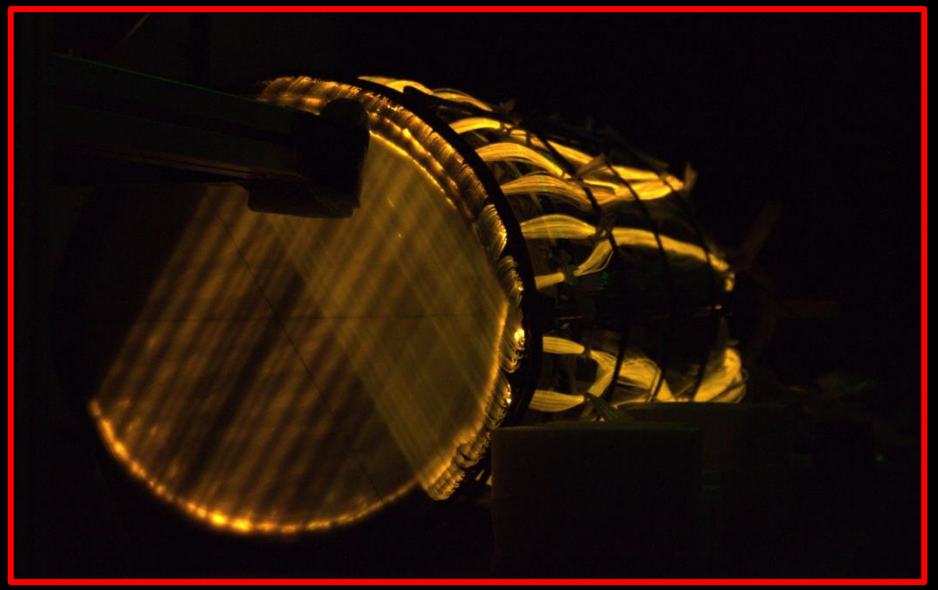
- Schedule shows Step IV construction ends such that commissioning with beam can start when ISIS resumes after the long shutdown:
  - Feb/Mar 2015


EXIT

Tracker and target:



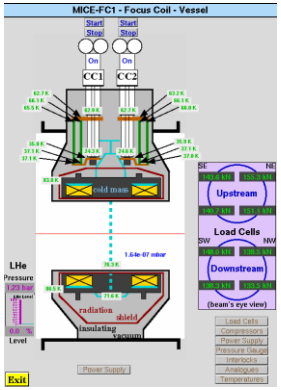




Focus coil module:

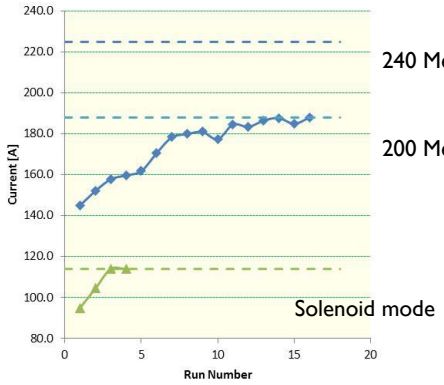
Science & Technology Facilities Council
Technology

Run Summary #1



Cool-down status 12th Feb 2014

Runs and results



- Just achieves 200MeV/c operation
- Looking at what sensible margins to be applied to this
- It is believed that the quenches are stick-slip
- FC1 is now back in the hall and in training following return of FC2 to Tesla

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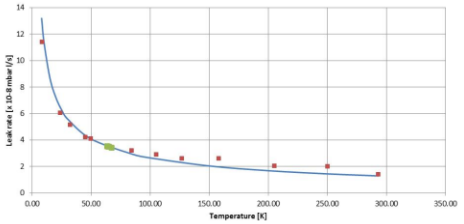
Technology

Focus Coil #2

- FC#2 unfortunately had a leak which developed with decreasing temperature => leak at low temperature (see graph)
- Also discovered a cold patch in the bore
- On cool-down failed to reach base temperature
- Returned to Tesla for investigations
- Currently being disassembled carefully with metrology at all stages – no smoking gun at this stage



Blue line is helium flow through a hole at the bath temperature – correlation is good

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- **FC#1:**
  - **Met acceptance criteria in solenoid mode;**
  - **Did not train acceptably in flip mode;**
  - **Issues identified:**
    - **Insulation between 1st and 2nd stages of cryocooler;**
      - **Fixed**
    - **Pretension in straps**
      - **Fixed**
- **FC#2:**
  - **Failed to reach operating temperature:**
    - **Returned to TESLA; remedial work in progress**

- **FC#1:**
  - **Cooled down ready for re-training;**
    - **First training quench imminent**
  - **Training campaign designed to:**
    - **Confirm acceptable operation in solenoid mode;**
    - **Re-establish working point in flip mode**

Focus-coil for Step IV:

- Critical path:
  - PRY;
    - South side
  - If resolution of focus-coil issue takes until Jul/Aug 2014, then FC becomes critical-path item
- Decision path:
  - FC options analysis (decision tree) developed by MIPO;
    - Refine, present, discuss at CM38 next week
  - Physics analysis group:
    - Have demonstrated using linear optics model of MICE cooling cell that Step IV can be performed over a reduced phase space with FC operating (~10%) below nominal current;
    - Working on demonstration using reconstructed data that positive conclusion reached with linear optics remains valid with full analysis chain
    - Refine, present, discuss at CM38 next week
  - With information gathered from:
    - Options analysis;
    - Physics analysis;
    - Experience in retraining FC#1;

    will be able to decide whether to proceed to Step IV with FC#1

- Information gained; discussion at this meeting critical i/p to decision

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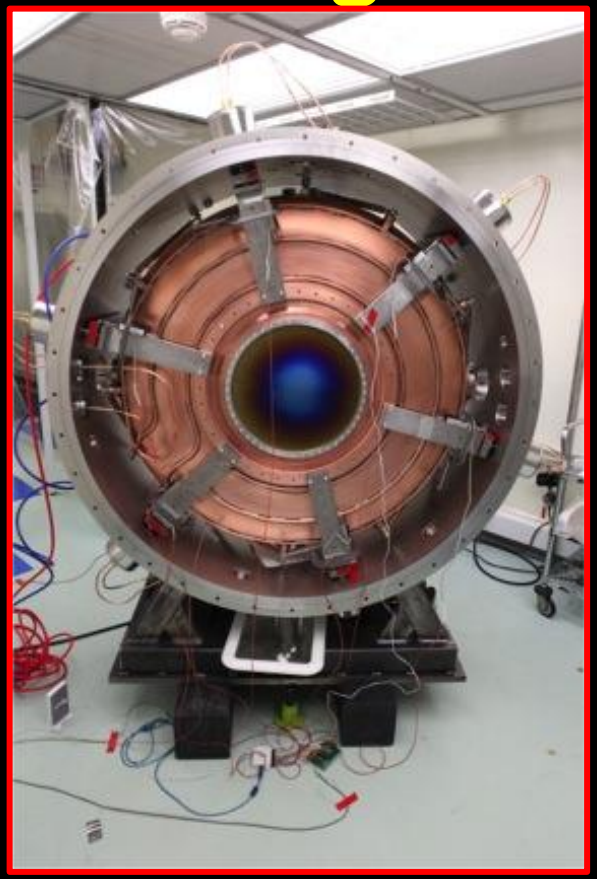
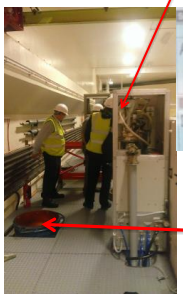
Step VI; [progress and] issues

Cooling cell:



Installation and Tests in MICE Hall

- TIARA requirement: Demonstrate the prototype amplifier operating in the MICE RF power station
  - Amplifier No.1 dismantled at DL and Transported to RAL
    - Includes 5 SPA, Preamplifier and Final Stage Amplifier subsystems with PSU's
  - Extensive water and air distribution systems installed
  - Pre-amplifier operating since the 4th December
  - Final stage operating since the 12th December
- Installation and operation achieved slightly ahead of a tight timetable
- Testing progressed very successfully: Power limited only by load capacity
  - At present space constraints limit size and power capacity of the RF load



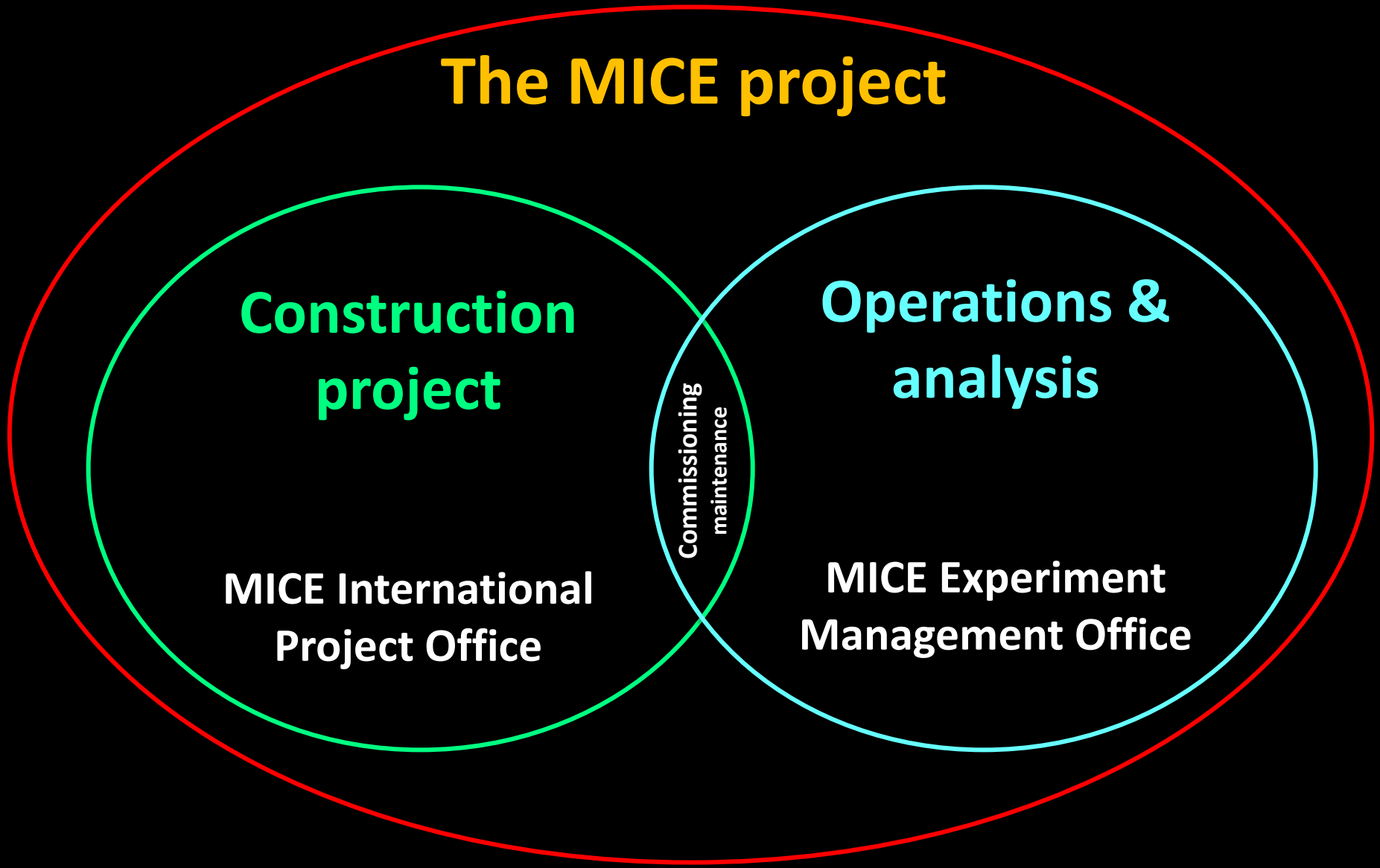
- **Urgent to start to plan support for MAP test of single-cell cavity in the MTA from the MICE RF group**

From Step IV to Step V or VI?

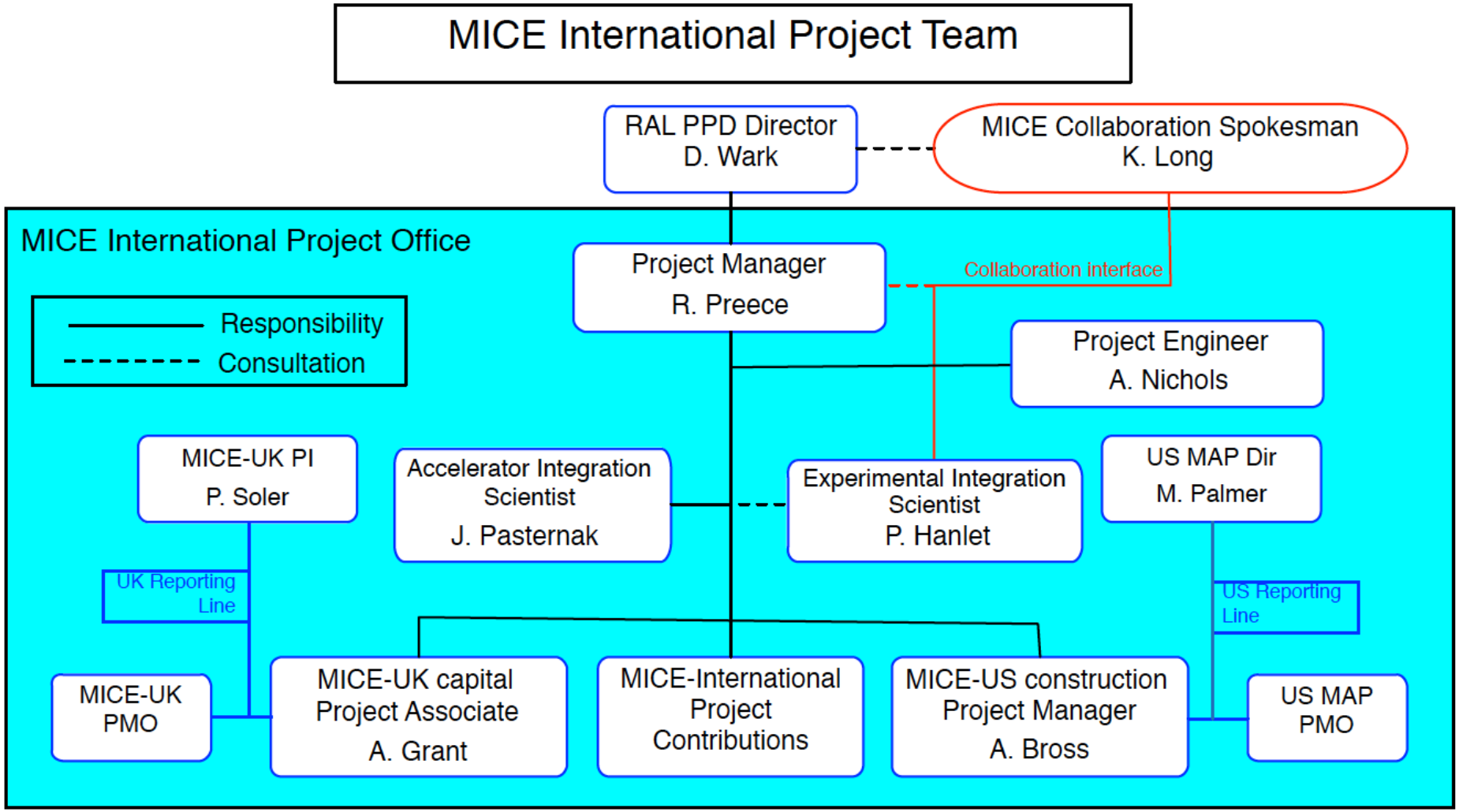
- Issue:
  - Remodeling of PRY from Step IV, to Step V and then to Step VI does not look optimal:
    - Need to decide: Step IV to Step VI …
- Full cooling cell only at Step VI:
  - Field flip critical for sustainable cooling;
- Benefit of Step VI over Step V:
  - Increased cooling effect:
    - More accurate measurement;
  - Many more optical modes:
    - Substantially increased exploration of parameter space
- Decision point identified; 2016
  - Construction project (MIPO):
    - Risk, schedule and cost
  - Physics analysis:
    - Precision, benefit of exploration, impact on cooling-channel simulation
  - Initiate targeted discussion at CM38:
    - Development required analyses and understanding

Spokesman's introduction

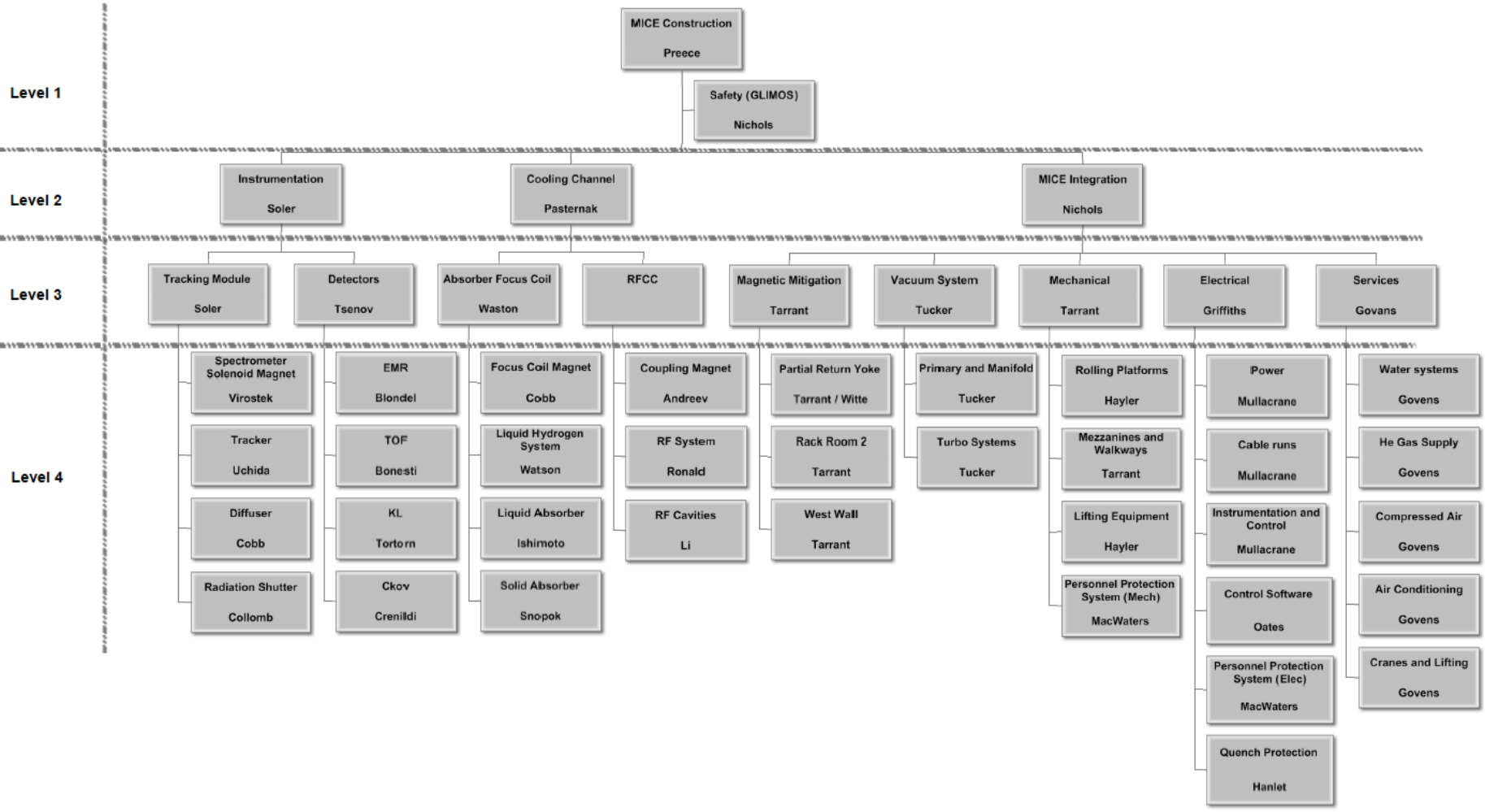
Organisation


The MICE project
Construction project
MICE International Project Office
Commissioning
maintenance
Operations & analysis
MICE Experiment Management Office

Version Date: 28 November 2013 Rev. M

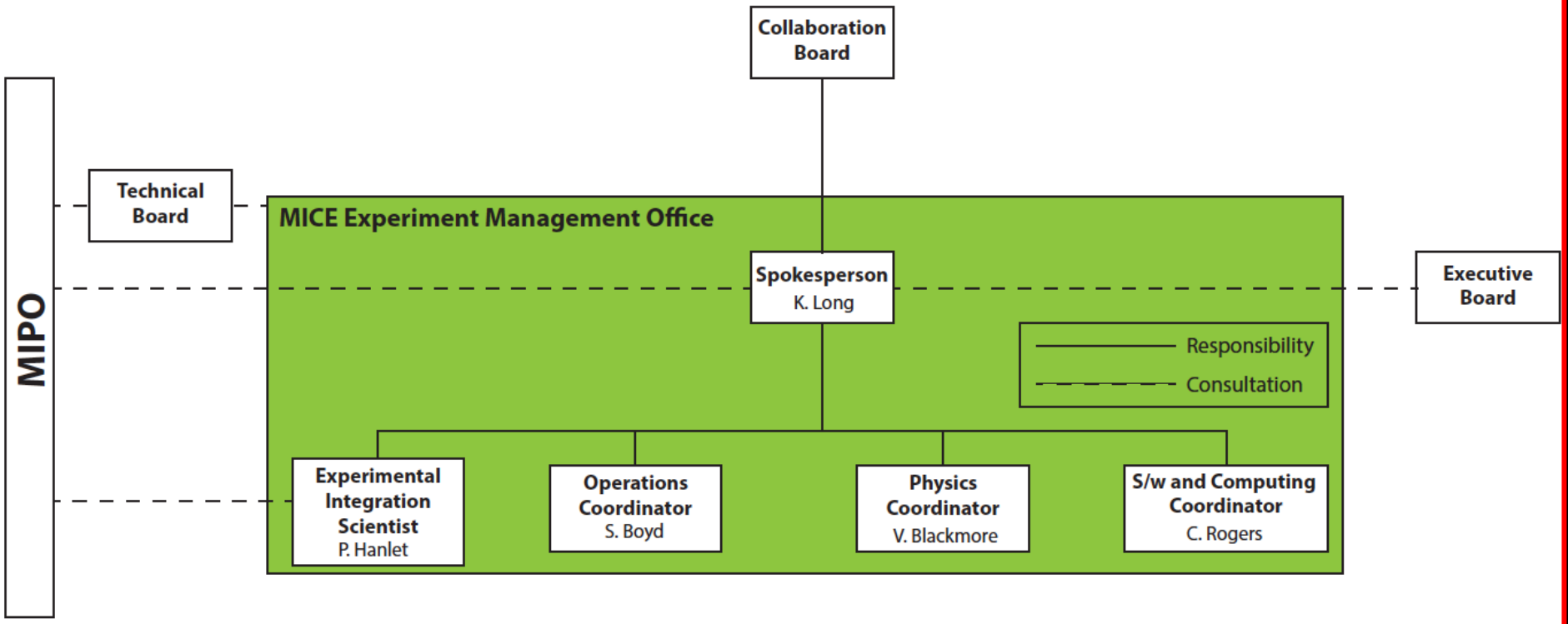


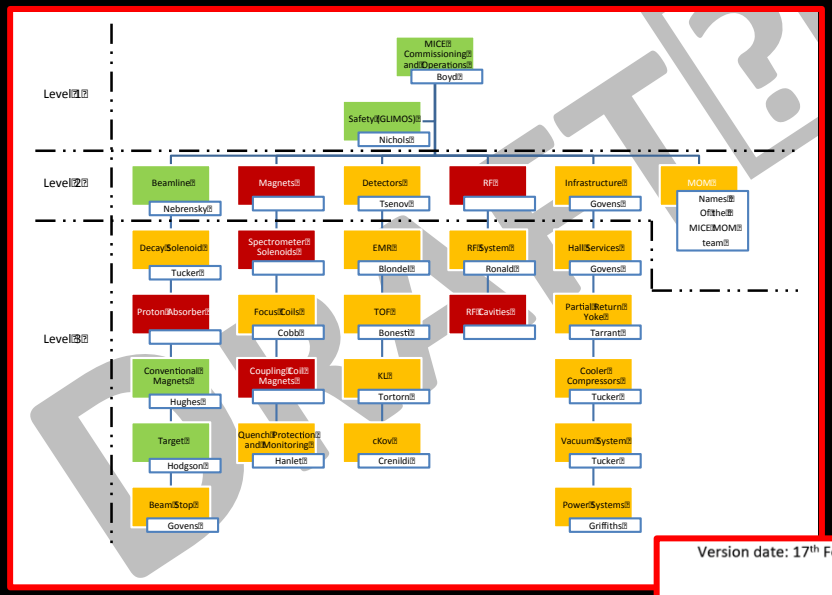
MICE Construction - Product Breakdown Structure (PBS)



Version date 18 November 2013 Rev D

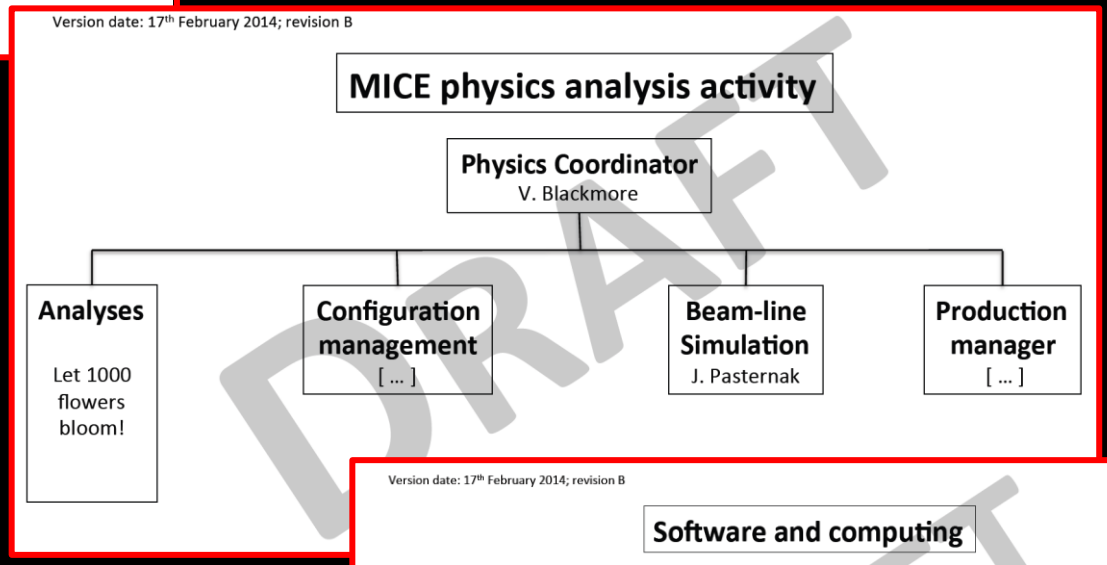
MICE Experiment Management Team

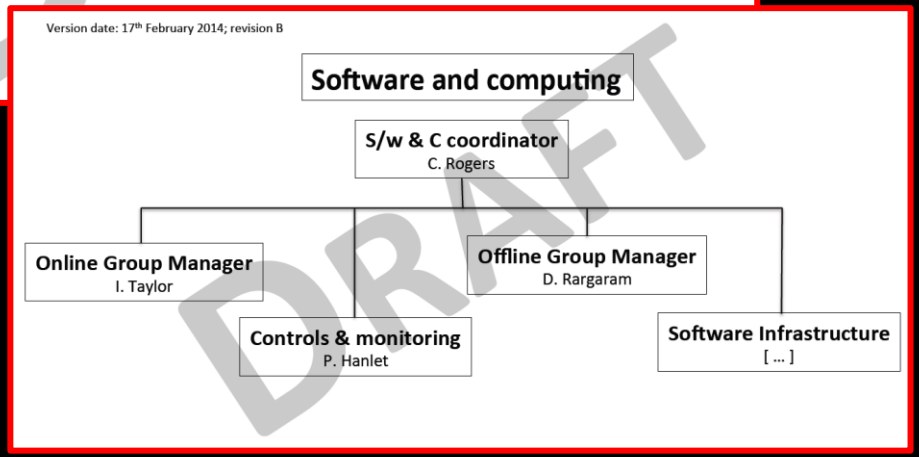




- **Commissioning:**
  - **"Horizontal connections":**
    - **Responsibility of:**
      - Accelerator Integration Scientist; and
      - Operations Coordinator
- **Planning:**
  - **6- to 12-month rolling plan:**
    - **Prepared by Operations Coordinator**
    - **Includes "no-beam" operations**

- **Physics and analysis:**
  - **Staffing issues:**
    - **Critically important:**
      - US university group's bid to NSF;
      - European groups bid to EC Horizon 2020
        - » In preparation





Discussed, refine and begin to address staffing issues

ISIS support for MICE operations:

- Negotiating support for MICE operations from ISIS Operations Group:
  - Concept:
    - MICE can draw on ISIS teams
  - MICE must:
    - Contribute with:
      - Personnel; and
      - Money(!)

Function/Title	FTE	Band	ISIS Structure	ISIS Group
MICE Hall Manager	1.0	E[1]	IAC/AEG	Accelerator Engineering
RF Engineer	1.0	D[1]	IAC/INJ	Linac RF
Vacuum	0.1	E[1]	IEO/SENV	Sample Environment Cryogenics
S/C Magnets	0.5			
Cryogenics	0.2			
Mechanical Engineering	0.2	D/E[2]	IAC/AEG	Accelerator Engineering
Ancillary Plant	0.8			
Mechanical Craft	0.1	B-C	IAC/AEG	Accelerator Engineering
Accelerator Physics	0.1	D-F	IAC/SYNCH	Accelerator Physics
Controls	0.5	D-F	IEO/CON	Target Controls
Electrical/Interlocks	0.5	C-E	IAC/OPS	Accelerator Operations
Conventional Magnets	0.3	D-E	IAC/EEG	Electrical Engineering
S/C Magnets	0.5	D-E	IEO/SENV	Sample Environment Cryogenics
Design	0.1	D-E	IDD	Accelerator Design
Heavy Gang/logistics	0.1	B-D	IEO/TGT	Target Operations
Total	**6.0**			

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Communication

Communication:

- MICEmine used to organise and share information on much of the S/w&C and Physics activities:
  - Opportunity for construction project; Roy's talk
- MIPO/MEMO meet every second week;
  - Notes on the meetings are posted as soon as possible;
  - Will now either:
    - Provide automatic alert to those signed up to the relevant project (MICEmine jargon); or
    - Send alert manually to MICE via MICE mailing list
  - Organisation of construction project and ops&analysis activity will be posted on MICEmine too, e.g.:
    - PBS
    - Operations plan
    - …
- Video conferences:
  - Standing items on:
    - Progress and status of the construction project (Project Manager); and
    - Progress and status of ops&analysis (Spokesman's update)
- Weekly news, etc.
- Need also to refresh and develop MICE.iit.edu

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Training MICE

Training MICE:

- EB felt that a revision course for MICE personnel on the context and details of the measurements we shall make would bring benefits
- First two talks in this series this CM from Bob Palmer:
  - Monday:
    - Cooling and particle beam facilities
  - Tuesday:
    - The physics of ionization cooling
- Talks will be videoed and posted on the WWW site:
  - To make them available to new members of MICE;
  - So that we can study them at our leasure!
- Goal:
  - By the time we start the Step IV programme the series will be dealing with the measurement and analysis concepts that will be used
  - Create a resource for the whole collaboration

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Outreach

Outreach:

- Preparing the Step IV "good news story":
  - Opportunity to publicise MICE and muon beams for particle physics:
    - To our peers; to the funding agencies etc., and also the public;
  - Predicated on delivering Step IV, of course:
    - So that remains the top priority!
- However, need to prepare with:
  - High-quality photographs of equipment;
  - High-quality video of people and equipment;
  - High-quality results;
  - Gathering of information such as:
    - Economic impact;
      - Fraction of money spent in local industry, training of young researchers etc.
  - …
- Tiny steps taken so far:
  - Have the support of the PR offices at CERN (Stephanie Hills), FNAL (Katie Yurkewicz) and STFC (Jake Gilmore);
    - They have agreed to help; we need to generate the story
    - I will arrange a phone meeting now that the AAAS meeting has passed
  - Exploiting the media, e.g.:
    - Revamp our WWW "presence";
- Your ideas and enthusiasm will be essential!

Spokesman’s introduction

Over to you …