



Schedule to completion, Risk and Critical Interfaces

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STFC RAL

RLSR
16th April 2015

- **Schedule**
 - Current Status
 - To Completion



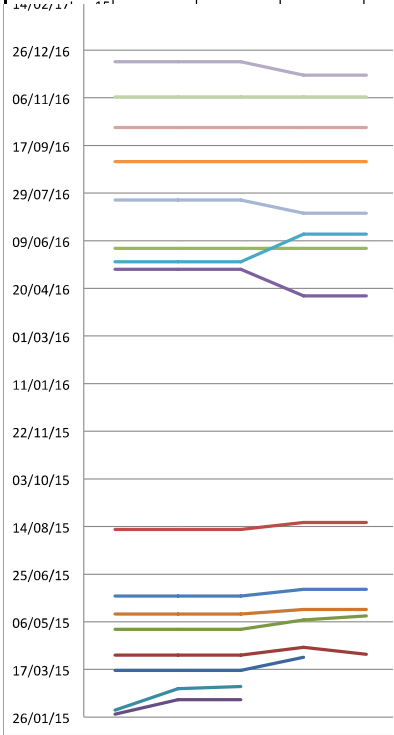
Schedule

Current Status



Dashboard and Slip Chart

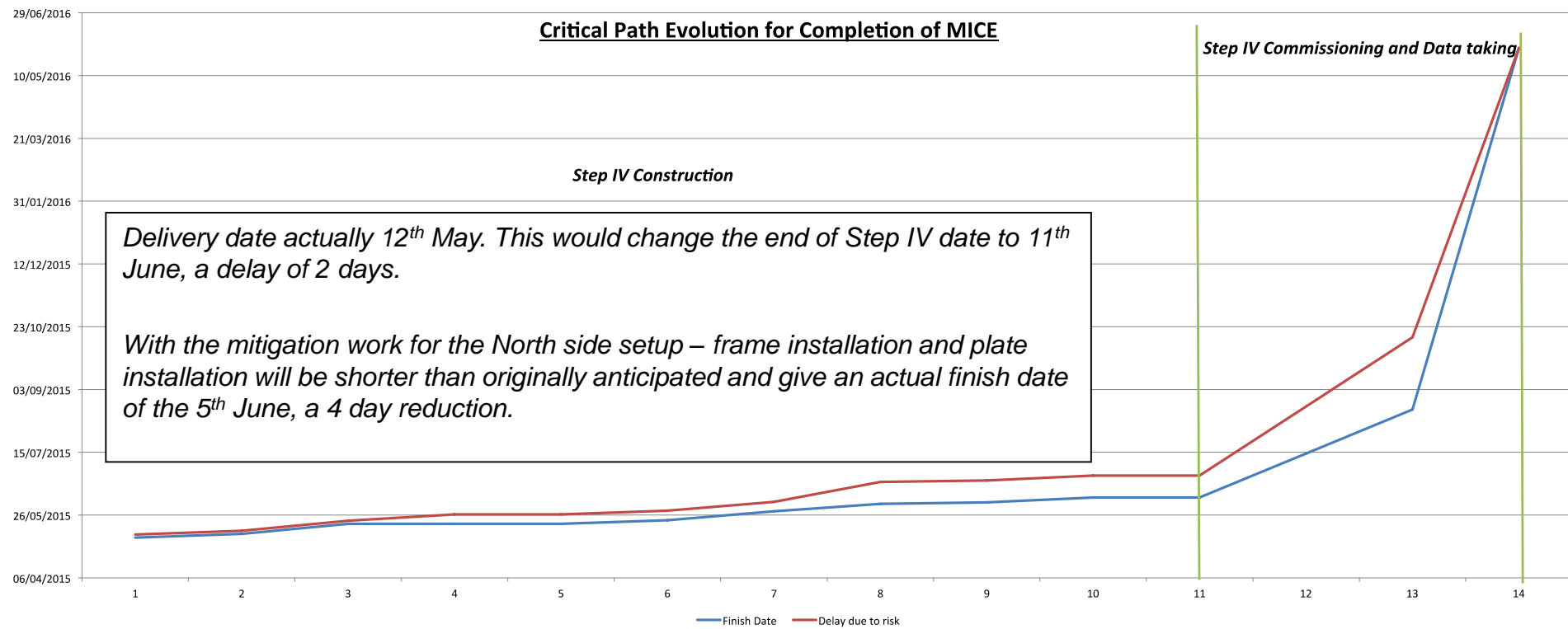
1st May 2015 Update	South side yoke material delivered	South side return yoke installation complete	North side yoke material delivered	Compressors ready for Cooling channels tests	Rack Room 2 Complete	North side return yoke installation complete	MICE step IV installation complete	Combined magnet operational tests complete	End of Step IV Operations	Partial Return Yoke materials arrive at RAL	RF Cavities arrive at RAL	Step IV De-Commissioning complete	RF Amplifier delivered	RF Amplifier 1 ready for electrical commissioning	RF Amplifier 2 ready for electrical commissioning	Installation of PRY South starts	Installation of RF Cavities and Chambers starts	Installation of PRY North complete	Cooling Demonstration complete	Cooling Demonstration commissioning complete	End of data taking in the Cooling Demonstration configuration
Baseline	16/03/15	01/04/15	28/04/15	29/01/15	02/02/15	14/05/15	02/06/15	11/08/15	01/06/16	10/05/16	18/05/16	22/07/16	31/08/16	06/10/16	07/11/16	14/12/16	19/01/17	01/02/17	24/03/17	02/05/17	31/03/18
Dec-14	16/03/15	01/04/15	28/04/15	29/01/15	02/02/15	14/05/15	02/06/15	11/08/15	01/06/16	10/05/16	18/05/16	22/07/16	31/08/16	06/10/16	07/11/16	14/12/16	19/01/17	01/02/17	24/03/17	02/05/17	31/03/18
Jan-15	16/03/15	01/04/15	28/04/15	13/02/15	25/02/15	14/05/15	02/06/15	11/08/15	01/06/16	10/05/16	18/05/16	22/07/16	31/08/16	06/10/16	07/11/16	14/12/16	19/01/17	01/02/17	24/03/17	02/05/17	31/03/18
Feb-15	16/03/15	01/04/15	28/04/15	13/02/15	27/02/15	14/05/15	02/06/15	11/08/15	01/06/16	10/05/16	18/05/16	22/07/16	31/08/16	06/10/16	07/11/16	14/12/16	19/01/17	01/02/17	24/03/17	02/05/17	31/03/18
Mar-15	30/03/15	09/04/15	08/05/15			19/05/15	09/06/15	18/08/15	01/06/16	12/04/16	16/06/16	08/07/16	31/08/16	06/10/16	07/11/16	30/11/16	25/01/17	17/02/17	31/03/17	09/05/17	31/03/18
Apr-15		02/04/15	12/05/15			19/05/15	09/06/15	18/08/15	01/06/16	12/04/16	16/06/16	08/07/16	31/08/16	06/10/16	07/11/16	30/11/16	25/01/17	17/02/17	31/03/17	09/05/17	31/03/18
May-15																					



- Project dashboard showing the milestone slip chart and current critical path items. <https://micewww.pp.rl.ac.uk/dashboard/>
- South side materials were delivered
- South PRY installation complete
- Racks have been installed to Rack room 2
- Compressors are ready for use
- North Material Delivery to port – 30th April with the bank holiday and high winds removal from containers has been delayed.
- From the experience gained with the South side PRY frames and plates the North installation has been streamline. Materials will arrive at RAL a few days later than the milestone but with the setup using the South frames time has been saved. Weekend working will come into action to hold the completion date.

Dashboard and Slip Chart

WBS	Name	Finish Date	Risks_Level	Risk_Impact	Risk Level Duration	Probability	Delay due to risk	Sequential Delay
3.1.3	North side yoke frame steelwork delivered	08/05/2015	(RISK)-(R4)	Contractor late delivery	10	0.25	10/05/2015	2.5
4.2.1.4.4	Install frame legs (inc drilling plates)	11/05/2015					13/05/2015	2.5
4.2.1.5	Fit North side yoke plates	19/05/2015					21/05/2015	2.5
4.2.1.6	North side return yoke installation complete	19/05/2015	(RISK)-(R4)	Installation time extension	10	0.5	26/05/2015	7.5
4.2.5.9.1	North side PRY in place by Feb 2015	19/05/2015					26/05/2015	7.5
4.2.5.9.2	Cryostat stands - North side in place	22/05/2015					29/05/2015	7.5
4.2.5.9.3	Move North side cryostats to hall and place in position	29/05/2015					05/06/2015	7.5
4.2.5.10.3	Reform and connect external waveguides to fit from PP to Cryostat - After North PRY installation	04/06/2015	(RISK)-(R3)		20	0.5	21/06/2015	17.5
4.2.5.10.4	Errect trellis to support external waveguides - After North PRY installation	05/06/2015					22/06/2015	17.5
4.2.6	Re-install TOF2, KL, EMR	09/06/2015					26/06/2015	17.5
4.2.7	MICE step IV installation complete	09/06/2015					26/06/2015	17.5
5.2	Spectrometer Solenoid preparation for lattice operation	14/07/2015	(RISK)-(R2)	Items found to be non operational in field ramping	40	0.5	20/08/2015	37.5
5.3	Combined magnet operation	18/08/2015	(RISK)-(R2)	Extended period for training all magnets together - delay stepIV	40	0.5	14/10/2015	57.5
5.6	End of STEP IV Operations	01/06/2016					01/06/2016	0



North Material Delivery to port – 30th April with the bank holiday and high winds removal from containers has been delayed. Risk date has come to fruition – time included for the frame leg installation has been mitigated with the South frame setup and so time will be saved. Weekend working.

- We are moving into a very intensive 1 month with a lot of work to be carried out
 - Electrical services – *There will be an intensive installation period next week with many warm bodies in the hall*
 - Magnet instrumentation – *Next week*
 - Solenoid Cold heads – *Just one cold head missing*
 - Magnet cooling services – *Almost there, when routing complete Helium lines can be installed*
 - Support structures for services routing – *¾ complete*
 - Partial Return Yoke frame setup – *Done for both sides*
 - Partial Return Yoke main plates – *South complete*
 - Moving the magnets – *All in place just need to get the Focus Coil in following the end flange installation and then connections to be made*
 - Hydrogen system – *Some work on the exhaust line required to reduce the back pressure in the absorber*
 - Detector system upgrades – *essentially done*
- With all these groups wanting time in the hall it will get very busy, very quickly.
- Safety of personnel, and equipment, during these times will be paramount
- Cleanup of the work area after each day is important.



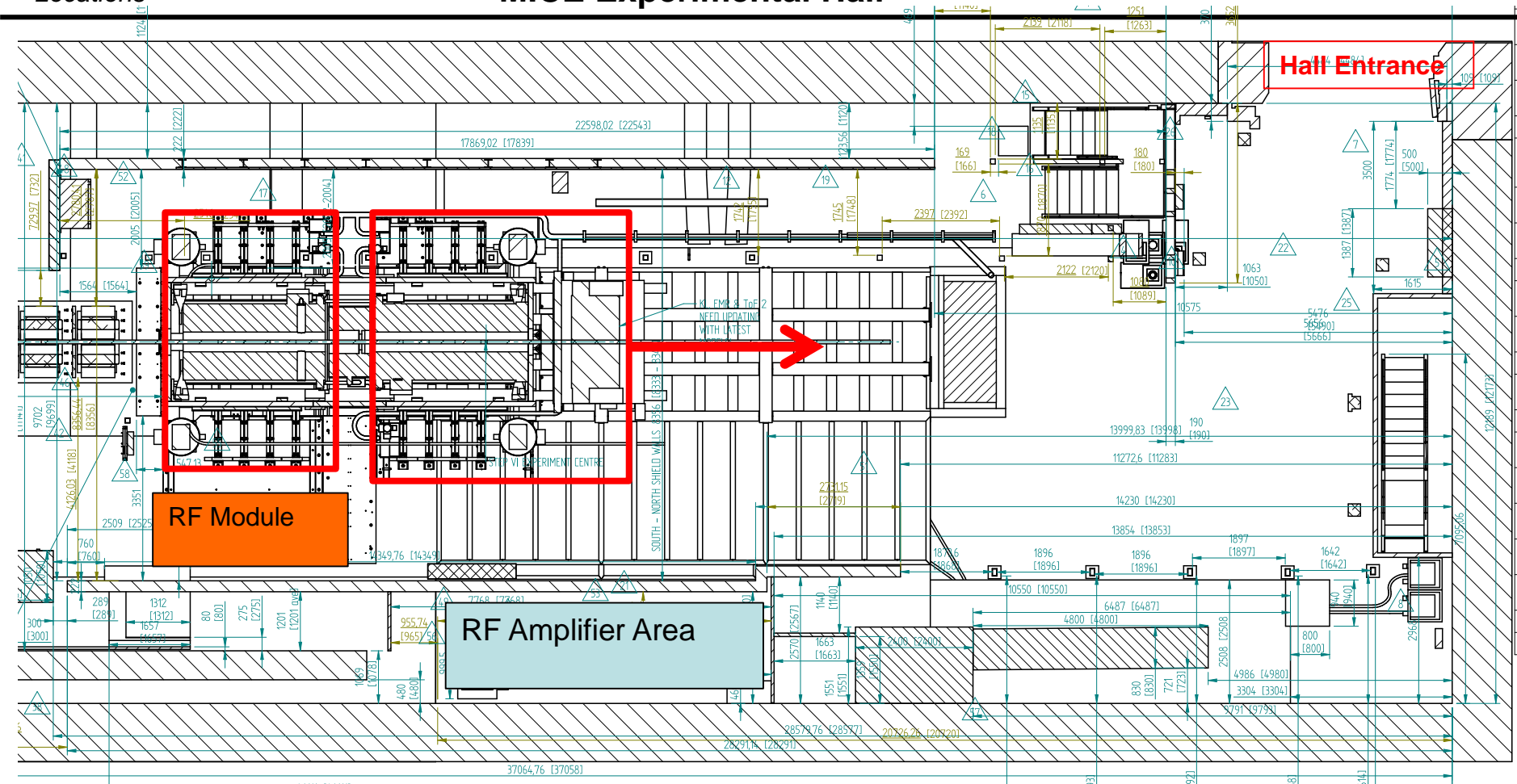
Schedule

To Completion



- The baseline schedule has been created joining the Step IV and Cooling Demonstration construction schedules
- Data taking periods for both Step IV and Cooling Demonstration have been included
- Critical Path for the project to completion has been found
 - The RF Amplifier installation is a driving item due to the highly skilled resource required for much of the activity.
 - Work is on-going to interact with the senior management of AsTEC and Daresbury TD to gain significant staff involvement.
 - We have connections with ISIS RF team and investigations for possible effort from CERN will be looked into.
 - Installation of the first RF amplification system in the hall as early as possible will enable off line testing of the RF modules
- The Step IV data taking period is used as construction slack
 - Hard milestone for end of data taking established – 1st June 2016
 - This does mean that any slippage of the Step IV construction has an impact on data taking period
 - If data taking is complete or no ISIS user runs are available at the 1st June timescale, early re-configuration of the hall will commence.
- The data taking period for the Cooling Demonstration has an end date of March 2018 coinciding with the end of the UK FY
 - UK Proposal required for 16/17 FY and will be prepared for submission toward the end of the this summer.
 - Analysis and exploitation will continue after the the March 2018 set point and has not at the moment been fixed.





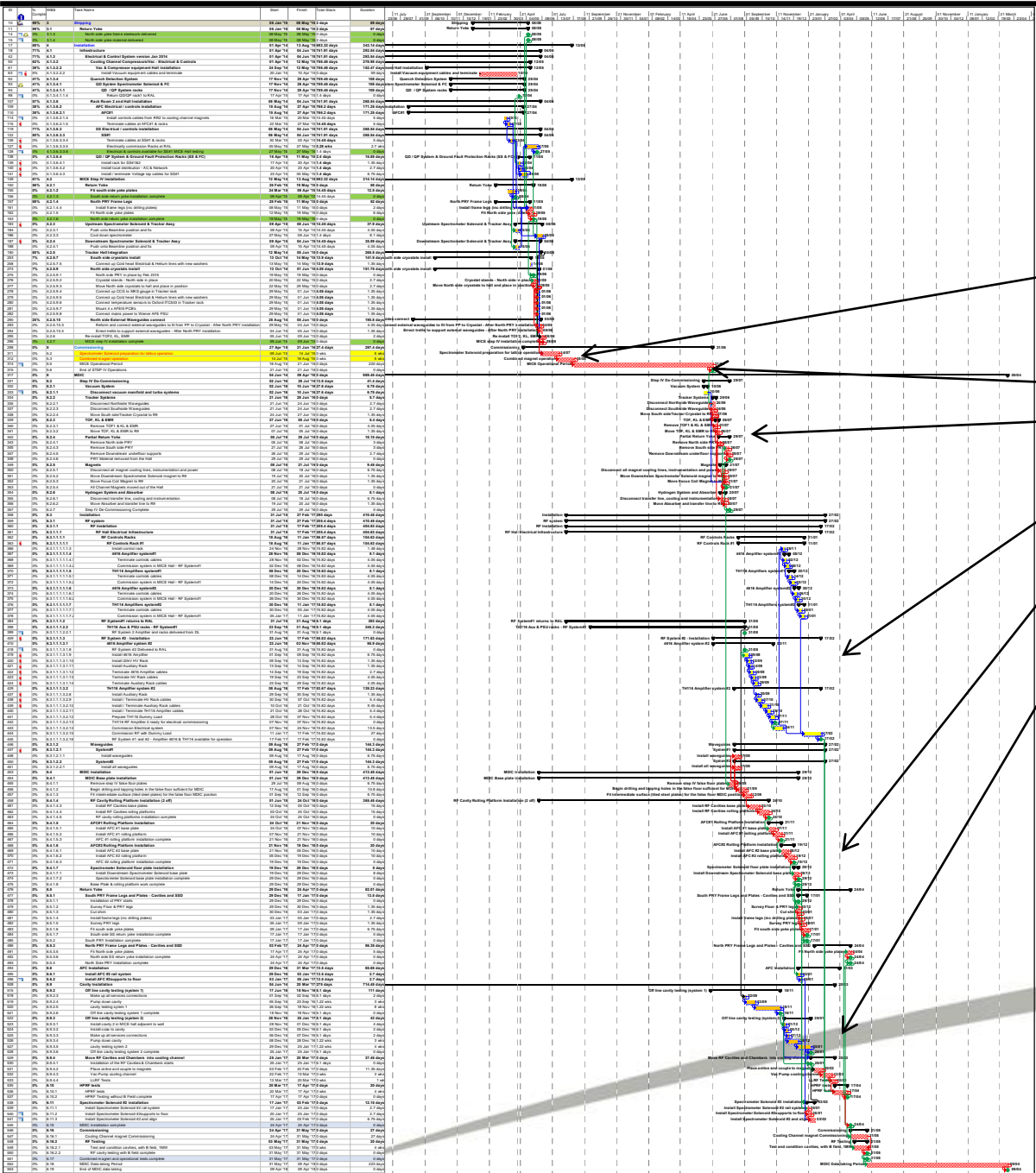
- Reconfiguration to Cooling Demonstration starts 1st June
- During re-configuration the Upstream Spectrometer Solenoid can stay in place.
- The PRY materials surrounding the Upstream Spectrometer Solenoid can also stay in place and will be re-used for the Cooling Demonstration.
- The intension is to have the RF Module test area next to the Solenoid.
- In this position work for re-configuration can continue. Installation of waveguide and other required equipment can start during ISIS down time during the Step IV running period.
- Reconfiguration scheduled to be completed – 31st March 2017

Milestones and Dates

- **ISIS User runs during Step IV data taking period**
 - 14th July to 24th July (2 week downtime)
 - 8th August 15 to 16th October 15 (2 week downtime)
 - 3rd November 15 to 18th December 15 (6 week downtime including Christmas Break)
 - 14th February 16 to 1st April 16
- **Arrival of the first RF Module at RAL – May 2016**
- **End of Step IV Data taking – 1st June 2016**

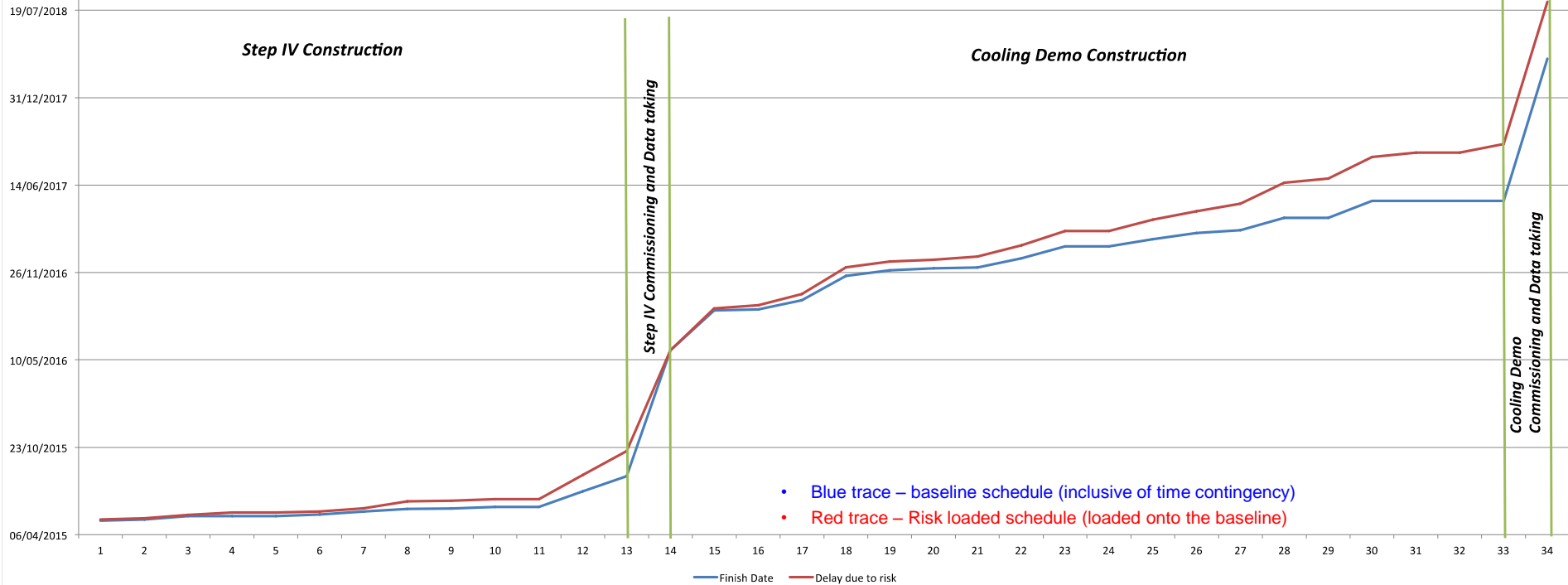
ISIS Cycle	Date From	Data To	1 Jun 15	1 Jul 15	1 Aug 15	1 Sep 15	1 Oct 15	1 Nov 15	1 Dec 15	1 Jan 16	1 Feb 16	1 Mar 16	1 Apr 16
2015/01a	2 Jun 15	5 Jul 15	█										
2015/01b	14 Jul 15	24 Jul 15		█									
2015/02	8 Aug 15	16 Oct 15			█								
2015/03	3 Nov 15	18 Dec 15					█						
2015/04	14 Feb 16	1 Apr 16									█		





- Critical and Near Critical path items
 - Orange – <15 days total slack
 - Yellow - >15 days < 30 days total slack
 - Green are milestones
- Step IV Data Taking period starting 18th August 2015
- Hard end date of 1st June 2016
- Decommissioning Step IV
- RF System 2 Installation
- Rolling platforms and floor
- Cavity testing
- Parallel operations have been planned into the schedule
- ISIS beam off times will be utilised to advance work for the offline RF module testing – Installations behind the North wall and waveguide installations to test position.

Critical Path Evolution for Completion of MICE



Dates:-

Step IV Construction Complete – 9th June 2015 (26th June 2015)

Step IV Commissioning Complete – 18th August 2015 (14th October 2015)

Step IV Data taking complete – 1st June 2016 (19th August 2016)

Cooling Demonstration Construction Complete – 31st March 2017 (25th August 2017)

Cooling Demonstration Commissioning complete – 9th May 2017 (22nd November 2017)

End of Cooling Demonstration – 31st March 2018 (13th October 2018 if funding in place for addition operations)

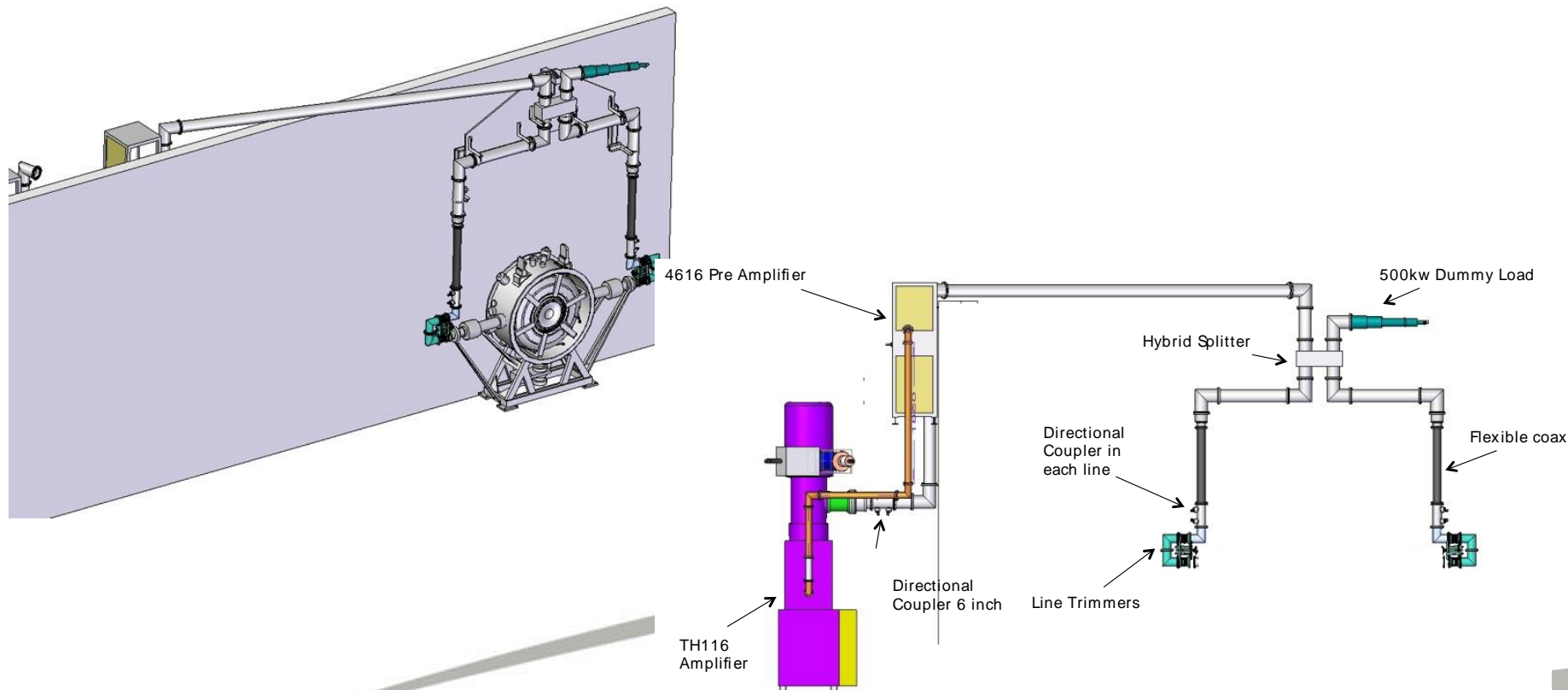
Schedule

Back up



Build up and Test

- Waveguides for the Cooling Demonstration will traverse the hall at high level
- 6" lines will carry the power to hybrid splitters and then 4" lines to the cavities through line trimmers to account for any mechanical mis-alignment.
- Loads will be mounted near to the hybrid splitters
- The lines will be pressurised with SF6
- Waveguide assembly can be built up in the R9 lab space during Step IV operation
- Installation to the North shielding wall during ISIS beam down times in preparation for the arrival of the first module.



• **Build-up and Installation**

- Once RF System#2 4616 Amplifier is installed and tested at DL, the RF System#1 4616 Amplifier can be shipped to RAL. The Amplifier will be available after Nov 2015 and could be installed during the Christmas shutdown period.
- The RF System#1 TH116 Amplifier is already installed at RAL, but the 4616 and the TH116 Amplifiers cannot be tested into dummy load until RF System#1 PSU & Auxiliary racks are sent back from DL. These are not available until Feb 2016 and Aug 2016 respectively.
- The main time constraint is with the delivery of the TH116 racks for RF system#1 so testing into cavity can only be estimated for late September 2016. Although it may be possible to bring this forward if each rack is not tested independently, it may be possible to send the RF system#1 racks for the TH116 Amplifier to RAL in June 2016 and test into cavities in August 2016.
- The control system for RF System#1 will be complete Oct 2015, and could be shipped to RAL for installation during the Christmas shutdown
- All the Instrumentation cables and HV cables are already installed for RF system#1 so it won't take long to re-install all the PSU and auxiliary racks once delivered, although the controls rack cables will need to be installed
- Build-up and installation of the waveguides, instrumentation and services can be done during all ISIS down times.



Milestones and Dates

- **Resource**

- RF engineering is under pressure – discussions with DL senior management
 - Strathclyde University will play a large role in the testing and operation – Kevin Ronald, Colin Whyte and the rest of the group.
 - Imperial university - Saad Alsari
 - DL staff required during testing, commissioning and operations
 - We have a connection to the ISIS RF team and investigating software effort for LLRF
 - Looking toward CERN for effort to help with software and commissioning.
- Mechanical installations in the hall are under control, utilising contractor effort – additional from RAL TD when required would be very useful.
 - Current MICE mechanical staff will carry out the build in R9
 - Installation to the North wall during ISIS downtime or when MICE operation give free access
- Mechanical and Electrical technician effort at DL for build of the amplifiers being discussed and defined with senior management
 - Pressure from external projects could be mitigated
 - Contract effort will be bought in to reduce pressure on laboratory staff

- **Risk**

- The resourcing risk of the RF project is high. Mitigating action to discuss prioritisation of the MICE RF effort with senior management within the STFC and providing additional funding in areas that can benefit.

