

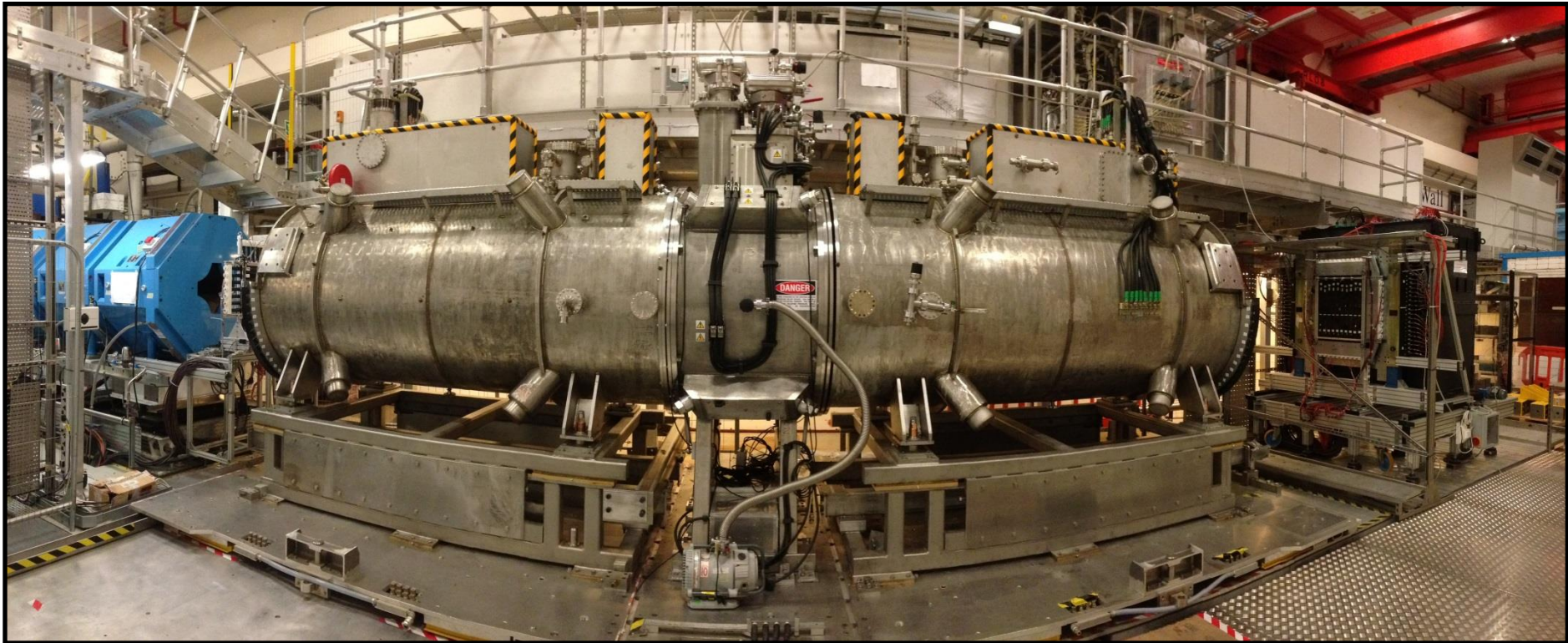


# *MICE Step IV*

Alan Grant

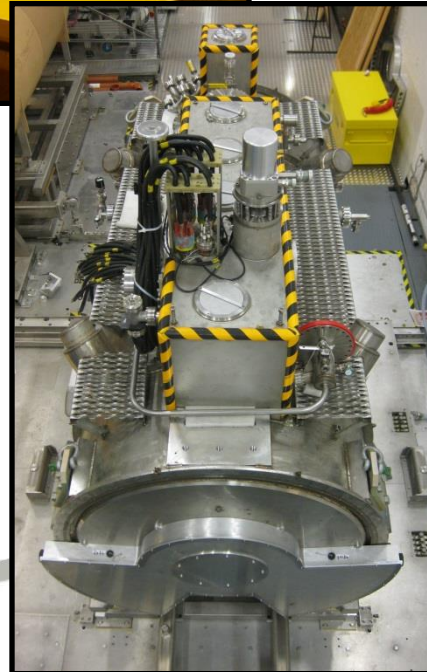
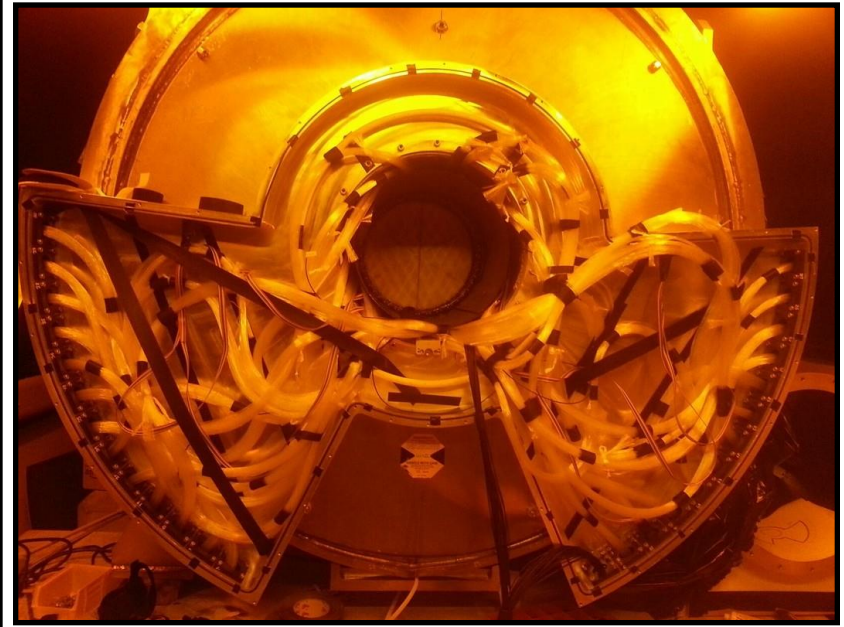
- **Step IV**
  - Construction Status
  - Finances
  - Schedule
  - Risks
  - Summary





- Tracker detectors installed to the Spectrometer Solenoid Magnets
- Bellows for connection of each magnet have been assembled
- Rolling platforms for Upstream Solenoid and Focus Coil tested and operational
- Mechanical fit checks will be carried out before the arrival of the PRY materials. Hydrogen transfer line fit check
- Layout and installation of the services to the magnets and detector systems are being progressed
- Vacuum manifold installation making good progress.
- Diffuser has been installed





- The Tracker Detectors have been successfully installed into each Spectrometer Solenoid.
- Hall Probes have been installed along side the planes of the tracker.



- The vacuum manifold system is fully designed and is currently being installed to the MICE hall
- 2 roots pumps are attached to the 100mm bore manifold providing redundancy
- All turbo pumps will be sited outside of the PRY enabling them to run constantly
- The system is specified to be extendable to the Step V installation

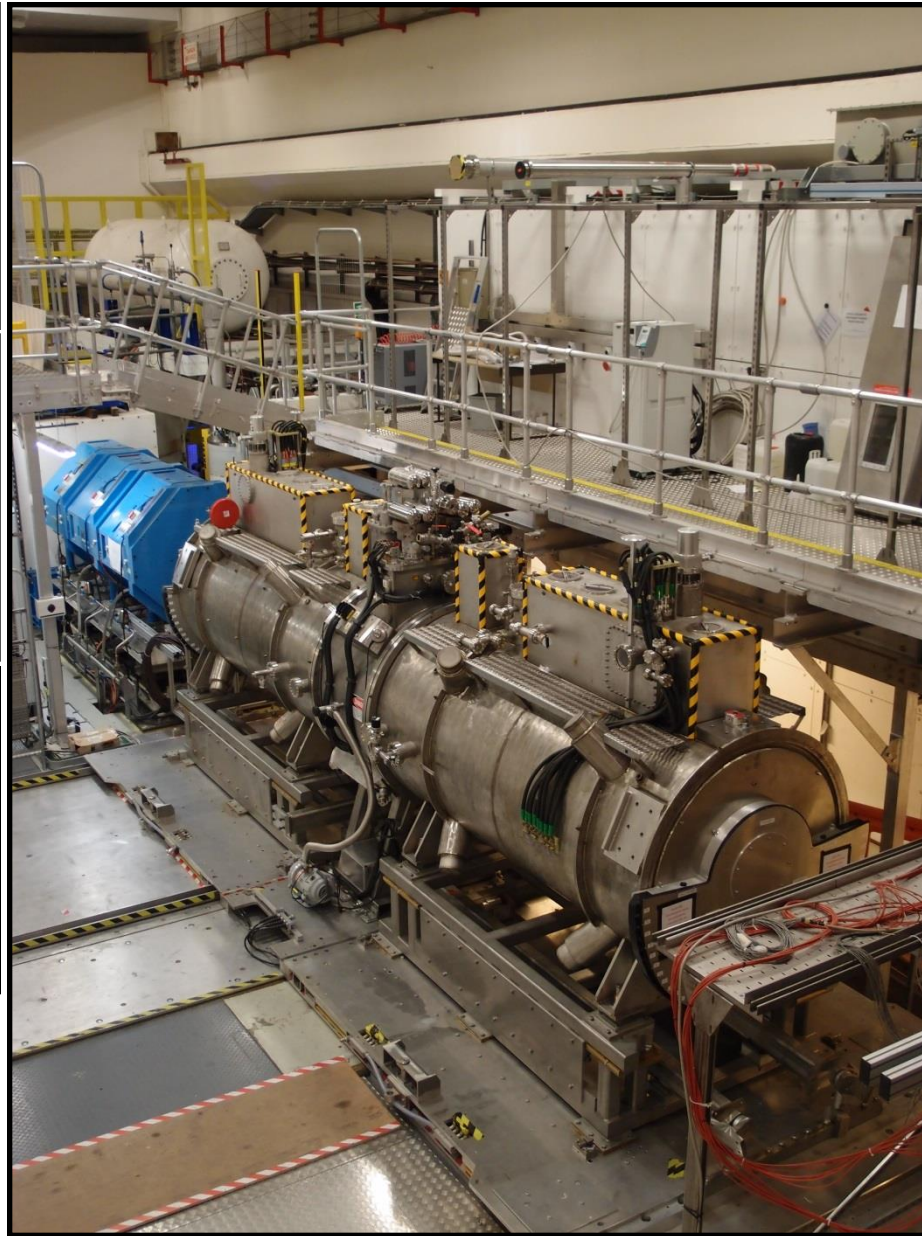
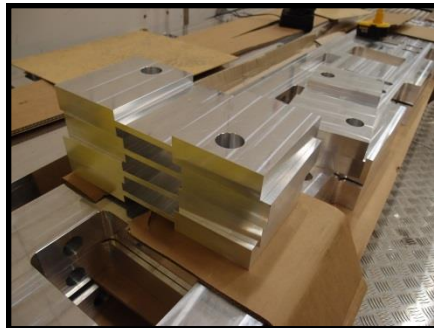
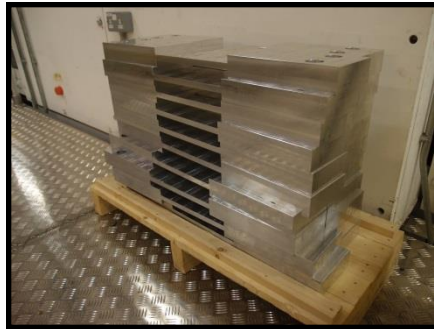




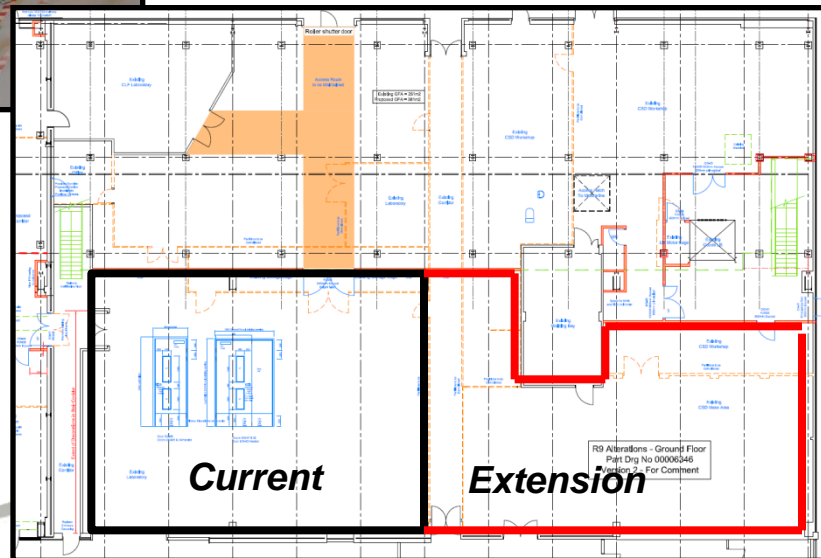
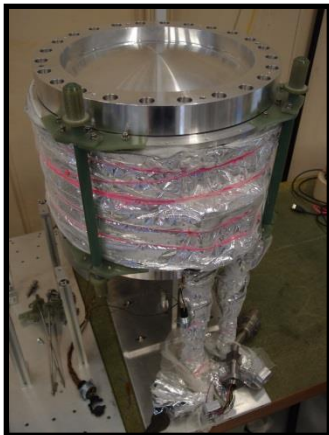
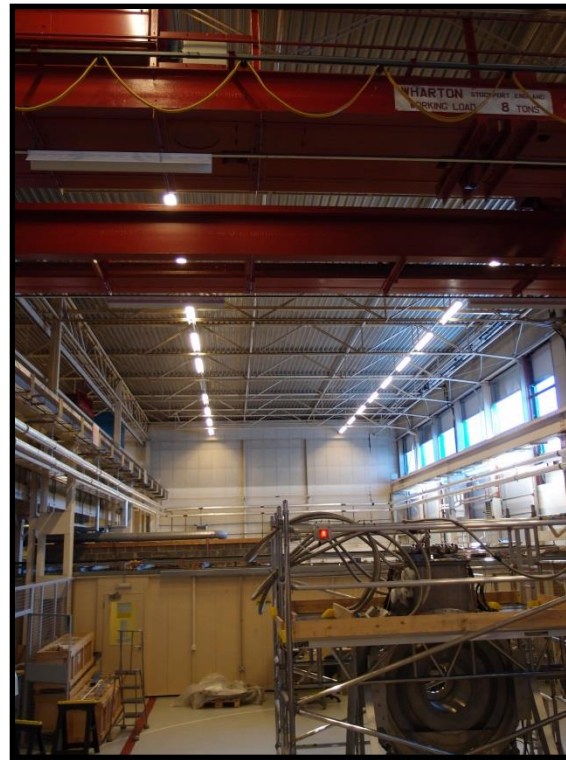
- The field mitigation work to move the cooler head compressors away from the field has progressed well.
- The mezzanine structure at the West wall of the hall is complete.
- The compressor support frames are in position with 10 compressors installed
- Services installation has started.
- The civil aspects of the new rack room have been completed including fire safety and main power.
- Magnet power and control racks are currently being installed.



- Before installation of the main structures and walls of the PRY the floor must be prepared to accept the materials.
- Floor support structures have been designed, manufactured and are now installed below floor level.



- The second Focus Coil, is progressing well.
- Powering tests are now complete.
- Magnetic Field mapping by the CERN team will be carried out after testing is imminent.
- An extension to the MICE laboratory / Construction space in building R9 has been granted and is a substantial investment to MICE.
- The operational space will be doubling in area and is fully covered by an 8 tonne crane.





<i>Total Project Spend - Excluding Revenues</i>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	Budget / Program	Project of Variance on FY
<b>NICE Full Cost Inc Overhead</b>	1,837,842	1,423,873	20,832	2,283,653	2,189,000	-28,653
<b>NICE Capital Project</b>	666,355	734,684	67,689	1,339,855	1,429,000	29,145
<b>NICE Capital Project - Revenue Inc Overhead</b>	271,833	248,465	-23,374	435,538	285,000	-150,538
<b>NICE Opn and Analysis Project - Inc Overhead</b>	153,888	176,725	17,746	328,278	484,000	155,722
<b>NICE Revenue Project Inc</b>	438,167	335,183	-102,984	815,888	765,000	-50,888
<b>NICE Full Cost Inc PPD and</b>	1,257,452	1,434,834	177,442	2,273,474	2,276,500	3,026
<b>NICE Full Cost Inc PPD and</b>	1,851,126	1,858,488	7,362	2,827,384	2,795,500	-31,884

<b>STAK00058</b>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	Budget	Project of Variance on FY
<b>St-66</b>	342,887	415,384	185,212	738,837	765,000	34,163
<b>Non-St-66</b>	354,388	319,388	-35,228	662,358	658,000	-4,358
<b>Total</b>	697,275	734,684	67,689	1,399,855	1,429,000	29,145

<b>STAK00061</b>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	Budget	Project of Variance on FY
<b>St-66</b>	158,487	133,843	-24,633	282,574	188,000	-94,574
<b>Non-St-66</b>	149,351	84,616	-28,735	242,357	185,000	-57,357
<b>Total</b>	307,838	218,459	-53,374	435,538	285,000	-150,538

<b>STAK00065</b>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	Budget	Project of Variance on FY
<b>St-66</b>	55,111	183,451	23,341	244,683	283,000	38,317
<b>Non-St-66</b>	182,838	67,273	-35,624	283,588	158,000	-125,588
<b>Total</b>	237,949	250,724	12,773	528,271	441,000	-87,271

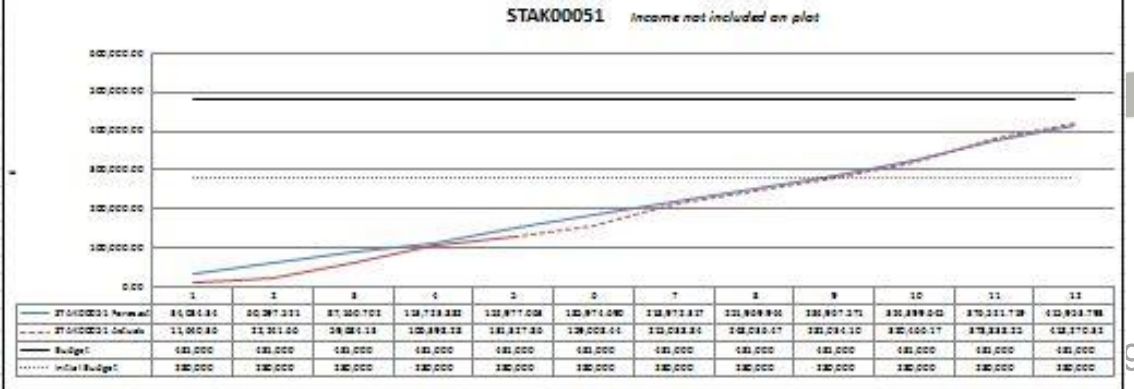
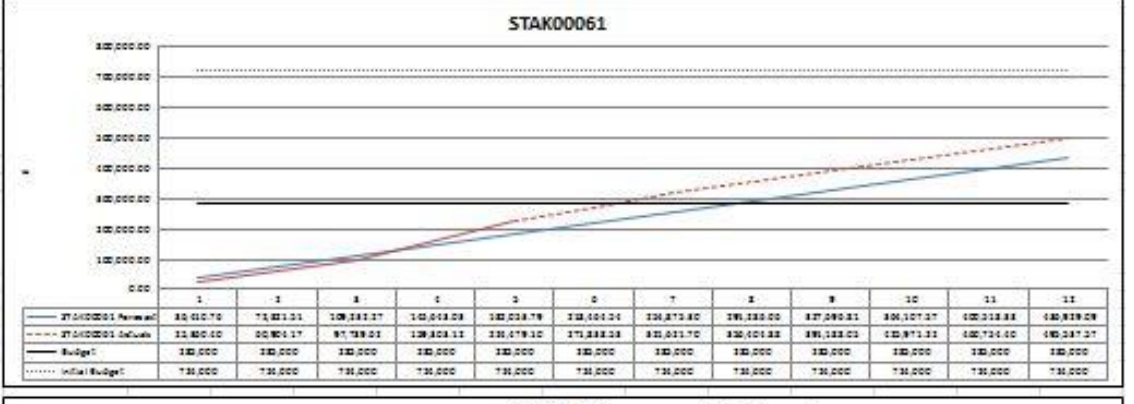
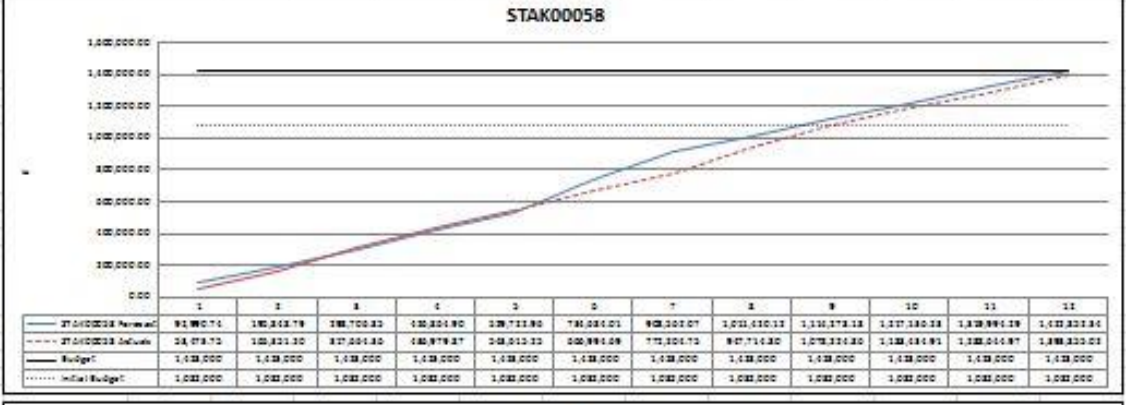
<b>Island</b>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	Program and Spread	Project of Variance on FY
<b>Capital Project</b>	43,234	85,588	42,285	168,734	165,000	3,734
<b>Revenue Project</b>	4,818	14,534	9,716	18,252	16,000	2,252

<b>PPD St-66</b>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	Program and Spread	Project of Variance on FY
<b>Capital Project</b>	1	1	1	1	1	0
<b>Revenue Project</b>	43,483	184,374	67,768	174,351	165,000	9,351

<b>Backlogs</b>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	March rolls into FY	Project of Variance on FY
<b>STAK00054</b>	23,863	53,267	33,484	124,834	165,000	40,166
<b>STAK00066</b>	67,236	77,363	18,113	163,356	165,000	-1,644
<b>PPD St-66</b>	25,888	58,214	35,126	184,428	165,000	19,428
<b>Total Backlogs</b>	116,987	188,844	86,723	472,618	495,000	-22,382

<b>Work Package</b>	Spread In Date	Forecast In Date	Variance on Spread / Forecast	Total Spend Forecast	Program and Spread	Project of Variance on FY
<b>PH &amp; PO - St-66</b>	143,352	182,427	62,475	335,266	248,878	-86,388
<b>PH &amp; PO - Non St-66</b>	184,227	183,864	-363	317,435	163,232	-154,203
<b>Mechanical - St-66</b>	45,513	34,856	-10,657	115,742	151,276	35,534
<b>Mechanical - Non St-66</b>	125,588	134,286	8,698	334,354	28,318	-255,445
<b>Electrical - St-66</b>	87,238	238,643	151,405	338,528	288,645	-49,883
<b>Electrical - Non St-66</b>	68,831	87,538	18,707	224,826	177,652	-47,174
<b>Panels Coll - St-66</b>	32,441	63,538	31,097	122,384	68,336	-54,048
<b>Panels Coll - Non St-66</b>	668	26,254	25,586	52,222	58,688	6,466
<b>Hydraulic System - St-66</b>	6,855	28,251	21,397	38,653	42,558	3,905
<b>Hydraulic System - Non St-66</b>	1,886	15,478	17,652	23,856	41,838	17,982
<b>RF System - St-66</b>	31,282	151,838	119,556	198,858	258,334	67,536
<b>RF System - Non St-66</b>	5,337	42,633	37,296	65,285	38,434	-26,851
<b>Magnetics Migration - St-66</b>	48,343	56,532	8,189	38,481	18,334	-20,147
<b>Magnetics Migration - Non St-66</b>	72,218	88,332	16,114	183,285	182,183	-1,102
<b>Process System - St-66</b>	8,327	28,538	11,658	34,158	27,238	-6,920
<b>Process System - Non St-66</b>	34,334	43,572	10,238	81,574	54,823	-26,751
<b>Software and Hardware - St-66</b>	1	5,818	5,818	1,232	1,232	0
<b>Software and Hardware - Non St-66</b>	1,763	22,758	20,995	28,863	33,713	4,850
<b>Opn and Analysis - St-66</b>	44,882	142,387	67,788	227,833	257,334	29,501
<b>Opn and Analysis - Non St-66</b>	84,328	153,413	69,085	149,138	6,888	-142,250

Forecast for the year	April	May	June	July	August	September	October	November	December	January	February	March
<b>STAK00058 Forecast</b>	32,338.74	155,048.73	238,786.85	426,864.38	523,722.36	734,684.81	888,562.87	1,811,428.42	1,114,278.48	1,217,136.23	1,319,334.23	1,422,852.34
<b>STAK00058 Actuals</b>	53,473.75	165,351.28	317,664.36	436,375.87	543,615.25	666,334.63	771,126.75	347,716.89	5,878,276.85	5,185,436.31	5,288,594.37	5,535,855.81
<b>STAK00061 Forecast</b>	36,418.76	72,821.51	183,232.27	145,643.83	182,853.73	218,464.54	254,875.38	231,286.86	327,636.81	364,187.57	488,518.33	456,323.83
<b>STAK00061 Actuals</b>	25,368.48	68,384.37	37,733.62	153,383.42	224,473.18	274,838.53	375,371.78	355,486.81	331,186.85	425,371.42	488,726.48	485,531.57
<b>STAK00065 Forecast</b>	34,834.34	68,537.524	87,168.782	119,723.882	152,377.863	185,374.638	218,372.317	251,363.344	284,367.571	324,333.645	376,321.718	415,333.733
<b>STAK00065 Actuals</b>	15,648.36	22,244.66	53,684.13	186,338.28	151,327.86	153,888.44	235,888.89	238,836.17	235,838.13	328,433.37	373,838.25	438,278.57



# Finance Update

<b>Total Project Spend - Excluding University</b>	On Spend to date	On Forecast to date	Variance on Spend / Forecast to date	Total Spend Forecast	Budget / Proposed Spend	Projected Variance at FY end	Project Code	April	September
<b>MICE Full Cost Ex PPD Inc Overhead</b>	1,097,842	1,129,873	-59,087	2,209,663	2,189,000	-20,663	STAK00058	1082	1432
<b>MICE Capital Project</b>	666,995	734,684	67,689	1,393,855	1,423,000	29,145	STAK00061	724	285
<b>MICE Capital Project - Resource</b>	271,839	218,465	-53,374	495,538	285,000	-210,538	STAK00051	280	481
<b>MICE Ops and Analysis Project</b>	159,008	176,725	17,716	320,270	481,000	160,730			
							Capital Total	1082	1432
<b>Overheads - Capital Project</b>	23,863	63,267	39,404	124,094	163,584	39,490	Resource Total	1004	766
<b>Overheads - Resource Project</b>	67,256	77,369	10,113	163,336	104,046	-59,289			
<b>MICE Full Cost Inc PPD and Overhead</b>	1,257,452	1,434,894	177,442	2,773,171					

- Capital project forecasting an underspend of £29.1k
- Resource project forecasting an overspend of £49.8k
- Need to report on the separate aspects of the project – can't add them together anymore
- STFC staff costs include overheads on resource project codes
  - Wp 1 – PM & PO (STAK00061)
  - Wp 10- Operations and Analysis (STAK00051)
- Budget was revised in September
- Forecasts try to capture all spares, equipment and staff
- Income included at.....64k common fund, 34k EuCard



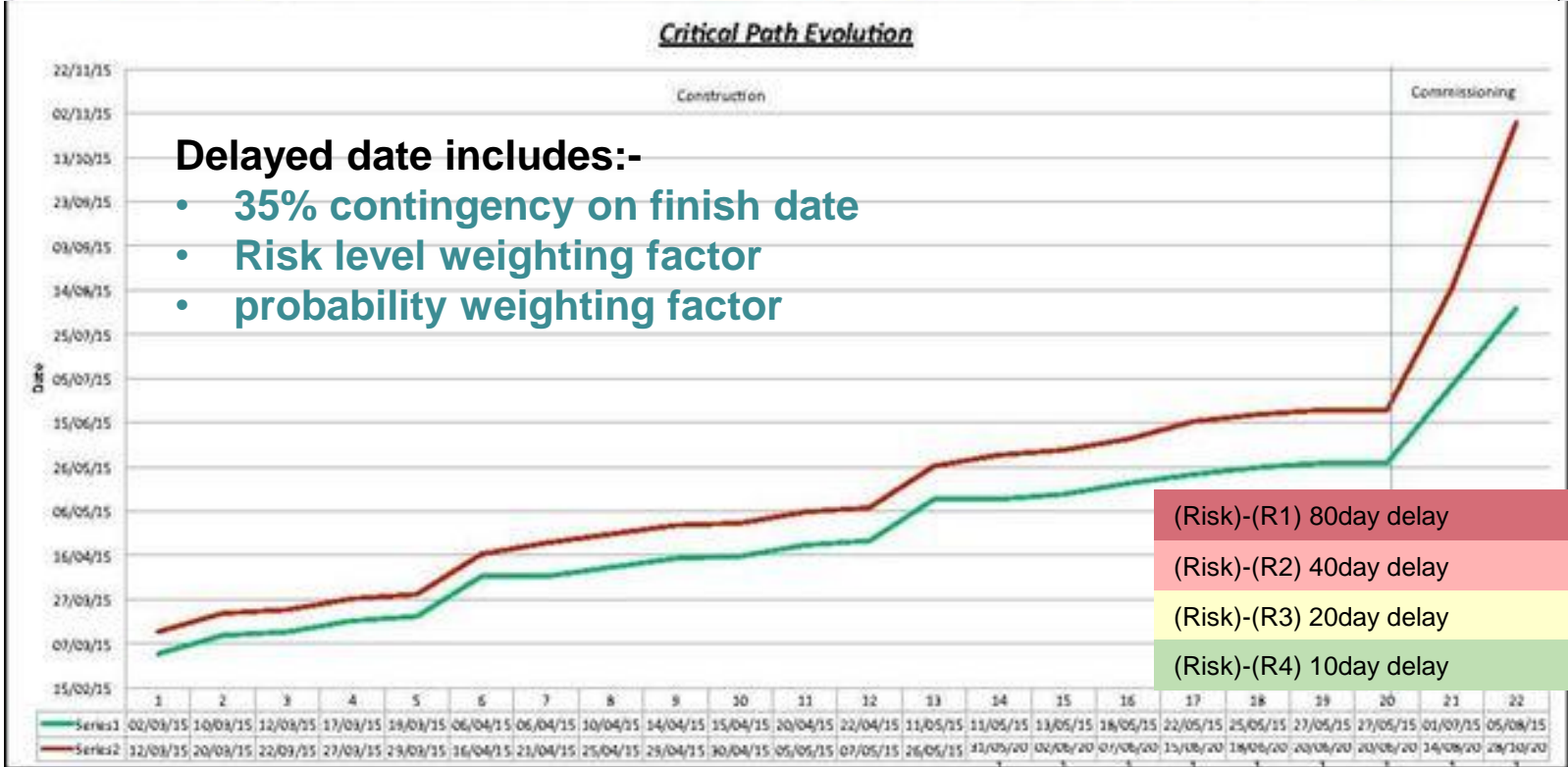
## Key Schedule Dates

- South PRY Frame and plates - 2nd March 2015
- North PRY frame - 2nd March 2015
- North PRY plates - 24th March 2015
- Construction complete - 27th May 2015
- Magnet Commissioning Complete – 5<sup>th</sup> August 2015
- ISIS User beam
  - 2015/1 - 2<sup>nd</sup> June 2015 to 24<sup>th</sup> July 2015
  - 2015/2 - 8<sup>th</sup> Sept 2015 to 16<sup>th</sup> Oct 2015



# Critical Path - Schedule Delays Due to Risk

WBS	Name	Finish Date	Risks Level	Risk Impact	Risk Level Duration	Probability	Delay due to Risk	Sequential Delay
3.9.1	South side yoke frame steelwork delivered	02/03/15	(RISK)-(R2)	Contractor late delivery	40	0.25	12/03/15	10
5.4.5.1.1	Survey Floor & PRY legs	10/03/15					20/03/15	10
5.4.5.1.2	Cut shim	12/03/15					22/03/15	10
5.4.5.1.3	Install frame legs (inc drilling plates)	17/03/15					27/03/15	10
5.4.5.1.4	Survey PRY legs	19/03/15					29/03/15	10
5.4.5.2	Fit south side yoke plates	06/04/15					16/04/15	10
5.4.5.3	South side return yoke installation complete	06/04/15	(RISK)-(R4)	Installation time extension	10	0.5	21/04/15	15
5.4.7.2	Push onto Beamline position and fix	10/04/15					25/04/15	15
5.4.8.2	Push onto Beamline position and fix	10/04/15					25/04/15	15
5.4.5.4.1	Survey Floor & PRY Legs	14/04/15					29/04/15	15
5.4.5.4.2	Cut shim	15/04/15					30/04/15	15
5.4.5.4.3	Install frame legs (inc drilling plates)	20/04/15					05/05/15	15
5.4.5.4.4	Survey PRY legs	22/04/15					07/05/15	15
5.4.5.5	Fit North side yoke plates	11/05/15					26/05/15	15
5.4.5.6	North side return yoke installation complete	11/05/15	(RISK)-(R4)	Installation time extension	10	0.5	31/05/15	20
5.4.9.2	Cryostat stands - North side in place	13/05/15					02/06/15	20
5.4.9.3	Move North side cryostats to hall and place in position	18/05/15					07/06/15	20
5.4.9.10.3	Reform and connect external waveguides to fit from PP to Cryostat - After North PR	22/05/15	(RISK)-(R3)		20	0.2	15/06/15	24
5.4.9.10.4	Errect trellis to support external waveguides - After North PRY installation	25/05/15					18/06/15	24
5.4.10	Re-install TOF2, KL, EMR	27/05/15					20/06/15	24
5.4.11	MICE step IV installation complete	27/05/15					20/06/15	24
6.2	Spectrometer Solenoid preparation for lattice operation	01/07/15	(RISK)-(R2)	Items found to be non operational in field ramping	40	0.5	14/08/15	44
6.3	Combined magnet operation	05/08/15	(RISK)-(R2)	Extended period for training all magnets together - delay sta	40	1	28/10/15	84



# Critical / Near Critical Path

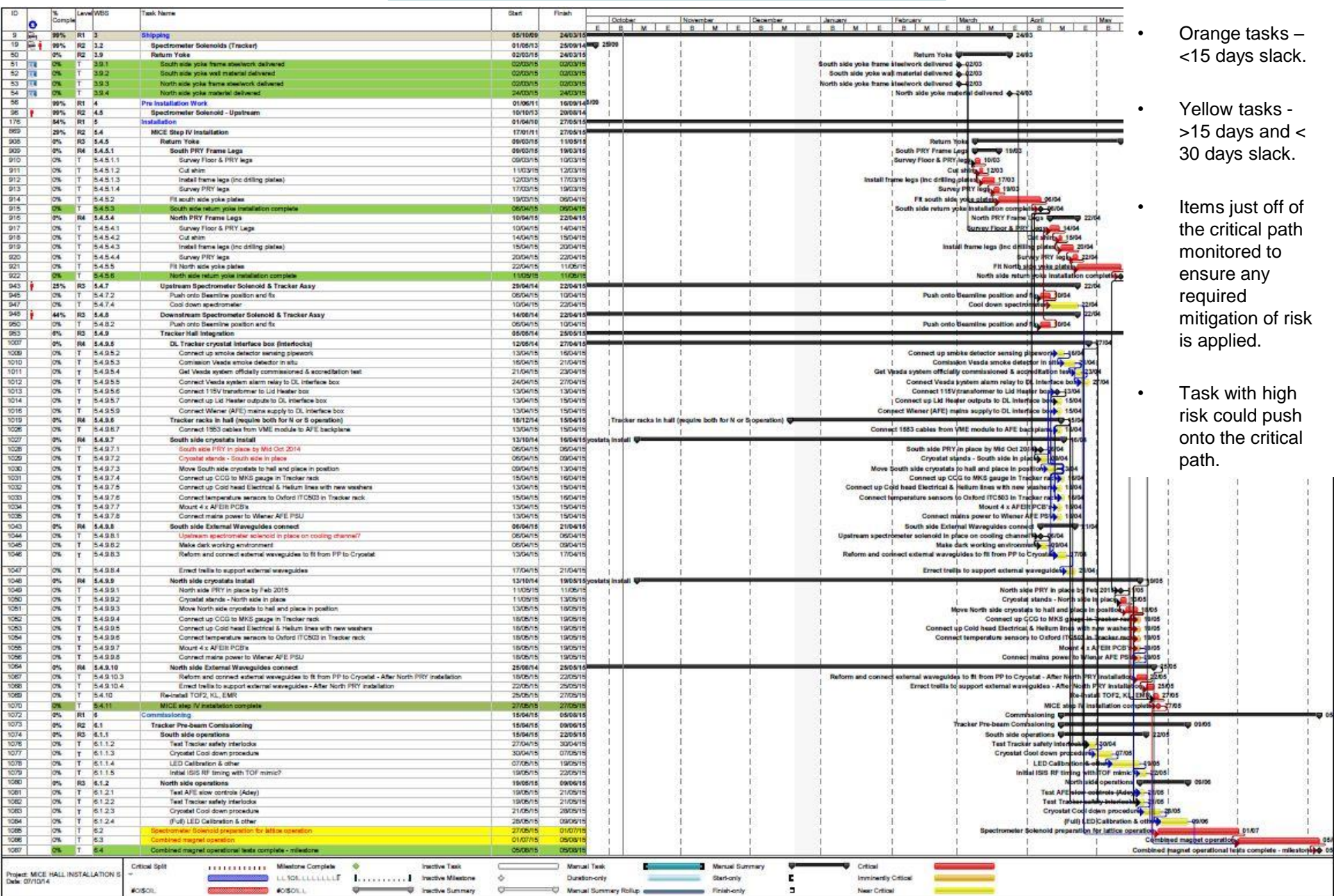
- Red tasks – Critical Path

- Orange tasks – <15 days slack.

- Yellow tasks - >15 days and < 30 days slack.

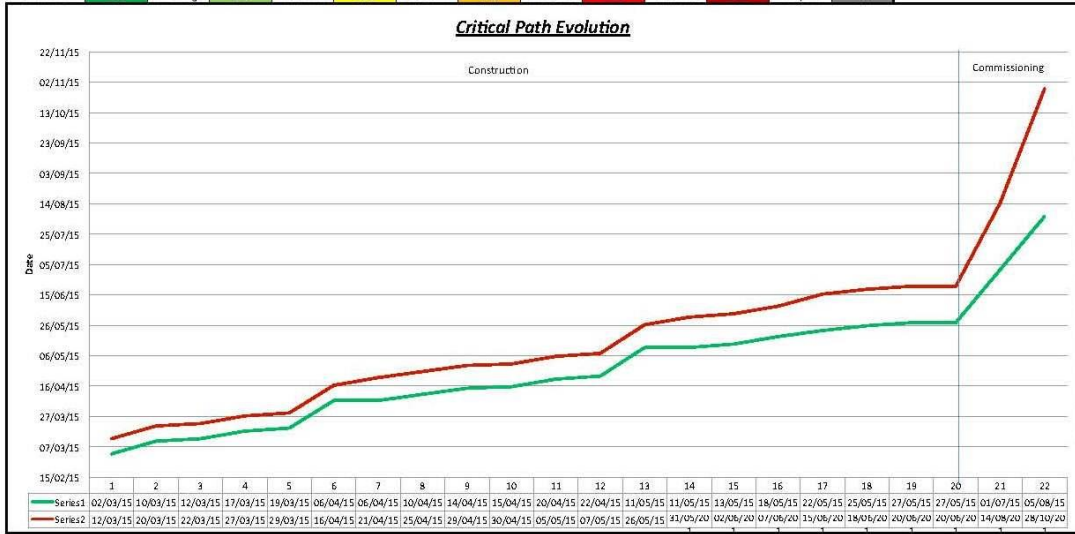
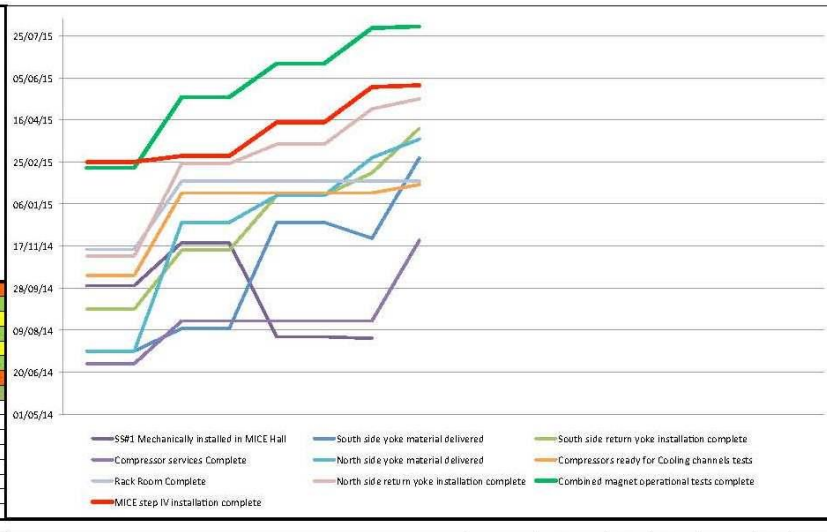
- Items just off of the critical path monitored to ensure any required mitigation of risk is applied.

- Task with high risk could push onto the critical path.



# Schedule Dashboard

	SSR2 Mechanically installed in MICE Hall	AFC installed in R2 ready for field mapping	Downstream Solenoid arrives at DAL	SSR1 Mechanically installed in MICE Hall	AFC1 ready for installation in MICE Hall	West Mez. build Complete - milestone	South side yoke material delivered	Rack Room 2 BPG work Complete	South side return yoke installation complete	Compressor services Complete	North side yoke material delivered	Compressors ready for Cooling channels tests	Rack Room Complete	North side return yoke installation complete	Combined magnet operational tests complete	MICE step IV installation complete
Feb-14	04/04/14	13/05/14	08/05/14	01/10/14	18/07/14	25/03/14	15/07/14	24/06/14	03/09/14	30/06/14	15/07/14	13/10/14	19/11/14	05/11/14	18/02/15	25/02/15
Mar-14	24/04/14	23/05/14	08/05/14	01/10/14	18/07/14	19/03/14	15/07/14	24/06/14	03/09/14	30/06/14	15/07/14	13/10/14	13/11/14	05/11/14	18/02/15	25/02/15
Apr-14	07/05/14	30/05/14	15/05/14	14/08/14			11/08/14	09/07/14	12/11/14	15/12/14	15/12/14	19/01/15	02/02/15	23/02/15	13/05/15	04/03/15
May-14	09/05/14	23/05/14	30/04/14	21/11/14	14/08/14		11/08/14	12/05/14	12/11/14	20/08/14	15/12/14	19/01/15	02/02/15	23/02/15	13/05/15	04/03/15
Jun-14				01/08/14	13/08/14		15/12/14	16/01/15	20/08/14	16/01/15	16/01/15	19/01/15	02/02/15	18/03/15	22/06/15	13/04/15
Jul-14				01/08/14			15/12/14	16/01/15	20/08/14	16/01/15	16/01/15	19/01/15	02/02/15	18/03/15	22/06/15	13/04/15
Aug-14				30/07/14			26/11/14	12/02/15	20/08/14	02/03/15	19/01/15	02/02/15	29/04/15	03/08/15	25/05/15	
Sep-14							02/03/15	06/04/15	24/11/14	24/03/15	29/01/15	02/02/15	11/05/15	05/08/15	27/05/15	
Oct-14																
Nov-14																
Dec-14																
Jan-15																
Feb-15																
Mar-15																
Apr-15																
May-15																



Critical Path Task	Finish date with Contingency	Delayed Finish due to Risk Realisation	Risk Level attributed to task	Duration of Risk level (days)	Probability of risk being attracted	Duration delay (Days)	Sequential Delay (Days)
South side yoke frame steelwork delivered	02/03/15	12/03/15	2	40	25%	10	10
Survey Floor & PRY legs	10/03/15	20/03/15					10
Cut shim	12/03/15	22/03/15					10
Install frame legs (inc drilling plates)	17/03/15	27/03/15					10
Survey PRY legs	19/03/15	29/03/15					10
Fit south side yoke plates	06/04/15	16/04/15					10
South side return yoke installation complete	05/04/15	21/04/15	4	10	50%	5	15
Push onto Beamline position and fix	10/04/15	25/04/15					15
Survey Floor & PRY Legs	14/04/15	29/04/15					15
Cut shim	15/04/15	30/04/15					15
Install frame legs (inc drilling plates)	20/04/15	05/05/15					15
Survey PRY legs	22/04/15	07/05/15					15
Fit North side yoke plates	11/05/15	26/05/15					15
North side return yoke installation complete	11/05/15	31/05/2015	4	10	50%	5	20
Cryostat stands - North side in place	13/05/15	02/06/2015					20
Move North side cryostats to hall and place in position	18/05/15	07/06/2015					20
Reform and connect external waveguides to fit from PP to Cryostat - After North PRY installation	22/05/15	15/06/2015	3	20	20.00%	4	24
Erect truss to support external waveguides - After North PRY installation	25/05/15	18/06/2015					24
Re-install TOF, KL, EMR	27/05/15	20/06/2015					24
MICE step IV installation complete	27/05/15	20/06/2015					24
Spectrometer Solenoid preparation for lattice operation	01/07/15	14/08/2015	2	40	50.00%	20	44
Combined magnet operation	05/08/15	28/10/2015	2	40	100.00%	40	84

- Focus Coil #2 testing is nearing completion.
- Both Spectrometer Solenoid magnets are installed in the hall
- Focus Coil #1 is installed in the hall
- West wall compressor services require installation of the water panel and pipework

# Top Level Risks

AFC#2 testing making good progress.

Anticipate retiring this risk very shortly.

Plan to use AFC#2 for step IV.

Experience gained in stepIV will help to minimise risks for next step



ID	Risk Description	Potential impact on project	Risk score			Ownership	Proposed Action	Post-action risk score			Comment / Conclusion	Cost of mitigation		Likely retirement of requirement
			L	I	Lxl			L	I	Lxl		Staff years	Non-staff (£k)	
			MICE 3	Magnetic field effecting operation of electrical equipment relating to the continued operation of the cooling channel magnet systems and detectors.	Inability to operate the cooling channel			5	5	25		MICE - UK / MAP	Installation of a partial return yoke has mitigated the major risk. Movement of the control and power supply equipment to a dedicated room outside of the magnetic field.	
MICE 4	Extended period of re-training for the lattice of magnets for Step IV - SS11/AFC/SS2.	Timescales for the training period, cost of the amount of LHe required to carry out the training the availability of the LHe. Expert personnel required to be available for magnet operations over a protracted period of time.	4	5	20	MICE-UK / MAP	Discussions with BOC (or supplier) to agree delivery timescales and availability during heavy use periods. Magnet integration task force to define commissioning method to keep schedule and cost to a minimum.	4	4	16	1	100	End step IV	
MICE 5	AFC Module #2 has the same type of fault as AFC module #1	Extended delay and uncertain cost burden.	4	5	20	MICE - UK	Bring forward test of module #2. Shorter timescale for training runs. Purchase of additional LHe if required to shorten timescale	2	4	8	0.2	15	End Sept 14 after final soak test.	
MICE 7	VAT payable on the delivery of all equipment imported from the non-UK collaborators	Budgetary constraints resulting in reduced work force and installation activities being carried out.	4	5	20	MICE UK	Escalation of the issue to the legal department of the STFC	2	4	8	0.1	100	Impacts final step	
MICE 8	Resourcing issues	inability to complete significant sections of work on agreed time or cost scales.	4	5	20	MICE - UK / MAP	Escalation of the issue to the STFC and DOE.	2	4	8	2		Impacts Step IV and all other steps.	
MICE 9	Senior management of the MAP collaboration / MICE-US changes.	Leadership and direction of the construction team unfocused.	4	5	20	MAP		n/a	n/a	n/a			End of Step 3PI2	
MICE 10	Late delivery of the PRY and / or Cavities for Step 3PI2 after advanced scheduling.	Standing army cost for period after hall preparations are complete and receipt of the PRY materials / Cavities	3	5	15	MICE-UK / MAP	Interaction with the MICE-US construction team.	2	5	10	£90k / Month		End of Step 3PI2	
MICE 11	US budget cuts changing magnet manufacture, commissioning and delivery	Halting project installation and subsequent data taking. Loss of key personnel from the project. Inability to continue with full cooling program.	4	5	20	MAP	Discussion with senior STFC management.	2	4	8			Impacts Step IV and Step 3PI2	
MICE 12	RF Power systems are not available for cavity testing	The critical path items following the RF system installation will extend in time. Testing of the cavities with and without B field. Commissioning of the channel and gaining data for the final step	4	5	20	MICE UK	Discussions with UK senior management to gain sufficient staff to carry out the work required on the RF systems and controls. Additional technical staff from collaborating institutes for	2	5	10	2	75	End of Step 3PI2	
MICE 13	Focus Coil 1 extended timescale for repairs to gain full operating current.	Repairs enabling the Focus Coil 1 to operate at the nominal currents for the experiment are not completed in time for installation and operation in the Step 3PI2	4	5	20	MICE UK	Scientific substantiation for the need to run at the higher current. Discussions with the manufacturing company to gain realistic timescales and cost. MICE project interaction with the manufacturing company senior management and supply technical effort to expedite the repairs.	2	5	10	1	100	Decision point 15th November.	

# Schedule Summary

	Finish Date Includes Contingency 35%	Delayed Finish date due to Risks
Step IV Construction Complete	27/5/15	20/6/15
Step IV magnet commissioning Complete	5/8/15	28/10/15
ISIS User beam	Start	End
2015/01	2/6/15	24/7/15
2015/02	8/9/15	16/10/15

## Step IV

- Critical path - driven by PRY.
- South PRY delivery 2<sup>nd</sup> March 2015.
- North PRY delivery in s 2 stages:-
  - frame 2<sup>nd</sup> March 2015
  - plates 24<sup>th</sup> March 2015
- Finish dates have 35% contingency
- Risk delays include weighting factors for risk level and probability
- Ongoing - identifying & quantifying risks.
- Schedule & risks need to be monitored as these will change

