



# Cost to Complete Cost Options

**Alan Grant**  
**STFC DL**

*26<sup>th</sup> April 2016*

# Overview

## Cost to Complete

- Flat Cash +10%
- Flat Cash

## OsC requests

- Further cost Reduction Options
- Stop at Step IV

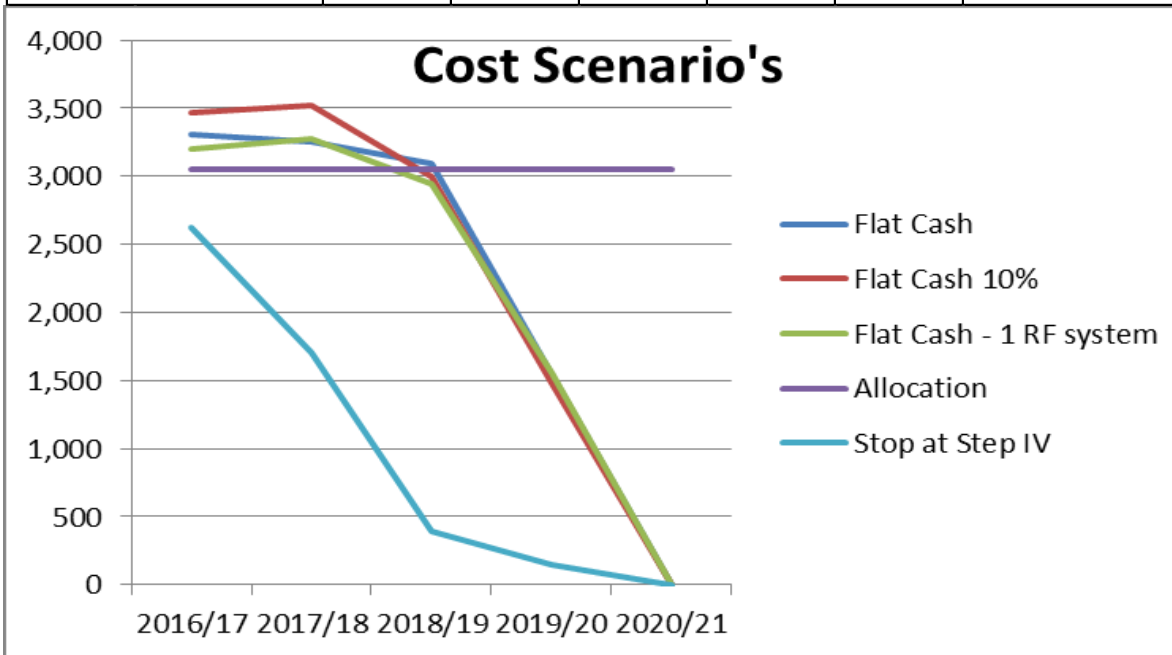
## Summary

- **Costs differ from those presented in the report following feed back from the MPB, delaying the delivery of the SSD by 7mths to August 2018**
- **Costs do not include procurement of SSD..... or finance transfers from DOE for the SSD**



# Cost to Complete

Cost to Completion Summary						
	2016/17	2017/18	2018/19	2019/20	2020/21	Total Inc Mitigation Cost
<b>Flat Cash + 10%</b>	3,334	3,338	2,994	1,478		<b>11,454</b>
<b>% above allocation</b>	8%	9%	-7%	-56%		
<b>Flat Cash</b>	3,307	3,252	3,095	1,550		<b>11,204</b>
<b>% above allocation</b>	3%	1%	-4%	-54%		
<b>Flat Cash - 1 RF system</b>	3,199	3,275	2,945	1,561		<b>10,979</b>
<b>% above allocation</b>	-1%	1%	-8%	-53%		
<b>Stop at Step IV</b>	2,620	1,708	389	149		<b>4,867</b>
<b>% above allocation</b>	-20%	-49%	-90%	-98%		



## Cost to Complete DoIC – Flat Cash + 10%

Work package		2016/17	2017/18	2018/19	2019/20	2020/21	
Id	Name	£k	£k	£k	£k	£k	£k
<b>Total staff and non-staff by work package</b>							
<b>MICE-UK</b>							
1	Project management and project office	519.95	585.87	415.24	26.20		1547.26
2	Mechanical integration	338.70	344.85	153.16	27.05		863.76
3	Electrical Integration	310.91	256.82	206.08	21.08		794.88
4	Focus-coil module	199.52	186.20	183.92	51.54		621.18
5	Hydrogn Delivery System	62.34	21.49				83.82
6	RF power	588.96	438.87	411.19	68.58		1507.60
7	Vacuum	98.01	62.59	40.24	5.92		206.76
8	Magnetic Mitigation	66.32	11.49	5.83			83.65
9	Software and computing	340.02	389.42	380.04	385.74		1495.22
10	Operations and analysis	939.11	1220.50	1198.41	891.90		4249.92
<b>Grand totals</b>		<b>3463.85</b>	<b>3518.09</b>	<b>2994.11</b>	<b>1478.01</b>		<b>11454.06</b>
<b>MICE-UK Cost of risk mitigation</b>							
		<b>130.00</b>	<b>180.00</b>				<b>310</b>
	<b>% above allocation</b>	<b>8%</b>	<b>9%</b>	<b>-7%</b>	<b>-56%</b>		

### Assumptions:-

- SSD delivery early Aug 2018
- Continue with step IV until September 17
- Complete RF system#2 build and test at DL and deliver to RAL mid July 17.
- Push back installation of RF system#2 until April 18 – effort saving!!
- Only test RF system #2 into dummy loads.
- Do not carry out HPRF tests on the cooling channel for cavity#1 using RF system#2. This set of tasks which takes approx. 1mth but may not be necessary. Small risk to project.

### Key Dates:-

- Commissioning complete Feb 19 after 6 months of commissioning
- End of Data taking Sept 19....7mths running DoIC
- End of analysis end Mar 20

- Includes University costs & resource charges
- Budget £3,050M

### **IN ALL CASES!!**

- **Costs do not include US FTE's for commissioning for SS's**
- **Costs do not include US FTE's for commissioning for RF systems**



## Cost to Complete DoIC – Flat Cash

Work package		2016/17	2017/18	2018/19	2019/20	2020/21	
Id	Name	£k	£k	£k	£k	£k	£k
<b>Total staff and non-staff by work package</b>							
<b>MICE-UK</b>							
1	Project management and project office	519.95	585.87	399.59	26.20		1531.62
2	Mechanical integration	250.50	345.36	258.51	47.96		902.33
3	Electrical Integration	264.91	256.82	206.08	69.19		796.99
4	Focus-coil module	199.52	186.20	163.33	51.54		600.59
5	Hydrogn Delivery System	62.34					62.34
6	RF power	566.56	351.60	443.46	71.54		1433.16
7	Vacuum	98.01	62.59	40.24	5.92		206.76
8	Magnetic Mitigation	66.32	11.49	5.83			83.65
9	Software and computing	340.02	389.42	380.04	385.74		1495.22
10	Operations and analysis	939.11	1062.23	1198.41	891.90		4091.65
<b>Grand totals</b>		<b>3307.24</b>	<b>3251.57</b>	<b>3095.50</b>	<b>1549.99</b>		<b>11204.30</b>
<b>MICE-UK</b>	<b>Cost of risk mitigation</b>	<b>130.00</b>	<b>180.00</b>				<b>310</b>
	<b>% above allocation</b>	<b>3%</b>	<b>1%</b>	<b>-4%</b>	<b>-54%</b>		

### Assumptions:-

- Same as above but delivery of RF system#2 April 18..... cost levelling.

### Key Dates:-

- Same as Flat Cash +10%

# OsC mtg 21<sup>st</sup> March

- requested - to look at further cost reductions
- may involve restructuring to deliver meaningful experiment
- also to understand cost savings if we stop at stepIV



## Cost to Complete DoIC – Flat Cash Only 1 RF system

Work package		2016/17	2017/18	2018/19	2019/20	2020/21	
Id	Name	£k	£k	£k	£k	£k	£k
<b>Total staff and non-staff by work package</b>							
<b>MICE-UK</b>							
1	Project management and project office	519.95	585.87	399.59	26.20		1531.62
2	Mechanical integration	250.50	345.36	258.51	47.96		902.33
3	Electrical Integration	264.91	256.82	206.08	69.19		796.99
4	Focus-coil module	199.52	186.20	163.33	51.54		600.59
5	Hydrogn Delivery System	62.34					62.34
6	RF power	457.87	375.36	292.79	82.14		1208.17
7	Vacuum	98.01	62.59	40.24	5.92		206.76
8	Magnetic Mitigation	66.32	11.49	5.83			83.65
9	Software and computing	340.02	389.42	380.04	385.74		1495.22
10	Operations and analysis	939.11	1062.23	1198.41	891.90		4091.65
<b>Grand totals</b>		<b>3198.55</b>	<b>3275.34</b>	<b>2944.83</b>	<b>1560.59</b>		<b>10979.30</b>
<b>MICE-UK</b>	<b>Cost of risk mitigation</b>	<b>130.00</b>	<b>180.00</b>				<b>310</b>
	<b>% above allocation</b>	<b>-1%</b>	<b>1%</b>	<b>-8%</b>	<b>-53%</b>		

- Most saving in yr 2016/17.....ceasing work on the RF system#2 build & test.





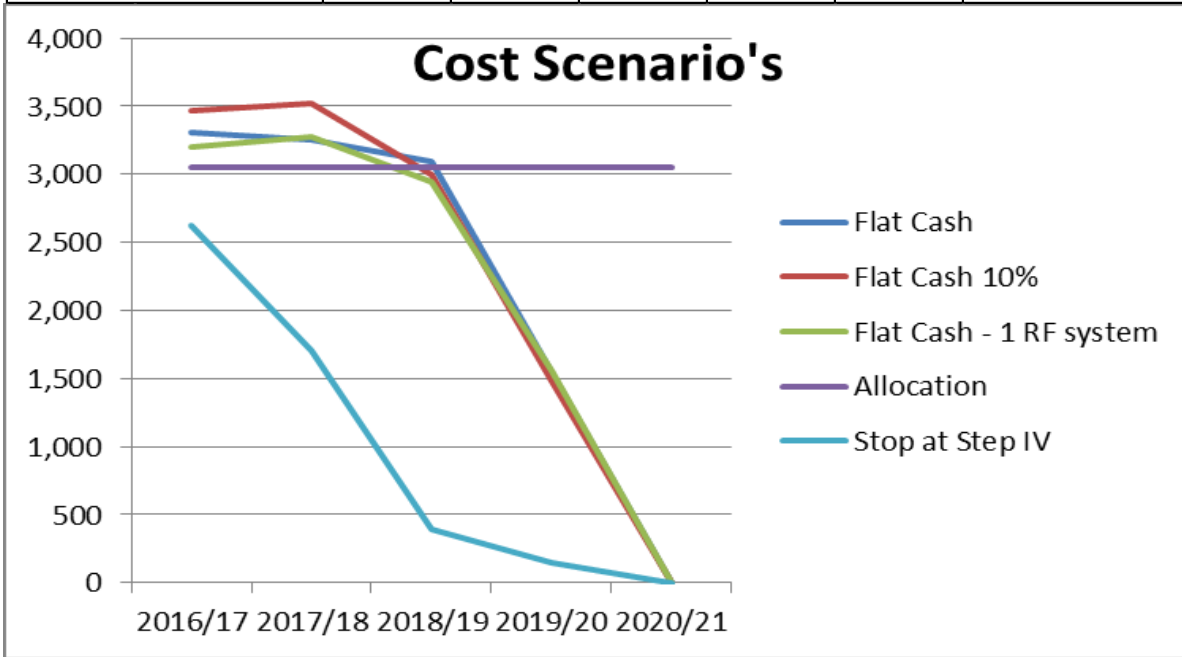
## Cost to Complete DoIC – Stop at Step IV

<i>Stop at Step IV - 1/7/2017</i>							
Work package		2016/17	2017/18	2018/19	2019/20	2020/21	
Id	Name	£k	£k	£k	£k	£k	£k
<b>Total staff and non-staff by work package</b>							
<b>MICE-UK</b>							
1	Project management and project office	519.95	164.30				684.26
2	Mechanical integration	246.20	110.74				356.94
3	Electrical Integration	254.91	118.23				373.14
4	Focus-coil module	128.94	27.39				156.33
5	Hydrogn Delivery System	62.34	10.74				73.08
6	RF power						
7	Vacuum	61.92	17.54				79.47
8	Magnetic Mitigation	66.32					66.32
9	Software and computing	340.02	389.42	95.01			824.45
10	Operations and analysis	939.11	869.89	294.49	149.26		2252.75
<b>Grand totals</b>		<b>2619.72</b>	<b>1708.26</b>	<b>389.50</b>	<b>149.26</b>		<b>4866.74</b>
<b>MICE-UK Cost of risk mitigation</b>							
		<b>130.00</b>	<b>20.00</b>				<b>150</b>
	<b>% above allocation</b>	<b>-20%</b>	<b>-49%</b>	<b>-90%</b>	<b>-98%</b>		

- Student costs required in 2018/19 & 2019/20 assuming 3.5 yr course commencing October 2016

# Summary

Cost to Completion Summary						
	2016/17	2017/18	2018/19	2019/20	2020/21	Total Inc Mitigation Cost
<b>Flat Cash + 10%</b>	3,334	3,338	2,994	1,478		<b>11,454</b>
<b>% above allocation</b>	8%	9%	-7%	-56%		
<b>Flat Cash</b>	3,307	3,252	3,095	1,550		<b>11,204</b>
<b>% above allocation</b>	3%	1%	-4%	-54%		
<b>Flat Cash - 1 RF system</b>	3,199	3,275	2,945	1,561		<b>10,979</b>
<b>% above allocation</b>	-1%	1%	-8%	-53%		
<b>Stop at Step IV</b>	2,620	1,708	389	149		<b>4,867</b>
<b>% above allocation</b>	-20%	-49%	-90%	-98%		



# Summary

## MICE UK Costs (k's)

Allocation Period Phase 1 Construction						
Spend	Spend	Spend	Spend	Spend		Phase 1
to 2008	2008/9	2009/10	2010/11	2011/12		
10,100	2,953	3,064	3,003	3,129		22,249

Allocation Period Phase 2 Construction					
Spend	Spend	Spend	Allocation		Phase 2
2012/13	2013/14	2014/15	2015/16		
2,613	3,509	3,100	3,278		12,500

Allocation Period Phase 3					
Requirement	Requirement	Requirement	Requirement		Phase 3
2016/17	2017/18	2018/19	2019/20	2020/21	
3,307	3,252	3,095	1,550		11,204

Total Spend across all three phases of the project					45,953
--	--	--	--	--	--------

- Allocation and required figures include risk mitigation costs for equipment and staff
- The 2018/19 FY request is for operations until Sept 2019 with 7 months of data taking and subsequent data analysis & paper writing.
- The 2019/20 request is for data analysis and paper writing until March 2020 end of 2019 FY
- Phase 3 costs based on Flat Cash figures
- Required allocation for Phase 3 - £11,204k
- Total UK spend for MICE £45,935k

# Questions?



# Backup



# UK Risks

Risk Burn Down 15th October 2015	Number of Active Risks	Number of retired Risks	New Risk added	Total Risk	Burn down
Top Level	20	3	10	23	13%
PM&PO	24	18	0	42	43%
Magnets	8	12	7	20	60%
LH2	4	23	0	27	85%
Electrical	5	6	0	11	55%
RF	15	6	0	21	29%
Mechanical	5	13	0	18	72%
Computing	6	41	0	47	87%
Muon Beam	2	3	0	5	60%

## New Risk Added

- Failure of Upstream Spectrometer Solenoid Magnet
- Failure of M2 in SSD.
- Failure of Helium space feedthrough in SSD.
- Cannot agree program and budget
- SSD delivery on schedule, quality & cost
- Problems during magnet string commissioning
- PED test of SSD vessel
- Staffing - risk that project cannot procure required technical magnet expert staff
- Failure to refresh and renew US leadership
- Inability to cool absorber to required temp

