

MICE - Resource Loaded Schedule Review (RLSR) Apr 29th 2014:

Panel Report

Professor Ian Robson, Panel Chair, Apr 29th 2014

Introduction

The RLSR was held at the RAL on the above date. The previous Review of November 2013 had requested the experiment and funding agencies to answer a series of recommendations; these are given in Appendix 1. The charge to the Panel is given in Appendix 2 and the Panel members in Appendix 3.

This meeting took place during the final stages of a negative change in the funding situation and potential future support within the USA. With this in mind the MICE Project Board concentrated on the technical aspects of the programme and the deliverability of the science goals; while specifically seeking to ascertain the benefits of Step V versus Step VI. The RLSR addressed the schedule, costs and risks and in particular, focused on the realism or otherwise of the project planning schedule for the achievement of the critical milestone: the completion of the installation of Step IV.

The Panel investigated the staffing resource, the financial planning and the risk register and its use in the schedule planning. Three members of the Panel spent two hours working with the Project Manager and Project Associate understanding what assumptions had been made in constructing the project plan and how schedule contingency had been folded in. This session also included agreement of what should appear (and in which format) for future reports.

General comments on the progress of the work are left to the MICE Project Board Report.

A number of *recommendations* to the project and funding agencies are provided along with one *action*.

Response to Recommendations from the RLSR of November 2013

The Panel were pleased to note that all of the recommendations had been implemented to a good degree; however, as noted above, the crucial point now is asserting the degree of confidence in the schedules, in particular to the completion of construction of STEP IV. The decision process regarding STEP V and VI has been overtaken by events as discussed below.

Project Management

The new arrangements introduced for the last RSLR appear to be working well and most of the posts have now been filled. The project does now appear to be more integrated across the two sides (UK and US) and the key deliverables are identified and milestones tracked. The project uses Microsoft Project to track the schedule and critical path, although both sides use a separate project plan, coming together at clearly defined interface points, which are usually

deliverables to the RAL site. As noted above, a special session was spent with the project management team to understand better the working methodology, which is discussed below.

Schedule

This is now a critical facet of the project. It is vitally important that the level 1 milestone, the completion of the installation for STEP IV that is currently scheduled for March 4th 2015, is achieved on time. This is a critical milestone that needs to be achieved to demonstrate the project's control over schedule, which up to now has not been apparent. All members of the consortium must now focus on achieving this milestone as a matter of urgency. Unfortunately, the documentation presented to the Panel describing the schedule was somewhat confusing and hence the time spent working through the details and assumptions with the team as discussed above.

The overall schedule now includes contingency both within the USA and UK and this deserves further explanation for the record. The US methodology was to construct a schedule, which for a task of a given duration, had an additional schedule contingency. This was typically near 35% and gave an overall finish date to the task in question and it is this date that is used as the US deliverable point in the UK schedule. This use of schedule contingency has been positive in the sense that the US-MICE has done reasonably well in hitting these dates; many of the technically challenging magnets have successfully passed testing and some have been delivered within the last six months.

Following this lead and previous recommendations from the RLSR, the UK has adapted the same methodology, ensuring that there is no duplication of contingency. However, how this contingency is handled with regard to consecutive tasks needs further work before the next meeting. In both countries, risks, as identified in the risk table, may add additional time giving a 'risk' schedule date. Using this methodology, three schedules can be produced: the optimistic schedule with no contingency; the contingency added schedule (just described), which is referred to as the baseline schedule; the worst case risk schedule, which assumes all the risks occur.

Given the very recent news about the US funding situation and the possible way forward (stop at STEP V), much attention was focused on achieving the STEP IV milestone of March 4th 2015. It was also clear that insufficient planning has yet been undertaken on the actual commissioning of the project and the planning for the runs. At a top-level the minimum run-time was four ISIS runs, each of which is six weeks, but to this has to be added additional time for the commissioning of the magnets, which are far from risk-free. The next planned ISIS shut-down is for the first three months of 2016, but at this time it is not absolutely clear that it will affect MICE. Nevertheless, it would be prudent for the project to assume that it will and plan accordingly, unless informed otherwise.

Regarding the schedule, the good news is that since the last meeting a number of deliverables have occurred, and these have been to schedule, although the milestone for STEP IV completion has slipped some six weeks. The critical path between now and this key milestone

contains a number of items that are out of the control of the project, specifically the construction of the partial return yoke in both the USA and the UK. However, these are recognised by the project and are included in the risk register (see later). The risks, schedule and milestones are reviewed monthly, which is good practice.

In the creation of the critical path charts, the above UK baseline schedule is used, although currently there is a known bug in the process (as discussed above). A system is being brought online which will calculate a 'baseline' date using a weighted value derived from the schedule contingencies in each task in the critical path. The committee reviewed the methodology and agrees it will be a more representative value for future use in comparing the baseline to the optimistic and risk dates.

The project dashboard is a very useful tool that MICE should continue to use and should be included along with the slip chart in the future reports. The dashboard shows a considerable amount of slip on many of the Step IV interim dates, with minimal slippage on Step V dates. This is because while Step IV is on target to hit the end of the ISIS shutdown in spring of 2015, the Step V start date in the current schedule is based on the delivery of the RFCC module 1 to RAL (nominally March 2018) minus 6 months, which is September 2017. Currently this leaves approximately 2.5 years of time for commissioning and running in STEP IV. However, in the recently proposed expedited Step V schedule rework (see below) these dates should be high level milestones, agreed upon by all parties, ensuring the commissioning and running time for Step IV is sufficient.

However, one of the key aspects that will need to be addressed is the probable reworking of the schedule to provide a project conclusion at the end of STEP V. This 'minimum time' or 'expedited' STEP V schedule may impact on its start time and have potential implications on the scientific data-taking for STEP IV. A possible scenario for this schedule change was presented at the Review (but not in the documentation as it was so hot off the press). This critically brings forward the completion of STEP V installation. The key component of this is the abandonment of the one-year testing of the RFCC in the Mucool Test Area (MTA) in Fermilab. The new plan would be to fully assemble the RFCC in the USA (rather than at RAL in the previous plan) and to ship it and have the high-power tests conducted at RAL rather than in the USA. This clearly transfers some risk and the project team will be looking at a cost-risk-benefit analysis of this option, which will be presented to the next RLSR. The reason that this can even be considered is due to the recent success of the testing of the coupling coil in the USA (see the Project Board Report) and the recognition that in any case the MTA test would not replicate the situation in the final MICE field arrangement.

It should be noted that at previous meetings there was a suggestion that using the prototype coupling coil from the MTA would bring forward STEP V somewhat, but the above described 'expedited' plan is much more aggressive, by essentially missing out the entire one-year test plan.

Risk and risk mitigation

This appears to be working satisfactorily but is too early to make any definitive conclusions about how the risk retirement is being achieved and at what cost. However, with the delivery of a number of risk milestones over the next six months, further data will be available for a better assessment at the next meeting.

Finance

This has turned into a roller-coaster ride for the project as it now appears that the significant uplift the US had injected into the project one year ago is about to be reversed! For the moment, the focus is on this current year (fiscal 14 in the USA and FY14-15 in the UK). The UK is operating to a 'flat cash' budget and this has been planned into the schedule, which in some cases controls the critical path. The available resource appears adequate to meet the schedule for the critical milestone of completion of STEP IV before the end of the financial year. However, this does not include the cash and staff effort cost to handle the schedule contingency discussed above. These costs come to around £205k and the project has been given some assurance from STFC that this contingency cost will be met should it be needed.

In the US, the latest Presidential figures and anticipated outcome from the US P5 process means that within the MAP Programme, reaching STEP VI for MICE is now not likely achievable. The latest financial data presented to the Panel is that the MAP Programme has suffered a budget reduction and with threats of more to come. For MICE this would nominally translate into a reduction of roughly \$2M per year. The MAP Director has determined that \$12-13M is required to complete the construction of the STEP V components. For the most effective and timely use of this investment this expenditure should take place largely over the next three years, giving an annual spend of \$4M. The MAP Director hopes that STFC and DOE will agree that a \$4M per year profile is both reasonable and necessary to expeditiously complete the MICE construction effort. It is these numbers that are now driving the focus on STEP V as an end to the project, and hence the critical need to maintain schedule for STEP IV.

Leaving aside the scientific arguments it is salutary to note that on the US-side, 70% of the cost of STEP V has already been expended and in the UK the situation is very similar, translating into a real spend of £28.2M. For the cost-to-go figures to the end of STEP V, the breakdown of cost is a staff:non-staff ratio of 78%:22% for the UK and 73%:27% for the USA. Therefore, curtailing the project before STEP V has been undertaken would be an enormous and hugely embarrassing case of nugatory spend; let alone reputational damage all around. Therefore, the clear recommendation from the RLSR Panel on cost and schedule grounds alone is to complete at STEP V (and this includes the data taking and analysis, not just construction) based on the fact that most of the R&D risks will have been retired in the next year.

Staffing and other resources

Good progress has been made in filling most of the vacancies and most posts are either now filled or individuals identified. Nevertheless, there are still vacancies that need to be filled and coupled with resignations, this continues to take management effort. There are a number of gaps in the operational side of the experiment. Also, the rebuilding of the ‘hydrogen team’ is an area of some concern but the project is aware of this. However, overall the project appears to be in a healthier position with regard to staffing than at the last meeting.

Recommendations

To the Project

1. It is vitally important that the level 1 milestone, the completion of the installation for STEP IV that is currently scheduled for March 4th 2015 is met and the project team must ensure that everything is done to ensure this is achieved.
2. The UK project management should redo the schedule projection taking into account the 35% contingency for concurrent tasks (the green line) by the end of May.
3. The project should produce a coherent plan for the commissioning and the running of MICE for STEP IV for the next meeting.
4. The committee reviewed the revised project planning methodology and agrees it is appropriate and gives a more representative value for future use in comparing the baseline to the optimistic and risk dates.
5. The dashboard and slip charts should be included in future reports.
6. The project should provide an optimum revised project plan for the completion and operation of STEP V within the financial constraints for the next meeting.

To the Funding Agencies

1. Given the recent success of the project in the assembly of major components in the MICE Hall, the confidence in the project planning and the current spend total of 70% of that required to achieve STEP V, it is essential that to avoid a hugely embarrassing nugatory spend and loss of international reputation, MICE is funded through to the conclusion of STEP V (irrespective of the science arguments – see the MICE Project Board Report).
2. The UK contingency costs, currently identified as £205k, should, as required, be provided by the STFC to ensure schedule adherence.
3. It is imperative that the MICE construction budget within MAP is maintained at a level of at least \$4M per year to achieve the delivery of STEP V.

Actions

1. The project is required to undertake a full cost-risk-benefit analysis of the proposed expedited STEP V schedule for the next meeting.

Appendix 1: Recommendations and Actions from the RLSR of May 2013

1. Complete the first action from the previous meeting. While the Panel appreciates the work to date it feels there is a need for more coherence between the two sides, especially the embedding of risk-contingency into schedule.
2. Produce a coherent single project plan that takes into account anticipated delays due to risk (and the R&D risks) by the next meeting.
3. Produce a *single*, coherent financial report for the project taking into account the schedule above by the next meeting.
4. Ensure that all work packages are adequately integrated into the overall cost and schedule
5. Encourage, through the Project Engineer, the project to develop more rigorous integration protocols across the project, such as acceptance criteria, to minimise schedule delays.
6. The UK Project Sponsor should notify the project about the ‘permitted overspend’ for this financial year as a matter of urgency.
7. The STFC needs to determine the ongoing annual spend planning assumption (flat cash or enhanced) for the project as a matter of urgency.
8. Ensure a first cut estimate of the Step V and VI partial return yoke concept is folded into the UK funding requirements.
9. Following the good work done on establishing the criteria for the successful conclusion of Step IV, the project now needs to focus on looking at how to decide for Step V versus Step VI as it no longer looks like going to V and then VI sequentially is the most optimum option (this is not critical at this point but that decision point and the science trade-offs needs to be continually borne in mind by the project and the funding agencies).

Appendix 2: The Charge

Monitor the progress and the risk management of the MICE construction project and deliverables, including cost and schedule progress within available resources.

Monitor integrated project management performance, where appropriate.

In the RLSR section of the meeting the Collaboration is asked to focus on resource (staff/cash) schedule and risks i.e. with the resource available what is the schedule to their milestones, what are the risk factors, what is the most likely schedule and subsequent cost when these risks are fully folded in. Technical details and progress should be covered in depth in the relevant MPB sections of the meeting.

Appendix 3: The RLSR Panel

Professor Ian Robson	STFC (Chair)
Dr Steve Peggs	Brookhaven National Lab
Mr Jim Kerby	Argonne National Lab
Mr Ron Prwivo	Brookhaven National Lab
Dr Tom Taylor	CERN

In attendance

Mrs Charlotte Jamieson	STFC
Dr Bruce Strauss	DOE