VISTA INFRARED CAMERA PDR PART 2, DECEMBER 11th 2002

Report of the Review Panel

Professor Ian Robson (Chairman) on behalf of:

Robert Laing
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Terms of Reference

The VISTA IR Camera Preliminary Design Review (PDR) is a preliminary review of the design of the infrared camera for VISTA.

The remit for Part 2 of the review panel is to:

- Assess the project schedule and verify it is practical
- Assess the management plans and ensure they are coherent and will support a well managed, efficient and cost effective project
- Assess the proposed budget to ensure that it covers the project requirements in a cost effective way and recommend areas of potential cost reduction

General comments on the overall proposal

The panel were briefed that they should endeavour to look for cost savings where possible given the financial situation. However, the documentation set provided did not allow a real ability to get to grips with the thrust of the terms of reference and cost savings. Lack of a master Project Plan identifying the Critical Path and the accompanying Resource Profile prevented informed discussion on resource issues, such as how much of the workpackages have been completed, at what cost and how much to go. While some aspects of the projects costs and schedule could be seen to be under control and coherent, this was not the case across the overall project and more work needs to be undertaken here. Nevertheless, the discussion at the review was full and frank and had positive outcomes, especially regarding margins and contingency.

It was not at all clear what was on the critical path. Although this was discussed at the review, the Panel remained concerned that the answers given lacked adequate understanding as to where the critical path actually lay. Managing a distributed project is clearly difficult and complex, but nevertheless, it must be managed effectively to succeed. During the course of the review, it was not clear what the weekly telecoms were achieving, it was clear what they were not achieving, project control, which one would have though might be their main aim. There was concern expressed that the cryostat window had not been ordered yet. The lead time for this item was considered very long, and its procurement may even be on the critical path. Procurement paperwork needs to be generated with some urgency.

One thorny issue that remained unsolved was the 'standing army' syndrome for a distributed project approaching a single final design review. This is closely linked with the requirement to be able to release people when their work is concluded, but be able to retain them again when their skills are needed for further work. Very careful workforce skills control is needed to ensure the most optimum and cost effective balance is retained. The panel felt that there was scope for savings to be found by better optimisation of staff resources.

Clearly the project needs to identify its technical review strategy, the current plan to have nothing between now and a FDR in eleven months time carries a high risk. The effectiveness of the single versus mini FDRs needs further discussion with the VPO, as does the procurement policy, where there seemed to be lack of clarity regarding responsibilities and a possible duplication of effort in the resources attributed to procurement.

Specific comments are noted below and the summary contains the Panel recommendations.

Workpackages

Durham began this section and unfortunately, while being a small cost component of the project, being first came in for some considerable and detailed questioning. The major issue was the project planning, which was not the same as presented by the Camera Project Manager, either in priorities or schedule. This did not give a good feel for an integrated project. Specifically, there is a need to bring forward the sub-system AIT by around six months and other work was not scheduled in the most appropriate order. There was a concern that the Durham work may even be the critical path. The Project manager and Workpackage Manager must agree to the specific tasks and schedule as a matter of urgency.

The software is projected not to be fully completed for final acceptance tests (with telescope software) in UK and the proposal was to undertake this in Paranal. The panel did not believe this was an acceptable statement. Overall, this area was a cause for concern and did not appear to be up to speed for a PDR review and on detailed probing it was not at all clear that the specific effort will be available on the required timescale due to the need for recruitment.

There was little to comment on the UK ATC presentation given the lack of detail. More work is need on the profiling. The software issue was again raised and while VISTA may be the UK ATC's top-priority, sheer lack of bodies with experience of the ESO systems remains a problem that cannot be solved by redeployment of staff from other work. Solutions from within the wider UK and even ESO will need to be worked through to mitigate this risk area. On the other hand, it was agreed that all software apart from the observing software would meet the required dates for the project.

The RAL workpackage was extensive but hard to get to grips with and was immersed in the general debate about margins, contingency and options (see below). There appeared to be a possible risk to access to the identified clean room at RAL if Solar-B suffers a major delay.

Options

The need for the completed instrument to be shipped to Durham for flexure tests was a clear focus for potential cost savings topic. Following extensive discussion it seemed to the panel that with more careful planning and design of handling stand at RAL, this step could be omitted with little risk and reasonable savings. A mini-review looking at all the requirements, costs and systems implications to determine the most appropriate way forward and close-out is required in the New Year. The VPO will need to be closely involved in this process.

While the current plan has the camera being completed well in advance of the telescope there seems to be no positive reasons for shipping it early to Paranal until the telescope is in a position to accept the camera. This also raised the question of how many of the staff have been ring fenced for a later commissioning in Paranal whenever they are needed? The commissioning plan was not at a well advanced stage so this needs folding in.

Risks

The team are just getting up to speed with this and these have not been taken through to post-acceptance in the UK. This strongly suggested a similar ethos to that discussed in Part 1 of the PDR, in that the project is almost complete after acceptance in the UK, it is then dispatched (launched) and everything will be fine from then on. The risks associated with shipping and installation had not been included in the risk register and need to be addressed. The panel had a strong suspicion that the real risks have not been equally assessed across the project and identified a number of areas that were not on the register but were felt to be of equal importance. The team have not yet come to grips with how they will implement the risk register as a useful tool for project management and control. This will need further development, probably including discussion with the VPO.

A hazard analysis needs to be generated and given to the VPO as soon as possible.

Costs

The costs appeared to be reasonably well under control, but this was complicated by the lack of contingency and unidentified margin question. It was agreed that reasonable margins had probably been used in developing the resource requirement, but the question of what contingency would seem reasonable at this stage in the project remained unanswered. The margins might be better utilised if they were held centrally by the project manager, for redistributed when needed on a case-by-case basis. There was a strong recommendation to identify contingency above the margins. Margins and contingency should also flow through the procurement areas. The recommendation of margins and contingency was accepted by the camera PM.

If there continues to be a large pressure on costs, then the camera team must be encouraged to look at design cost drivers and identify details of the spec that is the driver and engage in a dialogue with the VPO for release or waivers. Durham is an excellent example of how costs can be driven down through dialogue and are to be

applauded. There may be potential for descoping the vacuum pumping system to reduce costs.

As noted in a number of areas, planned maintenance v long-life reliability may be a cost driver and the VPO and camera team must get to grips with this aspect.

Specifically, there was concern about the ESO requirements for the CCD controller (Durham); this could be a notable cost increase if ESO are not content with the proposed camera solution.

Overall, there remained a suspicion that a few hundred £k could be taken out of the project with little risk, on the other hand, it would not take too many problem areas to lose all the savings and require the project become more expensive. A key may be the design to an over-ambitious spec and it may be that it is too late in the project to realise major savings now given the amount of work already undertaken. This should have been identified at the CoDR to give the team a real chance of changing design philosophy.

QA/Product Assurance.

This aspect was not dealt with in the review as there were few overall comments and the section appeared thorough. However, it was noted that the QA was more biased towards a space approach of ultra-high reliability rather than for a ground-based approach of cutting-edge performance. The following recommendations were supplied by Malcolm Stewart and although not part of the formal Review recommendations they are supplied for discussion within the project:

1. RAL is accredited to the widely accepted commercial ISO-9001 standard. Suggest use this as the framework rather than ESA-ECSS-Q.
2. The project PA plan may then focus only on the VISTA-IR specific areas. The relevant parts of the instrument specification (i.e. those for QA end goals) should be laid out in the in the PA plan.
3. Significantly increase the array handling and ESD precautions section. For example, if it's 40% of the risk/cost then 40% of the QA effort should be here.
4. Emphasise the final instrument calibration and data quality (ESO driver).
5. Review the instrument specification and end-user expectations with the distributed team to ensure no unnecessary costs are being built in. For example it could be that the whole instrument (except mechanism and detectors) are treated by the more as if they were typical RAL GSE than as a space instrument.
6. Define a limited sub-set of critical hardware up front and then use this to simplify the rest the PA document. Critical items could be:
   - mechanisms,
   - detectors,
   - optics,
   - safety critical items (loads >300N, pressures, cryogenic fluids).
7. Tests
   - Include notes on mechanism tests - will full life tests be done as an integrated instrument, if not what is minimum burn-in which will be done?

- Environmental tests not covered - will instrument and its electronics be cold chamber tested? Altitude de-rating of electronics not covered (is this an issue for VISTA?)

Summary

The recommendations from the review board are;

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Management Requirements

Topic	Required Action	By Whom	By When
General Comments On the Overall Proposal			
1	Although a full cost breakdown was provided the panel did not get sufficient view of the spend profile to make a full recommendation on costings. It is therefore recommended that the costings be reviewed by the camera PM. **Action: PM to review costings in more detail by end Feb 03**	K Ward	End Feb '03
2	The schedule presented to the panel was not fully populated and did not include the information on critical path. Likewise there was disharmony between the Consortium and Durham schedules. **Action: PM Camera to provide Chairman with consolidated schedule illustrating critical path by Jan 03**	K Ward	Jan '03
3	The panel felt that there was scope for savings to be found by better optimisation of staff resources. An issue was raised concerning resource planning and usage. It is clear that to save a 'standing army' a resource plan is required. **Action: PM to provide detail of resource planning in management plan by Jan 03**	K Ward	Jan 03
4	The single versus mini FDRs needs further discussion. **Action: VISTA PM to discuss with PM Camera ASP and see if mini FDRs are feasible.**	VPO/K Ward	Mar 03
Work Packages			
5	The UoD package appeared to be working to a different schedule than the rest of the consortium. In addition the requirement for AIT at UoD needs review. **Action: PM to discuss schedule with UoD and ensure co-ordinated AIT approach**	K Ward/ UoD	Feb 03
6	The software related to WFS was not to PDR standard. There is a need to find solutions and a review carried out by late March. **Action: A clear description of the current situation along with proposals should be made to the VISTA PM by Jan 03 with a resolution by end of March– UoD through PM Camera**	UoD/ KWard	Mar 03
7	There was little to comment on the UKATC presentation given the lack of detail. More work is needed on the profiling. **Action: A clear resource profile should be**	UK ATC/ K Ward	Jan 03

	produced by Jan 03 thro PM Camera		
8	There was an indication that insufficient software effort was available at the UKATC to support the IR Camera. **Action: PM Camera to discuss Software resource issue with UKATC**	UK ATC/ K Ward	Jan 03
9	The RAL work did not include a complete and clear risk plan (e.g. shipment) **Action: PM Camera to provide risk mitigation plan by Jan 03**	K Ward	Jan '03
Options			
10	The need to coordinate the AIT plan and review locations is required. **Action: Mini review to agree AIT plan should be held in Jan 03 to agree utility or not of UoD facility**	K Ward	Feb '03
11	There may be a difference in timing between Camera availability and telescope availability. **Action: PM Camera should plan resource requirements for commissioning in Chile and agree delivery schedule with VPO**	K Ward/ VPO	Mar 03
Risks			
12	Although the team presented an outline risk register, it was clear that the risk management required further coordination and harmonisation. **Action: PM to ensure that management plan includes management of risks across the consortium. He should ensure that Regular meetings review and consolidate the risks**	K Ward	Feb 03
Costs			
13	A discussion resulted in the need to push costs into the 'most likely' point and identify margin and required contingency. **Action: PM Camera to review costs and list margins and consider any contingencies required**	K Ward	Feb 03
14	The design proposed was based on the Technical Spec, but may have included some significant cost drivers. **Action: RAL are to investigate any specification elements that could be described as cost drivers. When noted, these should be addressed to the VPO if specification amendment is required**	K Ward	Feb 03
15	As noted in a number of areas, planned maintenance v long-life reliability may be a cost driver and the VPO and camera team must get to grips with this aspect. **Action: Camera team to discuss implications of maintenance plans with VPO and see what could be changed to reduce cost**	VPO/ K Ward	Feb 03
16	The Tech Spec for the technical controllers needs addressing **Action: UOD to prepare specification for passing to ESO by Jan 03**	UoD/ K Ward	Jan '03
17	The purpose and scope of the weekly project telecoms is unclear in terms of project control **Action: PM to review purpose and scope of weekly telecoms**	K Ward	Jan 03
18	Risk of AIT facility at RAL if Solar-B delayed **Action: PM to Identify a work around if RAL's AIT facility is blocked by Solar-B.**	K Ward	Mar 03