

- VVV SMP review -

RID=Review Item Discrepancy, RIC=Review Item Comment, RIQ=Review Item Question
Please use a separate page per RIX.

Reviewer: ESO Survey Team	
Document No	VVV SMP
RID, RIC or RIQ ?	RIQ
Section	Survey Reduction Process
Page(s)	
<p>RIX text</p> <p>EST – Date: 08.03.2007</p> <ol style="list-style-type: none"> 1. No discussion of the absorption correction along the line of sight towards the inner bulge/disk, which is a concern, given the heavy dust absorption in these areas, which affects the bluer filters, if not Ks. 2. While neglecting the linearity correction may not affect the primary goals of the Survey Team science, it would adversely affect the legacy value of this project for the community, so this calibration must be applied to the VVV data. 3. The PI states that the processing of VVV data will rely on an enhanced VDFS: what does it mean? How many pipelines will be running in parallel at CASU? 4. It seems that the team is outsourcing the most critical data reduction step to achieve their science goal, i.e. the identification of variable stars, and this is a concern. What are the robust criteria for variability selection? 5. When submitting the revised SMP, the PI must provide a written statement from both CASU and WFAU managers that the two data centers will support the data flow and the data processing needs as described by the PI in the VVV Survey Management Plan. <p>EST – Date : 07.12.2007</p> <p><u>Open issues related to current Review item (RIX) after VISTA PS senior review (22.10.07) and EST report (28.06.07)</u></p> <p>PI says that RR-Lyrae stars have a well-defined color, with a small scatter (± 0.03) but 1) these will be also obscured, so the observed colors will be affected, 2) their light curves will be known only after the time variability analysis and the light curve is derived. Therefore the Z, Y correction won't be known before that.</p> <p>Furthermore, if PI is responsible for the light curves, and he receives the data only after 2 months from CASU/WFAU, the feedback into the pipeline and the</p>	

quality controls may not be timely, and may slow down the whole process. The timescales described by the team in the revised SMP (data delivered, data processed by CASU, and achieving light curves with adequate time coverage) are far too long to allow for changes of strategy.

The EST has identified a clear conflict of loyalties in the management structure of the VVV public survey and the VDFS. Both CASU and WFAU members are included in the VVV survey team, yet in their letters of support to the PI for the data processing and allocated resources they identify themselves as an independent entity. As such, they state that they are going to support the VVV survey, or any other VISTA public survey, on a “best effort basis”, as well as discuss with the PI the issues of resources and funding should these be determined to be inadequate. As soon as any re-processing of the data is requested by the survey PIs to both WFAU and CASU, both data centers might saturate their capacities and be forced to prioritize their data processing tasks.

From this, it is not obvious to the EST who will be responsible for setting any priorities within the data reduction process¹, or deciding what can or cannot be done for the data processing. Also, it is unclear how technical problems and potential disputes will be dealt with within the survey teams and CASU/WFAU. The unanswered managerial issue is a strong concern for the successful implementation of the VVV survey, which depends critically on reprocessing at CASU, for absolute photometry in the heavily obscured regions, and the availability of DIA at WFAU, for the identification of variable stars.

Global photometry is crucial for the legacy value and must be endorsed by the survey team, even if variability is the main scientific goal for the team, for all their detected sources. This is an ESO public survey, and the data products must have a legacy value for the ESO community.

¹ Priorities among the six ESO public surveys were set by the Public Survey Panel and the EST expects that similar priorities are implemented in the data processing too.

Reply from Survey Team – Date 22.05.2007
Name: Dante Minniti, Valentin Ivanov, Phil Lucas

1. Regarding the absorption correction along the line of sight, we have studied this for our original proposal. In particular for our main science driver: the RR Lyrae have all the same intrinsic colors (± 0.03 mag). Their observed colors automatically give the absorptions at those distances along the line of sight. In addition, very detailed global extinction maps can be readily constructed using red clump giants, which are very numerous (e.g. Nishiyama et al. 2006, ApJ, 658, 358). In general for most other sources: absorptions will be determined based on the multiple band photometry (ZYJHK for most sources), and modeled along the line of sight. This is why we asked for near-simultaneous colors in year 1.

2. This linearity correction will be applied to the VVV data.

3. We are working with the VDFS, as they are “a member” of our team. This will only be one pipeline (at CASU), WFAU’s database driven processing adds specific products for VVV. The added VVV products will be multi-epoch fluxes via DIA or list-driven photometry from WFAU.

4. The team is not outsourcing anything, as the UK scientists are members of our team. While the DIA (difference image analysis) processing will be implemented at the archive, the identification of variable stars (i.e. light curve analysis) for the whole survey (both bulge and plane fields) will be made by the Chilean team. This is designed to avoid massive data transfer as much as possible. Alternative solutions would involve expensive means of data transfer between UK and Chile.

The selection of variable point sources is described in the proposal, for which we made light curve simulations of variables of different magnitudes and amplitudes. Briefly, we will use the dispersion around the weighted mean with clipped outliers as done for e.g. with the Cen A IR data by Rejkuba et al. (2003, A&A). This is achieved by the variability indices devised by Stetson (1995, PASP, 108, 851), and Welch & Stetson (1993, AJ, 105, 1813). This selection can be tuned to different families of variable stars, as shown in the figures of our proposal.

5. We provide written statements from CASU and WFAU managers as requested.

Reply to open issues related to current Review item (RIX) after VISTA PS senior review (22.10.07) and EST report (28.06.07)

Name: Jim Emerson, Manuela Zoccali, Dante Minniti, Valentin Ivanov, Phil Lucas

The absorption corrections would be done in the way of the UKIDSS (Lucas et al. 2007 astro-ph/0712.0100), which works well at JHK for UKIRT/WFCAM data (but not for ZY in heavily reddened fields, for which we will have additional observations of standards). This consists in applying a linear term in the color transformation based on the Schlegel/COBE maps to the 2MASS zero-pointed data. But is issue of

absorption is interesting and we plan also to do more than that taking advantage of the RR Lyrae stars and the clump giants. For example, the reddening can be estimated using clump giants, as was done in the MACHO, OGLE and EROS surveys, who published detailed reddening maps of their areas using clump giants (Popowski et al. 2005 ApJ, Sumi et al. 2004 MNRAS), and RR Lyrae (Collinge et al. 2007, MNRAS). We intend to do the same for the whole bulge with the VVV survey, of much higher resolution than the existing COBE/ DIRBE or MSX extinction maps. We note that no re-processing of the data is needed for these extinction corrections, which can be applied directly to the catalogs.

Regarding the timescales to allow change of strategies for the light curve production, we are planning to do all changes and fine tuning in the 1st and 2nd years. These would be done if necessary upon approval from the PSP and EST. With this previous experience in hand, the strategy for the 3rd and 4th years when the light curve data is acquired will be fixed, and we do not expect changes. One strategy change that we are evaluating for the 4th year could be the implementation of shorter exposures (1 sec instead of 5 sec) in the disk fields, in order to allow the monitoring of bright Cepheids. However, this will be better evaluated when the real efficiency is known from the first 3 years of observations.

The “conflict of loyalties in the management structure” applies equally to four of the other public VISTA surveys, and in part to UltraVISTA who only use the Cambridge pipeline of VDFS. We do not feel that ‘conflict of loyalties’ describes the issue well (VDFS’s actual loyalty is to process VISTA data into science products well), but agree that careful management will be required in dealing with requirements from various users (PIs) which from time to time may be conflicting. This is of course unavoidable in reality, and not peculiar to the VVV survey.

As with every other VISTA survey these issues will be dealt with by consultation / discussion between the VDFS management and the VISTA survey PIs. EST advice will also be sought as appropriate. One of the reasons that (each survey) chose to include VDFS as part of their teams was to forge close working relationships to enhance mutual understanding and ensure that difficulties were minimized, and when encountered handled appropriately. This approach worked well for the separate surveys making up the UKIDSS survey, and we have no reason to suppose that it won’t for the VISTA surveys.

There is a misunderstanding here as VVV does not rely on any re-processing at CASU, rather CASU will be involved in providing some of the algorithms run at WFAU for example to provide aperture matched photometry. We have mitigated the risk of the availability of DIA at WFAU with the plan as described in the response to RIX#5. Our risk mitigation strategy described in the other answers should be enough to deal with the worst case scenario, but if it becomes necessary to further supplement the VDFS effort we will find the resource to do so from amongst the VVV team.

We agree with the priorities for the data given by the PSP.

We understand the legacy importance of the VVV public survey, and are keen on providing accurate absolute global photometry for the regions covered.