IN CONFIDENCE **VPB(03)9 - June 06 June 2003**

PARTICLE PHYSICS AND ASTRONOMY RESEARCH COUNCIL

VISTA Project Board

VISTA Data Flow System (Progress since 02 Apr VPB meeting) Report by VDFS PI

Management

1) **Phases nomenclature**: the phasing of deliveries, with a summary of the rationale, are:

VDFS Development and Test Bed Phases (Apr 2002 to Jun 2006):
The first three deliveries (v1, and annual developmental updates as v2 & v3) of the VDFS system will operate on WFCAM data from UKIRT, which acts as a test bed for VISTA data, as VISTA will not become available until Q4 2006. As each new developmental update is delivered we will attempt to process all extant WFCAM data as quickly as possible (<1 month) to help check the robustness of the system at VISTA data rates.

VDFS Commissioning Phase (Jul 2006 to Jun 2008):
The fourth delivery (v4) will be the first to operate on actual VISTA data during VISTA instrument Commissioning and shakedown in Chile, and after an eighteen month shakedown period on actual VISTA data (during which sufficient data volume will be handled to enable the functionality to be checked and, where necessary modified) the system will be ready to move to a Routine Operations phase for both WFCAM and VISTA data. At the end of the shake down phase a final (v5) VDFS delivery will be made, incorporating all the lessons learnt with real VISTA data. This will be the version which routine operations will run with. V4 includes the ESO deliverables which are designated v4(ESO deliverables) to distinguish them from those for the UK which are designated v4(UK).

VDFS Routine Operations Phase (Jul 2008+):
This phase begins 18 months after VISTA begins to survey, and includes processing both WFCAM and VISTA data. The anticipated operating lifetime of WFCAM is 10 - 15 years, and that of VISTA between 15 & 25 years.

2) **Milestones**: were revised following availability of the Camera Plan:

Milestone	Scheduled Date	Actual Date
VDFS Phase A funding starts	01 Apr 2002	***2002***
VDFS-v1(WFCAM) Pipeline Critical Design Review (CDR)	21/22 Oct 2002	21/22 Oct 2002
VDFS-v1(WFCAM) Science Archive CDR (Reviews in Oct'02 and Apr'03)	21/22 Oct 2002	15/16 April 2003
VDFS-v4(ESO deliverables) Preliminary Design Review by ESO	19 Dec 2003	***2003***
Deliver VDFS-v1(WFCAM) Pipeline & Science Archive	31 Dec 2003	
Start VDFSv1(WFCAM) Pipeline Commissioning (Hawaii and UK)	01 Jan 2004	***2004***

WFCAM Commissioned and Science Observations Start	01 Apr 2004	
Start VDFSv1(WFCAM) Science Operations (Hawaii and UK)	01 Apr 2004	
Part VDFS e-science2 funding starts if this bid is successful	01 Apr 2004	
VDFS-v4(ESO deliverables) Critical Design Review by ESO	13 Aug 2004	
VDFS's e-science1 funding ends	31 Sep 2004	
Main VDFS e-science2 funding starts	01 Oct 2004	
Deliver VDFS-v2(WFCAM) Pipeline & Science Archive	23 Dec 2004	
Astrogrid tools released	31 Dec 2004	
Complete 1st year WFCAM data taking & processing (Hawaii and UK)	01 Apr 2005	***2005***
Deliver VDFS-v4(ESO deliverables) for European Instrument Integration	26 Aug 2005	
Deliver VDFS-v3(WFCAM) Pipeline & Science Archive	31 Dec 2005	
VDFS-v4(ESO deliverables) Exposure Time calculator to ESO	06 Feb 2006	***2006***
Complete 2nd year WFCAM data taking & processing (Hawaii and UK)	01 Apr 2006	
VISTA ready for on-sky commissioning	07 Jul 2006	
Start VDFS-v4(ESO deliverables) commissioning at ESO, Chile	07 Jul 2006	
Target date for handover to ESO	16 Aug 2006	
Estimated VDFS-v4(ESO deliverable) s/w final delivery; ESO acceptance	22 Sep 2006	
Start VDFS-v4(UK) Pipeline & Science Archive Commissioning in UK	16 Oct 2006	
Complete VDFS-v4(UK) Pipeline and Archive End-to-End Commissioning	31 Dec 2006	
Start VDFS-v4(UK) Science Operations	01 Jan 2007	***2007***
Complete third year of WFCAM data taking & processing	01 Apr 2007	
Complete first 18 months of VISTA data taking & processing	31 Jun 2008	***2008***
Release VDFS-v5(UK) Pipeline & Science Archive (no further development)	31 Jun 2008	
VDFS Routine Operations Phase starts	01 Jul 2008	

These need to be discussed in detail with VPO and ESO, but provide a much firmer basis of estimate than previously available.

3) **Grant conditions:** were finally agreed between PPARC, Cambridge and Edinburgh. I understand the grants are to be issued as revisable rather than rolling, which will presumably make future changes simpler to administer. Grant announcements are still imminent.

4) **Oversight**: PPARC have not yet suggested a new oversight body for VDFS.

5) **Funding**: A follow on proposal to the current e-science1 funded (up to end Q3'04) VDFS work was submitted to the escience2 call for proposals. It is entitled "VEGA: UK Excellence in Data Processing and Archiving Providing

VOProcessing for VISTA, Eddington and GAIA". This seeks Q2'04-Q1'07 funding.

6) **Future costs**: VDFS Phase A funding was at an average level of £0.49m/yr for 2.5yr (total £1238k). The table below shows, by Financial Year, the VDFS additional funding requirement from Q2'04 to the end of the development in Q2'08 and start of routine operations in Q3'08.

	Apr'04	**Apr'05**	**Apr'06**	***Apr'07***	***Q2'08***	***Q3'08***
	to Mar'05	**to Mar'06**	**to Mar'07**	to Mar'08	1 Qtr only	Onwards
Notes	1	2	3	4	5	6
Pipeline Development	2.4	4.4	2.4	1.6	1.6	-
Archive Development	2.9	4.8	3.8	3.8	3.8	-
Pipeline Operations	0.7	1.5	2.25	2.5	2.5	2.5
Archive Operations	1.5	1.5	2.25	2.5	2.5	2.5
Pipeline hardware	82k	213k	111k	56k	14k	56k/yr
Archive hardware	105k	53k	121k	150k	109k	100k/yr
Travel	16.8k	22.8k	92.0k	14.4k	3.6k	3.6k/yr
Management	1.0	2.0	1.9	1.6	1.6	-
Total staff years	8.6	14.2	12.6	12.0	3.0	5.0/yr
Staff Cost (@65k/fte/yr)	559k	923k	819k	780k	195k	325k/yr
Total non-staff	204k	289k	324k	221k	127k	160k/yr
Grand Total	763k	1,212k	1,143k	1,001k	322k	485k/yr

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Notes (row 3)

1) VDFS already funded at a mean 7.6FTE/yr thru Q3'04; continue in Q4 but add 1.5 FTE in Q2&3 only (to speed deliverables);

2) VDFSv2(for WFCAM) delivered. VISTA pipeline 1 year from ready

3) VISTA commissioned Q3/4 and VDFSv4 beginning to run Q1.

4) shakedown VDFSv4 move to v5 and incorporate more VO features

5) VDFSv5 released after 18 months of actual VISTA data. This column is the man effort in a single quarter and so is divided by 4 before being summed into staff years for the quarter.

6) No further development. Operations only for next 13yrs. Further use of VISTA to be reviewed in 2022. This figure is designed to give the long term annual running cost (which will need to be adjusted appropriately for inflation)

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VDFS Phase A funding was at an average level of £0.49m/yr for 2.5yr. The FY 04-07 VDFS request is at an average of £1.04m/yr which includes the added costs of hardware and operations necessary to deal with actual data flowing first from WFCAM and then from VISTA. In Q3'08 when development work ceases the annual operating cost of the VDFS is estimated as £0.485m/yr (at today's staff costs).

7) **Cost to Completion:** The whole (since inception) project cost of developing and operating VDFS over 6.25 yrs from Q2'02 will be £5,679k.
From Q3'08 onwards when development ceases and the cost will become £485k/yr (at today's staff rate) to cover the annual operating costs. VISTA will operate until 2022 in the first instance, and then will be reviewed by ESO for a potential further 10 years of operation.

8) **ESO Large Programmes & Surveys workshop**: ESO intend to make VISTA data available to users in exactly the same way that they make data from other instruments available, which means standard calibrations and corrections of each night's data set in isolation. There will be no facility provided by ESO for extracting the science from VISTA's surveys. [The same is true for the ESO VST (optical) survey telescope] This situation was the cause of some concern by astronomers from ESO nations attending a Workshop in ESO in May, but ESO simply do not have the resource for it to be otherwise. It confirms the wisdom of UK funding DFS, and may suggest the potential to share VDFS operating costs with other ESO states.

9) The first two monthly VDFS Management Group telecons took place. It was reported that the regular internal meetings are having a positive effect. The success in meeting targets will be evaluated when the quarter ends in a month. However it is already clear that the plan failed to allocate sufficient time need to respond to the CDR report and to prepare the e-science round2 bid. Whilst progress is reported as satisfactory not all the targets will be met.

Survey Scheduling Tool (ATC)

10) This has not been included in e-science2 bid. ESO are keen to progress this and if accepted by them it would be a software contribution in kind. Presumably the PPARC astronomy programme would fund it.

Pipeline (CASU)

11) The quarterly plan for Q2'03 is progressing with a number of deliverables already made.

12) ICDs defining the WFCAM data formats remain to be signed off. These have potential to delay other work.

13) ESO do not rule out mirroring of the Cambridge WFCAM raw data to ESO, and are evaluating the proposal.

Pipeline (CASU) - ESO Deliverables

14) CASU have identified difficulties using the SRD and OCDD because they assume both Visible and IR cameras in use and are thus out of date. A revised document focussing on science requirements relevant to QC and Calibration will be provide to CASU ASAP.

15) Discussions with Quinn & Cullum have clarified the process of interaction with ESO staff at the working level. They also agreed that ESO would have to participate fully in the DFS DRs.

16) Estimated costs were provided to PPARC.

17) The moving of the camera FDR to Dec has caused a change in DR dates.

Archive (WFAU)

18) The quarterly plan for Apr-Jun is progressing, with the response to the CDR recommendation likely to impact the deliverables actually ready in time.

19) VDFSv1 Science Archive CDR was held 15/16 Apr. The main task of the Panel was to determine whether the Science Archive design put forward by WFAU members met eight criteria, their conclusions were:
1 The end product is acceptable: Yes.
2 The project as conceived is feasible: The Panel had major concerns regarding the project schedule and risk assessment. Both were far too optimistic, and timescales could easily be scaled up by a factor of two.
3 Detailed plans for building the complete system are in place: A plan is in place, but important areas need to be better defined and planned. One important example is software architecture and software design procedures.
4 The budget and staffing resources are sufficient for the project and commensurate with the estimated time to completion: Staffing is a concern especially after deployment. Too little staff was allocated for v1 operations.
5 A reasonable estimate of the risk has been made, and whether there are useful de-scope options: Risk assessment needs to be planned in greater detail. No de-scoping options were presented although the Panel strongly felt that the hardware and software needed to produce satisfactory pixel data and source catalogs and curate them should be in place before any resources were allocated to the ingestion of external catalogs for example.
6 External interfaces are well controlled: Yes.
7 The path from v1 to v2 is understood and feasible: The path from v1 to v2 will be easier if sufficient attention is paid to proper software architecture and design procedures that will maintain portable code and clean interfaces between subsystems.

20) A response to the Panel's report is in preparation.

21) The panel questioned the adequacy of WFAU staffing to meet the tight schedule, confirming the background of VDFS management's previous request to GSC for increased manpower. More effort has been requested from Apr'04 from science round2.