Fermilab

Closeout Presentations

Directors' Review
of
the DES Project

April 28-30, 2009

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Executive Summary

Technical

The DES project has continued to make significant progress in all technical areas. With the additional resources that are being requested as part of the Supplemental Request to the NSF, the project and DESDM in particular appear on track to begin commissioning in the Spring of 2011. A number of technical issues that may pose risks to meeting that schedule have been identified by the review panel. Descriptions of these issues and recommended actions are given following this summary.

The DES Science Committee has defined comprehensive science requirements that have been flowed down and captured in the DESDM Requirements and Technical Specifications. With only a few exceptions, that are noted below, those requirements appear to be complete in scope and detail, and provide satisfactory guidance for the DESDM planning and implementation. The Science Committee should complete the review of that flow-down to avoid any late changes in scope that could delay completion of the DESDM development.

The DESDM team has made significant progress in developing the Processing Framework, Astronomy Codes, Archive and Data Access Framework. The performance of the small DM team is a testament to its members some of whom have nearly unrivaled experience developing astronomical software for the scientific community, and some of whom have extensive experience working on the data management of the SDSS. However, the relatively small size of the team and reliance on a few individuals and informal processes for many key deliverables exposes the project to risk. This risk can be partially mitigated with the staff growth and the increase in formality that will be possible with the proposed supplement award.

Testing and validation of the DESDM is being conducted via a series of Data Challenges. In the recently completed Data Challenge 4, all planned Astronomy Codes and selected Science Codes contributed by the SWGs were integrated and run in the processing framework, with the exception of the Differencing Imaging pipeline. After some initial problems, data were distributed to the Science Working Groups using the Archive and Data Access Framework. The performance of the DESDM has been assessed both by the DESDM and the Science Working Groups. Performance in some areas, such as astrometry, has already been shown to satisfy the survey science requirements. Performance in other areas does not yet meet the survey specifications or user expectations, but the results have been useful for identifying algorithms and approaches that require further development and tuning. The project is encouraged to incorporate the science-based tests and metrics that are being employed to assess the DC performance in the automated Quality Assurance pipeline that will be run during standard survey processing.

The Data Challenges have been based largely on large-scale data simulations that attempt to embody cosmology, atmospheric physics, telescope and camera systems, and sensor and electronics effects. The inputs for these simulations have been provided to a large extent by the very active DES SWGs. The project plans to improve the fidelity of these simulations over time to provide more realistic estimates of the expected DES raw data. Care should be taken to incorporate additional significant effects in the simulations that may drive achieved performance. In addition, the project would benefit by more schedule coordination between the simulations and various aspects of sensor and camera testing so that real DECam features can be efficiently incorporated in the simulations. Specific data quality goals should be established for each Data Challenge.

The DESDM processing system will form the basis of the NOAO DECam Community Pipeline that will be exploited by general users of the DECam at the Blanco telescope. Requirements for the Community Pipeline and data services are now being refined, but the scope, responsibilities and long term support still require improved definition and signoff.

Cost
A supplemental request to NSF is planned for June of this year in the amount of ~$600K. This will pay for additional staff needed to complete the DES Data Management tasks to support the goal of being ready for "data taking" by the end of September 2011. This amount is felt to be fully justified by NCSA / DES resource costing based upon experience to date. The committee is unsure whether this amount is sufficient without examination of a fully resource loaded plan.

Another area that requires additional funding to be identified is the NOAO DECam Community Pipeline. A minimum of about $260K is needed to deliver the software intended to meet the Community needs described in a report drafted at CTIO. Again a fully resource loaded plan was not available to justify this request.

Schedule
The DECam milestone of shipping hardware to CTIO has recently slipped by 3 months to February 2011, but the committee believes that there is still time for installation and commissioning to be ready for "data taking" by the end of September 2011.

Progress on the CTIO Facilities Improvement Plan is going well and will support the plan to be ready for "data taking" goal by September 2011.

The completion and analysis of Data Challenge 4 (DC-4) took longer than had been anticipated, but much was learned by the SWG – DESDM groups working together. Two more Data Challenges (DC-5 and DC-6) are planned before data taking. Care must be exercised especially on DC-6a and DC-6b so they can be completed as scheduled and do not hold up readiness for taking data. We note that all of these Data Challenges should have critical data quality milestones.

Management
Senior DES management was well represented at this Directors' Review signifying their dedication to the program. The NOAO Director and all three other working members of the DES Council were present. The DES Director and principals for each subproject were also present and participated in the review.

The review focused on the DES Data Management, DESDM. The Council had taken great pains to draft a charge replete with many questions regarding DESDM. But, it seemed there was somehow a "disconnect" between the charge and the agenda including presentations. The charge questions were largely couched in the terms of formal project management language and the presentations did not explicitly respond to the charge questions. Nonetheless, we have garnered a generally positive impression about progress toward first light.

We were pleased to see the extent to which the Science Working Groups have been engaging in attempts to use the results of DC-4. However, a major area of concern is in the oversight and management of Science Codes that are developed by the SWGs, and that are providing science products specified in the DES Science Requirements (for example, the Photometric Redshift pipeline).

Because these codes are not being subjected to the same level of schedule and design rigor, the project risks incurring delays in acceptance testing if any of these codes do not conform to the project's milestones. The project should consider when writing the Acceptance test plan, that the DESDM acceptance metrics focus on their core functionalities that when satisfied the project may move into commissioning. The Science Codes could then be tested and tuned using commissioning data. Their acceptance testing would then apply to the initiation of the survey operations.

1.0 Introduction[1]

A Directors' Review of the DES Project was held on April 28-30, 2009 at the National Center for Supercomputing Applications. The charge included a list of topics to be addressed as part of the review. The assessment of the Review Committee is documented in the body of this report. Each section in the report is generally organized by Findings, Comments and Recommendations. Findings are statements of fact that summarize noteworthy information presented during the review. The Comments are judgment statements about the facts presented during the review and are based on reviewers' experience and expertise. The comments are to be evaluated by the project team and actions taken as deemed appropriate. Recommendations are statements of actions that should be addressed by the project team. A response to recommendation(s) is expected and the status of actions taken will be reported on during the DOE/NSF Review of DES scheduled for July 8-9, 2009.

The Charge for this review is shown in Appendix A. The review was conducted per the agenda shown in Appendix B.

2.0 Response to Charge Regarding Data Management and Request for Supplement to the NSF Award

Primary Writer: Robert Hanisch

Contributors: Jeff Kantor, Margaret Votava

2.1 Are the DM goals, specifications, and requirements adequately documented, tested, verified, and accepted by all? Is progress in these areas adequately monitored, reviewed, and reported?

The project goals, specifications, and requirements are generally well-documented, and there is general consensus. A detailed tracking of high-level science requirements into detailed implementation plans remains to be done. The project overall is adequately reviewed, though we are not aware of their being regular (e.g., quarterly) internal high-level status reports. We also note the lack of a sign-off process to formally accept requirements, implementation plans, and revisions or exceptions to requirements or plans. A recent increase in the project management effort should help keep the project on track overall assuming that the project personnel and project manager communicate effectively.

2.2 Does the Data Management team have sufficient resources and are they making adequate progress to complete the development and commissioning of DESDM in time for on-sky commissioning in 2011? Are the milestones and plans (including remedial plans) to meet them acceptable?

The review panel was shown the basis for the DM development labor estimates, these being a combination of the past several years experience and a forward extrapolation. The expensed labor

[1] Introduction courtesy of Dr. John Peoples

record, however, is based on time allocated (e.g., 25% level of effort for a particular individual) rather than actual time spent (e.g., via time card reporting). Future labor cost estimates are based on software complexity, though as a review panel we had no way to validate these estimates. Contingency costs are being estimated based on software complexity, with an average of 22% (this is rather low compared to industry norms).

We were not shown detailed, resource-constrained development schedules, nor is it clear that such schedules are being developed. The WBS as presented shows only a list of milestones, and marked which ones are completed. The project staff appears to have confidence in their resource and schedule estimates, but we do not feel that we have sufficient independent information to either confirm or doubt their conclusions. It is also not clear whether or not shortfalls against performance goals for DC4 can be attributed to staff shortages as opposed to algorithmic problems, inadequate simulations, or other reasons.

2.3 Are the DM team and activities adequately integrated with the Science Committee and Science Working Group codes and needs? Are the plans for acceptance testing of DESDM by the Science Committee adequate?

We observe that there is significant interaction going on among the SWGs, SC, and DM development team, particularly in the context of the Data Challenges. There is a need for a more formal process to integrate SWG input, simulation development schedule and DC schedule early in each DC. As the project moves into acceptance and commissioning, this input will ultimately need a formal change control process. DESDM is not tracking/managing SWG code development efforts any longer; the SC is overseeing this work, and tracking against major DC milestone dates. The DES Project Director has an immediate goal to develop an integrated schedule over all parts of the project (DECam, CFIP, DESDM, SWG). This will specify integration milestones and schedule for deliverables from all parts.

The Science Committee Working Groups act as data quality analysts and ensure requirements flow-down. The science requirements flow-down has not been kept current. It was initially done in 2006 without SWG input (the SWGs were not in existence then). Since then, the SC has updated the SRD with input from SWGs, but the SRD has not been re-baselined.

Acceptance testing is considered a part of the Commissioning process by the SC, but the DESDM project lead sees acceptance testing as also occurring prior to Commissioning. The expectation for this role by the SC is set in the committee charter and plans and acknowledged by SC, but detailed acceptance/commissioning plans are not yet developed. The SWGs are developing test plans associated with each DC and presumably many of these will also be used during Commissioning. Assuming continued integration of SC, SWGs with DC5/6, the process should be adequate to produce good plans.

2.4 The upcoming NSF/DOE Joint Review will ask for a Supplement to the NSF Award for Data Management. Will this level of supplement requested provide for the adequate resources to meet the DM requirements? Has sufficient management reserve or contingency been identified and held by the DM management?

It is difficult for the review panel to determine this independently. When the supplemental budget is presented to NSF it needs to be very clear that the additional funds are critical and not just-in-case. It would be helpful to have a risk plan in order to help bolster the case for the supplement. The average

22% contingency figure is rather small for complex software development projects, though it is not unreasonable given how far along the software development effort has progressed.

While the amount of funding and the tasks to be performed with the funding are defined, the proposal work has not started. It was not clear if the project knows how the proposal will be reviewed or what level of detail is needed in the proposal regarding DESDM operations.

Given that the supplemental request is going to NSF in June to be reviewed on July 8/9 and NSF needs time to evaluate and approve, this implies that the project will not have supplemental funding sooner than Fall 2009. Given that the plans assume contingency from April 2009 to end and that analysis by the Project Lead shows that progress is impacted if staffed at base level, it is the project management's intent to proceed at the fully funded burn rate until the arrival of supplemental funding. That is, the project is incurring performance risk in order to push funding risk out to the end rather than accepting a schedule slip now.

2.5 Is the DM team organized and managed in a way to assure on time and within budget performance?

This is a PI project from an NSF perspective, but it is much more complicated and has a larger scope than a typical PI project. As such, it needs to be managed more like an MREFC project, albeit a small one. The project structure is reflective of this, with formal Project Lead, Project Manager, Test Lead, and Level 2 WBS leads. A modest level of additional process management, in the form of change control and document sign-off, would be helpful.

Findings

- Hardware/Networks: A hardware conceptual design exists, but detailed design is in progress. Hardware is being sized based on initial proposal estimates updated with performance results of Data Challenges. The project will submit annual proposals for hardware acquisition one year in advance of need for operations. Data Challenge 6b will inform the first proposal for hardware. NCSA has committed hardware for DES processing. The project will also request TeraGrid allocations as a processing resource. All major servers are redundant and equipment failure and replacement rates are being addressed. Database servers are doubly redundant. The current plan is to have spare/temporary network and compute capacity for "catch up" after any outage/slowdown. For SNe mission, this means catch up must happen within 4 days, or science is impacted.

- The required sustained bandwidth averaged over eighteen hours is 36 Mbps[2]. The existing bandwidth is 155 Mbps down mountain (microwave) and 45+ from La Serena to NOAO and NCSA. The plan is to upgrade to 80 Mbps for DES, doing tests with 155 in August 2009. NOAO is responsible for plan/cost for bandwidth acquisition from La Serena to NCSA; estimated costs were not presented/discussed.

[2] Original reviewers comment was 39 Mbps, but it is 36Mbps averaged over 18 hours. The DES MOU requires all data to reach NESA within 24 hours of the first part of the night.

- Database: Oracle Net-specific features are required for the cluster of databases that will be used in DC5. Oracle is not required for tertiary/snapshot databases. Currently (on one database instance) the system can ingest 4k files/s and 15k objects/s.

- Data access: No a priori query response requirements have been specified for the data access portal. Exploratory testing is being carried out with 33 users and some number of simultaneous queries. The most expensive query currently originates with the WL survey: a join of 7 tables over 100 deg^2 took 35 hours. Theoretically, Oracle supports 10,000 objects/s irrespective of database size on the current project hardware.[3] Other than the empirical test above, the review panel did not see a sizing estimate for user load for portal/DAF/Archive, and there is no current plan to do any SQL query throttling. There is a plan to add capacity (subject to funding) and the architecture does support load balancing across database instances. The latter capability is being implemented in an Oracle-specific fashion, which presents some issues for the NSA archive interfaces/implementation.

- Support for Virtual Observatory interfaces and protocols are part of the system requirements, but have not been implemented in the current data access system. Cone Search services were mentioned, as was use of VO authentication and authorization services, but the project seemed unaware of more recent/more sophisticated VO protocols such as the Simple Image Access Protocol (SIAP), Table Access Protocol (TAP), VOSpace for management of distributed storage, and the Astronomical Data Query Language (ADQL). Early adoption of even the most basic VO service standards would provide advantages to the development and science teams, such as delivery of database queries in VOTables and scriptable queries.

- Efforts are being made to re-use extant software, but there is significant lack of awareness of applicable software from immediate predecessors to the project such as SDSS (CASJobs, for example, for managing a variety of database queries and associated results storage).

Comments

- There has been a lot of good technical forward progress with a shortage of manpower. The review committee commends the project for this.

- A DESDM architectural overview with mappings to the WBS would have been useful input to the review panel.

- The material was not presented in a format that made it easy to answer the charge questions. Naively, reviewers would have expected to see a list of the major upcoming milestones for each presentation and how you are progressing on reaching those milestones. Presentations should be reviewed prior to a review to verify that this is done. Slide numbers should be listed on all slides. In addition to the technical details, all L2 breakout session talks should reference the WBS in terms of labor and schedule. It looks more cohesive if all talks come from a standard project template. The panel would have preferred more in depth presentations on DM-specific issues with very brief overviews of camera status, CFIP, and science programs.

[3] Text “on the current hardware” added.

- While the charge to the review panel asked for comments on the operations plan, none was presented. There should be software development efforts that are needed in preparation for operations such as automatic error detection and recovery and diagnostic interfaces. How will new software releases and database schema changes be deployed? The DM team should involve operations personnel soon to help with the requirements. DESDM project lead commented that the level of effort in operations would be roughly equivalent to that in development. Since there is no operations plan, the review panel is unable to comment on the validity of this level of effort.

- The reviewers didn't see much evidence (plots, stats) on performance testing the infrastructure against requirements. There is also very little in the system specifications regarding throughput and end-user performance metrics. What size queries will be supported? How many simultaneous queries will be supported? Scalability issues concerning the database size deserve further exploration.

- The monitoring portal is being developed with guidance from staff who are currently expected to assume operations responsibilities, and monitoring screens do not appear to be easily reconfigured. Operations staff is subject to frequent turnover, so a broader base of input on the ease of use of monitoring tools would be useful.

Recommendations

1. The project manager should create and own a "living" resource-loaded plan that is leveled against available resources. The WBS should encompass the lists of tasks associated with the project and level of effort needed. It should reflect a software release structure that parallels the data challenges. It should also indicate the critical path of the project.

2. We recommend DESDM undertake a technical review of the DB schema involving an outside large DB expert. The review should consider at least the issues of scaling behavior, performance versus expectations, and robust schema evolution. We recommend this review take place as soon as feasible to exploit improvements and adapt to changes sooner.

3. Contingency should be pulled out and held by the DM project manager so it can be tracked.

4. A formal integration plan is needed in order to assure that all components of the DESDM system and its interfaces to other DES systems work together effectively and are delivered on schedule.

5. It is important to define *who* determines whether software deliveries are acceptable and by what process and criteria such a decision is made.

6. The project needs to develop an initial operations plan prior to the next major review.

7. The issue tracking tool should be used to support a change control system, identify liens on contingency, and track all externally generated issues regarding DES DM.

3.0 Response to Charge Regarding Data Challenge 4

Primary Writer: Jeff Kantor

Contributors: Roc Cutri, Robert D. Kennedy

3.1 Have the goals and requirements of DC4 been achieved?

DC4 was primarily scoped at getting functional versions of the pipelines integrated with the processing framework and event system, and ingest of pipeline output into the DES Archive. We agree with the results documented in the DC4 report, and find that the goals for DC4 have been achieved to the extent stated in the DC4 plan, with two exceptions:

- the difference imaging pipeline was not completed;
- Oracle RAC testing was not completed.

The difference imaging pipeline goal was not achieved in time for the DC4 schedule. Development of the difference imaging pipeline proceeded through mid March, and large scale testing is now underway. The Oracle RAC testing was descoped during the summer of 2008 when it became clear that there was no hardware available at either NCSA or Fermilab to support this test.

Are there solid plans for any remedial actions addressing any new problems, opportunities, changes in direction, personnel, or interactions that were brought to light by the DC4 experience?

Clearly, the effort for DC4 was underestimated to the extent that the image differencing pipeline was not completed in time. The project lead elected to continue development beyond DC4 in order to deliver the pipeline prior to DC5. There appears to be no significant negative impact to the overall project schedule due to this slippage, but it reinforces the need for contingency funding and planning.

The Oracle RAC Testing goal has been programmed into DC6[4], after operations hardware is available. This is a reasonable plan and should be in time for project needs.

[4] Reviewers' comments referred to RAC testing in DC5. This is actually occurring in DC6. All corresponding references in the document have been updated.

3.2 The Joint DOE/NSF Review of September 2008 recommended that the Science Working Groups (SWG) begin to use the DES Data Archive during DC4, since it would be filled with simulated data. Have the Science Working Groups been able to access the DC4 data and has mutually beneficial feedback been exchanged between the SWG and DESDM?

Each SWG is in the process of preparing a report on participation in DC4. SWGs provided input catalogs to DC4 and compared DESDM output with input "truth". They were able to access the data via the portal, albeit with some initial difficulty due to software defects that have since been corrected. In addition, two working groups provided analysis pipelines (weak lensing and photo-z).

We find that these interactions are significant, and mutually beneficial to both the DESDM team and the SWG. In the case of the DESDM, the interactions provide a vital function of testing the astronomy codes. In the case of the SWGs, the interactions provide familiarization with the data products and data access capabilities of the DESDM.

The interactions should be continued and expanded, to the point where the SWGs have input into the DC plans (see recommendations), and their efforts are integrated more closely with those of the other DC participants.

Findings

- Achievement of Goals
    - Technical:
        - DC4 did not have specific provenance requirements, did not specify level, i.e. do not require enabling complete recreation of a data product from raw data. DESDM has scientific provenance built into data tables. Have svn branch/tag documented in ASCII file with each build. File is ingested into a RUNS table. Not currently tracking pre-requisites such as third-party software libraries, versions, but plan to do so in future.
        - Fault-tolerant pipelines are not specifically required, but DC4 demonstrated block-level checkpoint w/manual restart. Processing stops on failure. Can manually restart from middle of pipeline. Have not tested database fail-over primary to standby, will do so in DC5.
        - DC4 database ingest rates have now achieved required rates.
        - No transfers demonstrated over distance/DTS in DC4. DC4 Data transfer rates within NCSA were demonstrated.
        - DAF and DTS not required to be integrated with DES Control Portal. DC4 DAF uses gridftp for simulated data file transfer within DES Archive at NCSA. Do not currently report Orchestration, DTS events to Event System and Monitoring, but relatively easy to do so.
        - (side note: NOAO DTS uses SRB. SRB is unsupported, next generation is iRODS. NOAO DTS direction, to permit multiple transport protocols, replace SRB with iRODs, gridftp, other. It is NOAO responsibility to ensure this works.)
        - There is some pipeline-database interaction, done primarily through perl-dbms interface, one C-dbms interface plus stored procedure (the latter will be redone to enhance dbms portability).

        - The definition of some DC4 goals, in particular the control portal work, was not clearly specified in the DC4 plan, and thus are not easily assessed as completed or not. In particular, user interface development can suffer scope creep and can benefit from a crisp description of the intended deliverable or some other means to judge whether progress is "sufficient".
    - Scientific:
        - DC4 did an essentially "blind" test with 3.5 TB simulated data with artifacts. Processed 8000 deg^2 images, 181M objects. Speed is good. Achieved basic image processing results required for DC4.
        - Difference Imaging Pipeline not done, in work for DC5.
    - Programmatic:
        - Kept schedule, worked successfully with distributed team, but integration effort was higher than expected.
- Remedial Actions
    - Test Oracle RAC system (hardware available in summer 2010) in DC6
    - Finish Difference Imaging Pipeline in DC5
    - By plan, in DC4, system does not yet meet DESDM data quality requirements, but that is expected in DC5/6. That being said, there do not appear to be explicit requirements (other than "something less than the full science requirements") for each DC that indicate what level of data quality is to be achieved by the end of that DC. Improvements to simulated data (shapelet catalogs, shear, detector/PSF/geometric distortion models) are needed also to move toward the data quality requirements. It would seem that specifying data quality goals/requirements for each DC would help scope that DC and rationalize the SWG testing and simulation data requirements/effort for that DC. It is not clear what the process is by which simulation data requirements are linked to the DC requirements/effort.
- Science Committee Involvement in DC4
    - Each WG is reporting on participation in DC4, provided input catalogs, compared output with input "truth". Two working groups provided analysis pipelines.
    - Had some issues with data access via portal due to software limitations/defects. Causes were debugged, fixes worked back into DESDM interfaces. No formal coding/interface standards documented/enforced in DC4, led to some "reinventing the wheel" by SWGs. Have started a "how to create a pipeline" page. Will move to formal bug tracking/reporting in DC5.

Comments

- The fidelity of the simulations must be driven by the science requirements and the requirements of the data challenges. For example, the astrometric accuracy on the sky is likely to be less than what is currently being obtained from simulations though it is still likely to be good enough while the simulation of the shear and the photometric calibration (flat fielding, vignetting, photometric accuracy) have the potential to impact significantly the science returns of the

survey. The level of this fidelity needs to match the science requirements document (e.g. the requirements on shear systematics will drive the fidelity of the atmosphere, telescope and detector model) but could include, atmospheric effects, differential chromatic refraction, variation in chip heights and tilts, pixel sensitivities, scattered light and ghosting.

Recommendations

8. The project should assign a Data Challenge Coordinator for each Data Challenge, with the responsibility and authority to establish total DC scope across all DC participating groups and manage scope change requests.

9. SWG feedback to DESDM from the DC4 experience resulted in a list of feature requests. That feature request list should be jointly prioritized by DC leadership and the SC, and the work broken down to determine what can be accomplished with available staff, and that "accepted feature list" vetted with the SWGs. We suggest including some general performance goals for these features to help clarify the work scope and low-level acceptance criteria, and handle these feature requests in a change management system. We suggest these same mechanisms be applied to defect reporting/tracking.

10. Given the role that the SWGs play in terms of assessing data quality with each Data Challenge and the need for the simulation group to produce simulated data in support of this testing, we recommend specifying data quality goals and simulation data requirements (including level of fidelity) for each DC. This would help scope that DC and rationalize the SWG testing and simulation data requirements/effort for that DC. It would link together DESDM pipeline, simulation data, and SWG tests into an integrated DC plan.

11. Since the SWGs are providing code that forms an integrated part of the DESDM that ultimately must be maintained, we recommend that coding standards and feature/defect reporting tracking process and tools applied to non-SWG DESDM code also be applied to those DESDM codes provided by the SWG. We recognize that this implies an incremental effort increase on the part of the SWGs.

12. The DC4 plan, being oriented at basic functionality, did not have very much in the way of specific, quantified data quality goals. The DC5 plan currently includes a significant list of qualitative improvements to the simulated data. Based on having these improvements in the data input to the pipelines, there should be explicit goals for DC5 in the areas of photometric quality, PSF characterization, shape measurements, and retention of astrometric quality.

4.0 Response to Charge Regarding Science

Primary Writer: Yannick Mellier

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4.1 Is the Science Requirements Document complete and sufficiently comprehensive?

Almost complete. Overall the science requirements document (in v.9.1) is sufficiently detailed. Only a few numbers or precisions are missing. But most critical requirements (photometry, PSF) are now in

and can be taken into account by DESDM. They now should proceed to a formal sign off the document by the Science Committee heads, the Project Scientist, and the DESDM leadership.

The photo-z precision changed in recent revision of the science requirements from a separate precisions for red (0.03) and blue (0.2) galaxies to an overall (0.12) accuracy requirement. Is this adequate or should tests of galaxies by color and/or spectral type be separately considered with regard to cluster science and BAO science? It was the impression of the committee that the photo-z accuracy obtained in DC-4 was not yet fully understood.

The project's photometric system is not defined.

It is unclear in R-11[5] how the atmospheric refraction is to be accounted for.

These are mostly small problems that could be readily fixed with another iteration of the requirements document.[6]

Are there adequate plans for judging whether the science requirements are being met both by the individual components and collectively by the DES system as a whole?

The materials for judging are rather well defined, based on DC4-DC6 and real data (Cosmos, CFHTLS). DC4, DC5 and DC6 define the plans for validation from the DESDM output data, and then possible identification of bugs and critical issues from the analyses: top level astrometry requirements, photometry requirements, PSF analysis and measurement accuracy, star-galaxy classification. Tests on clusters of galaxies and photo-z show how the SWGs can use DC4. DC4 already revealed several requirements that were not met with current astronomy codes and provided useful outcome for the ongoing software development activities. DC5 includes shear. The metrics to check if the science requirements can be met are defined by the numbers in the Science Requirements documents. The data flow and efficiency of DES DBs and archive access, GUI can be tested by SWGs.

At this stage, testing of the DESDM in the various Data Challenges is being driven by simulated images. The simulations leave out numerous effects and this may lead to overly optimistic conclusions about DESDM performance. It is therefore important that the DESDM and SWGs pipelines and codes be tested and validated on real data. Further, the simulations should move to more realistic data with several important new features. These include spatial structure in atmospheric extinction, particularly from clouds, and wavelength dependent atmospheric refraction. The impact of filters spatial non-uniformity on photometric calibration has not been assessed, though it may turn into a stressing requirement on DESDM. It is unclear whether the simulations include realistic chip-to-chip variation of QE as a function of wavelength and other detector problems, like cross-talk are not included in the simulations. All of these omissions will make photometric, and to a lesser degree, astrometric, calibration appear to perform much better than it will with real data.

[5] Fixed typo that was erroneously stated as R-22.

[6] Comments based on requirements document v9.1.

4.2 Has there been proper science requirement flow down to the DESDM?

Very good progress achieved. However, the Science Committee should review the flow down of science requirements to the DESDM, as captured in the DESDM Requirements and Technical Specifications Document.

Because the DESDM and SWGs activities are partly decoupled, it is important the flow down to the SWGs works and be controlled. The oversight by the Science Committee is crucial. It is important to check that science requirements are put in DC5, in particular in simulations, but also to have clear metrics to control whether the science requirements are met.

Is the DESDM being designed and implemented in a manner consistent with the meeting the overall DES science requirements?

Step by step process: DC3 and DC4 were used to successfully meet the astrometry requirements; DC5 will be used to meet the galaxy photometry requirements. DC4 has been used for preliminary testing of clusters of galaxies detection. DC5 will include shear, so WL can be tested. So, at least each critical module and requirement can be tested. The DC4 and DC5 data can also be used to test the data flow to DES scientific institutions to meet the scientists' needs.

4.3 Are the responsibilities of the DES Project Scientist well defined and appropriate to accomplish the mission?

No. The presentation of the Project Scientist was very well focused to reporting on how well the results of DC4 went toward meeting the science requirements. However, there was not clear communication of these results to the writers of the DC4 results report, where these comparisons were not mentioned. In other projects, the Project Scientist has responsibility for over all data quality and also for transmitting the metrics or importance of data quality to the teams.

This role seems incompletely covered by a combination of the DES Project Scientist and the leadership of the DES Science Committee. According to the Project Director, the Project Scientist is responsible for the observing plan, and for the flow down of science requirements to the system requirements. The Science Committee appears to mainly be responsible for the management of the Science Working Groups. There was not an adequate response to the question of how the project would deal with data quality from (for example) the weak lensing pipeline being poor.

4.4 Are the charge, organization, and composition of the Science Working Groups satisfactory to accomplish their mission and challenges?

The teams are strong and effective. The charge, in particular the critical elements (PSF, photo-z, photometry) are very well understood and drive the work of the SWGs. However, the software development plans for science codes seem to be unmanaged and disconnected. Some verification and validation schemes and criteria for science codes appear to be out of control of the DESDM, for instance the weak lensing and difference image pipeline are not directly under DESDM ownership. This is manageable, so long as the eventual testing is integrated at the Science Committee level.

4.5 Have the SWGs successfully interacted with the DM team on Data Challenge 4?

Reasonably well. There was disagreement on the definition of progress toward success, with the DESDM team focused on processing completeness and speed with minimal exceptional (error

throwing) cases with some science quality analysis, and the Project Scientist focused on metrics in the science requirement document. Both are important, and both should be reflected in the final report on the Data Challenge 4.

It seemed that the science quality analysis of how well DC4 did was only realized somewhat late. In fact, had it been realized earlier, perhaps on a smaller subset of the DC4 dataset, then (for example SExtractor) pipeline parameters could have been tuned to improve result (for example on sky subtraction or with aperture magnitudes). This points to a remaining difficulty in getting results from the DC4 back to the scientists in a timely and useful fashion. This issue is being addressed by improving the data access portal, but tools or additional 'derived science tables' within the database, containing more 'end-user' combinations of quantities or indices, may also help.

4.6 Does the Science Committee successfully coordinate the work of the Science Working Groups?

Yes, but it could be improved. Astronomy codes outside DESDM seem less centrally coordinated, without clear schedule and plans. Code validation is totally uncontrolled, with no risk estimates or backup plans. The Science Committee is now the only oversight committee that determines that everything is on track and will be ready on time. Its role is then most important. An integration leader, who is in regular contact with both the Science Working group code developers and the DESDM code team, and who has input to or control of an integrated schedule, is an important role to identify.

4.7 Are the plans by the Science Committee for acceptance testing of DESDM satisfactory?

The DESDM DCs 4, 5 and 6 as well as processing real images from CFHT/LBT and the acceptance tests provided by DESDM (astrometry, photometry, limiting magnitude, photot-z) will provide a solid ground toward clearly defined acceptance tests with respect to the Science Requirement Documents. There is still a need within the simulations for a very realistic instrument model and observational operations models (with moon light, very bright stars, scattered light, unstable guiding, defocus) put into DC5 or DC6, or at least an understanding of how those items affect the requirements.

However, no plan for the commissioning has been shown and no schedule to provide this plan has been given. Due to the decoupling between the DESDM and the SWGs astronomy code developments, it is impossible to anticipate what that plan could be. There is a serious risk the DESDM and the SWGs activities will be difficult to coordinate into a realistic commissioning plan. The role of the SWGs in the commissioning milestones has to be defined.

4.8 Are the Science Committee and SWGs making sufficient progress toward the commissioning milestone in 2011?

Slightly more than two years remain before the arrival of real data. In our opinion, progress made to date is very sufficient at this time. The Data Challenge paradigm is working well. However, at the end of each Data Challenge there are always many items which one wished one could have incorporated sooner into the production path. Since only 2.5 DCs remain (DC5, DC6a and DC6b), better communication and an integrated schedule will help. Also, the processing of small subsets of the DC dataset early in the DC process with quick feedback and dissemination of quality checks can help to tune parameters or fix problems before full production on the whole DC dataset is pushed through. Whenever possible, the full DESDM mechanisms for job submission should be used to process these small data subsets.

Findings

- The science working groups are now all set and are working. They actively contribute to the updated version of the science requirements document and the production of astronomy code put in DESDM. Most critical science codes and pipelines are in good shape.

- There is a somewhat artificial dividing line between what are called astronomy codes and the science codes.

- The role of the Science Committee to oversee SWG activities seems well thought out and the procedures to set up new WGs in fields not yet covered seems to work well. It also has a primary role in the communications between SWG and DESDM.

- The Science Committee has not yet vetted the flow down of the Science Requirements to the DESDM Requirements and Technical Specifications and there is not a schedule to do so, according to the response to a question asked during the review presentations.

- There does not appear to be a science driver defined in the DES Science Requirements Document for running the Image Differencing pipeline on main DES survey data. Image differencing for the purpose of SNe detection in the SNe survey is described.

- The communications between the SWGs and the DESDM are improving and led to the productions of important science codes for the DES main goals (WL and photo-z). The present decoupling between the DESDM and SWGs astronomy codes is a serious concern.

- Two examples of bad communications: the WL group failed in initial attempts at downloading the processed DC4 data. The group was not aware of the complexity of the internal database operations required to return their scientifically interesting data volume. The LSS working group was not aware of the observing strategy put in DC4 and on its consequences on the survey homogeneity and the need for masks.

- The LSS working group seems to be less advanced than others (CL, WL, SNIa) in as far as progress toward a science pipeline to do LSS (BAO) science which was integrated into the overall DESDM system.

- The PSF analyses done by DESDM and by the WL working group seem to be decoupled. There is apparently no communications between the two groups and that efforts are duplicated. This seems to be common on all SWG developments: not managed in DESDM.

- Needs planning of science astronomy codes, external to DESDM. Will these codes be distributed to DESDM or will they be public or totally DES private? How will they be integrated in DESDM? Does this refer to SExtractor tools, detrending pipelines or both?

- The DC4 data have been extensively used by several working groups. It confirms the Data Challenge is an excellent concept to prepare DES and to strengthen the communications between DESDM and the SWGs.

- The simulations produced by the DESDM for DC4 seem to be based on top level requirements and do meet the need at this stage. It is not clear however, how the more detailed science requirements will be taken into account in next data challenges.

- The science based quality assessments are not yet defined with clear metrics. It is not clear how and through which decision process science based acceptance criteria will be added to the validation process of processed data.

- The science requirements are evaluated with respect to simulations, need to have the same analysis on real data.

- The DESDM and SWGs codes are totally decoupled and DESDM has no control of the activities of SWGs.

- The deblending code effort, while very important for science success (i.e. generation of a uniform and complete galaxy catalog within crowded clusters), can easily become an open-ended development project, and it may be difficult to reach convergence. Some check points or intermediate milestones could be developed in conjunction with the science committee (i.e. if you can deblend galaxies in the Coma cluster down to 22nd magnitude then you've reached milestone #1) which can be used in conjunction with DC5 and DC6. A similar point can be made for progress in modeling the PSF with the PSFEx code and for model fitting of galaxies.

Comments

- The science requirements document does not specifically discuss PSF analysis for the calibration of stellar photometry.

- To improve query performance, a new follow-on 'coadd-science' table, derived from the coadd-object table in the primary database which contained one line per coadded object and also contained weak-lensing, photo-z, and other astrometric information (such as extinction information) and which contained indices on quantities such as colors and shapes could help as a table which the DES scientists could access large numbers of objects from quickly without interfering with day-to-day production/operations of loading and merging of the object and coadd-object tables. Such a table, while it would take some time to generate, could be generated or updated several times during the running of a data challenge and thus provide access to 'science end user' outputs which could then be rapidly compared to science requirement metrics by the science working groups.

Recommendations

13. We recommend the WL working group and the DESDM astronomy code leader engage closely in communication on the parallel PSF shapelet characterization and the PSF homogenization and shape analysis for co-added exposures.

14. We recommend that the Science Working Groups review the data model and schema structures in the main database. Such a review could lead to recommendations, relatively straight-forward to implement, which would help connect the low-level outputs of the pipelines and science codes to the combined, extracted output data sets needed to rapidly assess whether the science requirements are being met.

15. The Science Committee should review the flow down of science requirements to the DESDM, as captured in the DESDM Requirements and Technical Specifications Document. This should be done prior to the Supplemental Funding Request to be certain that the scope and cost estimates for that proposal adequately capture all work that is needed.

16. Add to the Science Requirements document the motivation for performing difference imaging in the main survey data (e.g. characterizing variability, proper motion, SNe statistics in bright galaxies). Alternately, the project should consider not running the Image Difference pipeline on regular survey data and thereby reduce processing complexity and loads.

17. When doing their performance analysis on DC4 (and later) processing runs, the SWGs should define sets of science performance tests and associated metrics that can be incorporated into the standard DESDM Quality Assurance system.

18. The DES would benefit from collaborating with other survey projects on image simulation and photometric calibration.

19. A DES project-level plan should be developed to manage the SWG software development process to ensure that both software quality and science data quality are achieved on time and in coordination with DESDM activities.

20. A commissioning plan for acceptance testing of DESDM that incorporates both DESDM and SWGs elements has to be set.

5.0 Response to Charge Regarding Community Pipeline

Primary Writer: Andrew Connolly

Contributors: James Myers, Brian Yanny

5.1 Do the community pipeline requirements, efforts, and accomplishments meet the needs of the science side of DES with respect to organization, roles, and responsibilities, and the Science Working Groups?

The community pipeline has no apparent impact on the science side of the DES and the SWGs other than at the resource level. The community pipeline should not draw resources away from the core DESDM responsibilities to DES.

5.2 Are the Community Needs Pipeline Requirements, Specifications, Deliverables, and Responsibilities well documented, and do they adequately meet the need with respect to analysis level provided?

The boundaries between NOAO and DES are not completely defined. The technical specifications and implementation plan are a major step forward in defining this interaction but the deliverables and the interaction between NSA and DES need a much higher level of detail. The expectations of each group (NOAO and DESDM) in terms of their responsibilities in terms of data products, development and support do not appear to be in sync and should be clarified. There are many subtleties in supporting the data products generated by the community pipeline in the NSA archive and we would recommend that the ingestion of the community pipeline data products be a part of the DC5 test plan. Costs of support of the conversion from an Oracle designed set of tables to one defined for Postgres (or the cost of supporting the Oracle system) should be evaluated as part of the process of refining the implementation plan to include specific tasks and resource allocations. The technical and implementation plans need to be signed off by the project and NOAO.

5.3 Are the testing and acceptance criteria for the Community Pipeline that will be used by NOAO and by the CTIO Director satisfactory?

A sign-off process for the community pipeline that includes the community needs working group and ends with the NOAO director appears appropriate. No testing plan nor acceptance criteria were provided so how appropriate this effort is cannot be judged at this time. The staffing of the group who will undertake this evaluation should be specified. It is unclear that the timing of the sign-off for the community pipeline will work as it will occur before the DECam goes into full production (in modes that are not standard for DECam). Support for the long-term development and support of the community pipeline is a major concern. The belief that the code will not require continued development and can be delivered to a point where it will just require bug fixes is unrealistic. A process for how the community pipeline will be supported through operations and beyond (including costing) needs to be specified.

Findings

- There has been substantial progress in the community pipeline definitions compared to a year ago (including scope and boundaries between the NOAO and DESDM) but have not yet been formally accepted and baselined by the DES project. While the project is developing to these

requirements, this seems to be too important to leave in an unbaselined state. The implementation plan appropriately reuses significant portions of the DESDM internal processing pipeline.

- While the progress in this area is encouraging the boundaries within this effort (what DESDM supports and what NOAO expects) remain incomplete (e.g. the products that will be delivered, reduced images or catalogs, the functionality of the code to handle non-DES specific data). No detailed task list or bottom up labor estimate exists, estimate was done by extrapolation from DESDM Data Challenges/DESDM pipeline effort. Project expects to achieve progress through FY09 with existing staff (at some difficulty). DESDM is currently seeking to add 1FTE to support the Community Pipeline development.[7]

- The Implementation plan for the Community Pipeline work in FY10/11 (DC5, 6a, and 6b) require $260k of funding to be secured from DES internal sources, and the Project Director has started this process. He indicated that $125K is already all but secured and is hopeful for the rest. It also appears that given the critical nature of this deliverable in order to secure the Blanco telescope time, it deserves a Level 2 Manager. The project has recognized this and is working to find a person. The above funding would cover this person. This funding would seem to be a risk item that needs immediate resolution if the schedules are to be met.

- The long term support and development of the community pipeline through operations and the evolution of the interfaces is not defined nor scoped in any of the documents and presentations.

Comments

- The current implementation document specifies that the community pipeline will deliver detrended images and catalogs to the NSA as fits binary files based on the schema defined within the DES archive. The delivery of catalogs to the NOAO community as opposed to just detrended images is an enhancement that is strongly encouraged.

- The WBS breakdown for the development of the community pipeline does not appear in the organizational charts and is unstaffed. The draft implementation plan is primarily a system specification document and does not address, outside high level info in section 4.1, the technical tasks and milestones required to implement the system.

- A breakdown of how the continued development of the community pipeline once delivered was missing from the presentations and scope of the documentation. It is likely that more development will be required once the pipeline has been delivered (current surveys are still actively developing their software years into their operations).

- No specification was provided for how NOAO can define additional requirements (i.e. additional functionality not bugs) for the community if the system doesn't perform at a level required for data taken in non-DES mode. It was not clear who gets to define when an issue is

[7] Added the comment about FTE support for the Community Pipeline.

defined as requiring a fix or enhancement and what support will be in place for NOAO continued development of the code if it doesn't perform.

- If the community pipeline data products include source and object catalog data the NOAO and DES need to define how the NSA will ingest the DES community products given that the DES data schema is specified for an Oracle database. If any of the data products are specific to the Oracle design (e.g the table structure and the use of stored procedures) they need to be specified in terms of a Postgres database (including the ability of Postgres to scale to the size of the community data).

- NOAO needs to specify the way they will deliver data to the community, what data products they will support, the level of reductions users can expect and use this to define the requirements on what the community pipeline will deliver.

- It was noted that progress on community pipeline was listed as the first point on a list of several items for DC5, suggesting highest priority. While important a balance must be kept such that the community pipeline remains synchronized with the DC5 goals of iteratively improving the DESDM analysis system and working toward meeting the science requirements.

Recommendations

22. The community pipeline is a joint NOAO and DES effort and needs to be presented as such by the project. The NOAO and DES groups need to define a plan for the long term support, development, curation and support of the software and data products that will be delivered both through the community pipeline (and for support of the public DES data).

23. To judge the cost and required effort to support the community pipeline (through construction and operations) DES and NOAO need to provide a joint operating budget with the costs and responsibilities of each group clearly defined. A complete set of tasks should be presented for the development of the community pipeline where it deviates from the DESDM system. Even given the lack of detail, the cost of developing for a Postgres archive, supporting non DES operations (e.g. the lack of calibration data), a graceful failover mode, documenting and testing/validation appears too low.

24. The funding of the development work for the community pipeline must be in addition to current DESDM work and must not take away from the DES DM effort (including any open ended support for the community pipeline).

25. We encourage the integration of the community pipeline in DC5, including the delivery of data to NOAO and the ingestion of these data within the NSA to determine the requirements on the archiving of these data.

26. The difference in functionality required by the community pipeline (e.g. due to narrow band filters, large extended images, dense fields) needs to be specified based on the NOAO expectations of the use cases for community observing. While a graceful failover for non-standard data is appropriate, calibration (flats, bias, linearization) up to and including a WCS for output images should be considered a minimum set of functionality for the majority of community uses. The definition of graceful failover should be formalized and justified by

science requirements. DESDM and NOAO need to define the software components that are shared between the efforts for the community pipeline and the DES DM. The overlap between these components should be the maximum possible and the software should be in a common repository. This will minimize the cost of development and support.

27. The process by which NOAO can request additional development of the community pipeline from DES for functionality that goes beyond standard DES observing mode should to be defined. This process, the support of the continued development of the community pipeline (including costs) needs to be specified through operations.

28. NOAO should provide a long-term support plan for the community pipeline beyond the end of DES operations.

29. The licensing of the software developed by DESDM as part of the community pipeline should be specified (e.g. in an open source form) to enable the development and support outside of the DES/NOAO community.

Appendix A Charge to the Directors' Review Committee

Directors' Review of the Dark Energy Survey Project
April 28-30, 2009

This Charge is for a Directors' Review of the Dark Energy Survey (DES) project that will be held at the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign on April 28-30, 2009. The two primary objectives of DES are the successful deployment of DECam, a world-class astronomical instrument on the Blanco Telescope at Cerro Tololo, Chile, for the benefit of the entire astronomical community served by NOAO and the successful completion of the scientific program of the Dark Energy Survey. The review will cover the three parts of the DES project: the Dark Energy Camera (DECam), the DES Data Management (DESDM), and the Cerro Tololo Inter-American Observatory (CTIO) Facilities Improvement Project (CFIP) and it will also cover accomplishments to date of the Science Working Groups and their plans for the future. The DES Council of Directors: Peter Garbincius, Associate Director for Research for Project Oversight at Fermilab; Richard Crutcher, Astronomy Division Director at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign (UIUC); David Silva, Director of the National Optical Astronomical Observatory (NOAO), and Craig Hogan, Director of the Fermilab Center for Particle Astrophysics, are commissioning this review.

The main question to be assessed is whether all aspects of DES are making sufficient progress to bring all four-components together into a working system capable of delivering on its scientific promise soon after first light in 2011. We request recommendations to help ensure that this goal is achieved.

Since it has already had multiple extensive reviews, only a brief status report will be presented for DECam, with emphasis on progress and outlining problem areas where additional help can be brought to bear. Since CTIO will be in the midst of a major shutdown of the Blanco telescope to carry out the Telescope Control System Upgrade and repair of the radial supports of the primary mirror, only a brief status report will be presented on CFIP.

The areas of emphasis for this review, described in more detail below, include the very interrelated topics of Data Management, Data Challenge 4, activities of the Science Working Groups, including their interfaces with the DESDM Project, and the Community Needs Pipeline.

This Directors' Review will also serve as preparation for the Joint NSF/DOE Review of DES at Fermilab on July 8-9, 2009, which, among other topics, will serve as an NSF review of the request for the Supplement to the NSF Award for Data Management activities at NCSA.

Finally, the review committee is requested to present complete and consensus findings, comments, and recommendations at a closeout meeting with DES, Fermilab, NCSA/UIUC, and CTIO/NOAO management. It is expected that, except for minimum modifications (e.g. minor corrections, format and cosmetic changes), the documents prepared for this closeout will suffice as the final report.

Peter H. Garbincius, Fermilab
Chairman, DES Council
April 8, 2009

Specific Items and Questions for the Directors' Review of DES – April, 2009

Due to the interrelationships, some questions apply to multiple topics.

Data Management and Request for Supplement to the NSF Award:

Are the DM goals, specifications, and requirements adequately documented, tested, verified, and accepted by all? Is progress in these areas adequately monitored, reviewed, and reported?

Does the Data Management team have sufficient resources and are they making adequate progress to complete the development and commissioning of DESDM in time for on-sky commissioning in 2011? Are the milestones and plans (including remedial plans) to meet them acceptable?

Are the DM team and activities adequately integrated with the Science Committee and Science Working Group codes and needs? Are the plans for acceptance testing of DESDM by the Science Committee adequate?

The upcoming NSF/DOE Joint Review will ask for a Supplement to the NSF Award for Data Management. Will this level of supplement requested provide for the adequate resources to meet the DM requirements ? Has sufficiency management reserve or contingency been identified and held by the DM management?

Is the DM team organized and managed in a way to assure on time and within budget performance?

Please review and comment on following elements of the DM project: Astronomy Codes, Processing Framework, Archive and Data Access Framework, Science Pipelines (e.g. SNe and Diff imaging), and Testing and Validation (including quality assurance), and Commissioning. In particular, for each element, please comment on current implementation status, technology and implementation choices, current development status, the likelihood that choices will fulfill requirements and the likelihood that choices will lead to on-time and on-budget delivery.

Please review and comment on DESDM operations plan, including data transport, processing, quality control, science product delivery to end users and archive curation.

Data Challenge 4:

A general goal was to evaluate the experience of Data Challenge 4 (DC4) to baseline or better understand the data process.

Have the goals and requirements of DC4 been achieved? Are there solid plans for any remedial actions addressing any new problems, opportunities, changes in direction, personnel, or interactions that were brought to light by the DC4 experience?

The Joint DOE/NSF Review of September 2008 recommended that the Science Working Groups (SWG) begin to use the DES Data Archive during DC4, since it would be filled with simulated data. Have the Science Working Groups been able to access the DC4 data and has mutually beneficial feedback been exchanged between the SWG and DESDM?

Science:

Is the Science Requirements Document complete and sufficiently comprehensive? Are there adequate plans for judging whether the science requirements are being met both by the individual components and collectively by the DES system as a whole?

Has there been proper science requirement flow down to the DESDM? Is the DESDM being designed and implemented in a manner consistent with the meeting the overall DES science requirements?

Are the responsibilities of the DES Project Scientist well defined and appropriate to accomplish the mission?

Are the charge, organization, and composition of the Science Working Groups satisfactory to accomplish their mission and challenges?

Have the SWGs successfully interacted with the DM team on Data Challenge 4?

Does the Science Committee successfully coordinate the work of the Science Working Groups?

Are the plans by the Science Committee for acceptance testing of DESDM satisfactory?

Are the Science Committee and SWGs making sufficient progress toward the commissioning milestone in 2011?

Community Pipeline:

Do the community pipeline requirements, efforts, and accomplishments meet the needs of the science side of DES with respect to organization, roles, and responsibilities, and the Science Working Groups?

Are the Community Needs Pipeline Requirements, Specifications, Deliverables, and Responsibilities well documented, and do they adequately meet the need with respect to analysis level provided?

Are the testing and acceptance criteria for the Community Pipeline that will be used by NOAO and by the CTIO Director satisfactory?

END

Appendix B – Agenda

28 April 2009
Tuesday

28 Apr 2009, 08:00	Executive Committee Meeting	
28 Apr 2009, 09:00	Morning Plenary #1	Welcome & Overviews: DES DESDM
28 Apr 2009, 10:15	Morning Break	
28 Apr 2009, 10:30	Morning Plenary # 2	Overviews: DECam, CTIO, Science Comm
28 Apr 2009, 12:15	Lunch	
28 Apr 2009, 13:00	Afternoon Plenary # 1	Simulations; DESDM Details
28 Apr 2009, 15:30	Afternoon Break	
28 Apr 2009, 15:45	Afternoon Plenary # 2	Science WG Accomplishmen & Plans
28 Apr 2009, 17:00	Afternoon Plenary # 3	Questions & Responses
28 Apr 2009, 18:00	Executive Session	

29 April 2009
Wednesday

29 Apr 2009, 08:00	Executive Session	
29 Apr 2009, 08:45	Morning Plenary # 1	DESDM PEP; Questions & Responses
29 Apr 2009, 10:00	Morning Break	
29 Apr 2009, 10:15	Morning Plenary # 2	Science Req & Community Needs
29 Apr 2009, 11:30	Morning Plenary # 3	DES Interfaces; Questions & Responses
29 Apr 2009, 12:30	Executive Session	12:30pm-6:00pm (working lunch)

30 April 2009
Thursday

30 Apr 2009, 08:15	Executive Session	
30 Apr 2009, 09:30	Closeout	

Adjourn at 10:30 am

Appendix C - Review Panel

Edward Temple, Chairman, Argonne National Laboratory/Fermilab
Tim Axelrod, Large Synoptic Survey Telescope
Andrew J. Connolly, University of Washington
Roc Cutri, California Institute of Technology
Robert J. Hanisch, Space Telescope Science Institute
Jeff Kantor, Large Synoptic Survey Telescope
Robert D. Kennedy, Fermilab
Yannick Mellier, Institut d'astrophysique de Paris
James Myers, National Center for Supercomputing Applications
Magaret Votava, Fermilab
Brian Yanny, Fermilab