ASTROPHYSICAL RESEARCH CONSORTIUM
Principles of Operation for SDSS-III

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1 Introduction

The Sloan Digital Sky Survey III (hereafter SDSS-III) as currently envisaged is a six-year program to use the 2.5-meter wide-field telescope at Apache Point Observatory to carry out four surveys (BOSS, SEGUE-2, APOGEE, and MARVELS) on three scientific themes: dark energy and cosmological parameters; the structure, dynamics, and chemical evolution of the Milky Way galaxy; and the architecture of nearby planetary systems. Observations are planned to take place between 1 July 2008 and 30 June 2014.

This document defines the scientific objectives, management structure, and basic operational policies for the project.

SDSS-III builds upon the scientific and technical success of the first two phases of the Sloan Digital Sky Survey (SDSS-I and SDSS-II) which used the 2.5-meter telescope to carry out imaging of over 10,000 deg^2 and spectroscopy of 1.3 million stars, galaxies and quasars. Observing for SDSS-II will end on 30 June 2008. However, SDSS-III is a distinct project; policies and data rights from SDSS-I and -II do not carry over to SDSS-III unless explicitly stated in this document.

These Principles of Operation (PoO) are based on the equivalent document written for the SDSS-II project, which can be found at
`http://tdserver1.fnal.gov/sdss/SDSS-II/docs/PoO-II-10a.pdf`.

The principles articulated here have been agreed upon by the Participating Institutions. They may be revised as needed by future agreements. Changes to the PoO must be approved by the ARC Board of Governors, based on recommendations from the Advisory Council.

1.1 Scope

This document provides the basis for the governance of the SDSS-III collaboration. The Director of SDSS-III will develop and implement more specific procedures and rules in many of the following areas in keeping with the principles expressed here. The Director will keep the Advisory Council informed about such procedures and rules, which will be posted to the SDSS-III internal website.

1.2 Key Terms

Certain key terms, when capitalized, will have the following meanings throughout this document:

- **SDSS-I:** The SDSS-I, originally the SDSS, is defined to consist of all operations and data obtained prior to 1 July 2005 with the Apache Point 2.5-meter telescope.

- **SDSS-II:** The SDSS-II is defined to consist of all operations and data obtained between 1 July 2005 and 30 June 2008 with the Apache Point 2.5-meter telescope.

- **ARC:** Astrophysical Research Consortium, a nonprofit Washington corporation for research and education in astronomy with the following current institutional membership (as of July 2007): University of Washington, University of Chicago, Johns Hopkins University, Princeton University, Institute for Advanced Study, New Mexico State University, University of Colorado, and University of Virginia. ARC has ultimate responsibility for SDSS-III. The ARC Board of Governors consists of two representatives from each of ARC's member institutions.

- **PoO:** Principles of Operation, this document, setting forth the operating principles for SDSS-III. These are understood to be distinct from the principles that governed SDSS-I and SDSS-II.

- **Participating Institutions:** The institutions participating in SDSS-III. There are two categories of participation: Full and Associate. Full members and Associate members with at least three Participants have voting rights on the Advisory Council. The Appendix provides a current list of these partners in each category of scientific participation. Rights and responsibilities of each institutional member of the collaboration will be governed by an individual Memorandum of Understanding (MOU).

- **Participants:** Long-term scientific staff, e.g. faculty, research-track scientists, and the equivalent, who have access to the SDSS-III Science Archive and rights for scientific exploitation and publication of SDSS-III data prior to public release. The extent of Participant status within each Participating Institution is described in the respective MOU.

- **Architects:** Team members who, on the basis of a significant contribution to project infrastructure, are awarded authorship rights on papers involving proprietary SDSS-III data.

- **Advisory Council (AC):** The body which represents the Participating Institutions and advises the Board on matters relating to SDSS-III. Until the AC is established, the Steering Committee (SC) will act in its place.

- **Director:** The Director of SDSS-III.

- **Collaboration:** Collectively, all Participating Institutions and Participants.

- **Management Committee:** The group that provides advice on regular operations of the project to the Director and the Central Project Office. A subcommittee, the Executive Management Committee, is authorized to act if it is not practical to convene the full Committee.

- **Ombudsman:** The Ombudsman is an independent, neutral party who helps settle disagreements within the project in an informal manner.
- **Project Teams:** Project Teams have specific charges and deliverables as part of the operations of SDSS-III.
- **Core Programs:** The BOSS, SEGUE-2, MARVELS, and APOGEE surveys, collectively.
- **Scientific and Technical Requirements:** a document, drawn up by the Director and approved by the AC, that specifies the scientific performance and interface requirements of each instrument and software package used by the project.
- **Science Archive:** the repository of all scientifically useful SDSS-III data made accessible to Participants.
- **Proposal:** a formal proposal in the name of ARC or a Participating Institution to an external funding source requesting financial support for SDSS-III or its scientific exploitation.

2 Scientific Program

The intention of SDSS-III is to conduct four interlocking surveys over a six-year period, with scientific goals as listed below.

- The SEGUE-2 survey will use the SDSS-II spectrographs to carry out a spectroscopic survey of 350,000 stars selected from existing SDSS imaging to do dynamical and metallicity studies of the halo and thick disk of the Milky Way. It builds on the success of the SEGUE project, which was a component of SDSS-II. This survey will use dark time from 1 July 2008 through 30 June 2009. Subsequently, SEGUE-2 will use the upgraded SDSS-II spectrographs in a parallel observing mode during bright time, sharing the focal plane with MARVELS and APOGEE and using up to 300 fibers per pointing (as a second priority program).
- The Baryon Oscillation Spectroscopic Survey (BOSS) will carry out a spectroscopic survey of 1.5 million luminous red galaxies (LRGs) to $z \sim 0.7$ and 160,000 $z > 2.5$ quasars. Its goal is to obtain a high-precision measurement of the baryon acoustic oscillation scale in the clustering of LRGs and Lyman-α absorption in quasar spectra, which acts as a standard ruler and can be used to constrain cosmological models. BOSS will occupy dark time from summer 2009 through 30 June 2014. It will also carry out an imaging survey using the existing SDSS-II camera of 2,000 deg^2 in the Southern Galactic Cap in Fall 2008. BOSS will upgrade the existing SDSS-II spectrographs by increasing the number of fibers from 640 to 1000, replacing the existing $3''$ diameter fibers with smaller ones of diameter $2''$, and replacing the CCDs to increase the throughput and wavelength coverage.

- The Multi-Object APO Radial Velocity Exoplanet Large-area Survey (MARVELS) will use a pair of 60-object fiber-fed, dispersed, fixed-delay interferometers to measure radial velocities of bright stars to an accuracy of 32 meters/sec at V = 12 in a one-hour exposure, where the error includes photon noise and all systematics. MARVELS will use all the bright time from 1 July 2008 through 31 December 2010, and half the bright time thereafter, to survey 11,000 stars in search for the Doppler signature of orbiting giant planets with periods from several hours to two years. With these technical goals, MARVELS is expected to discover and characterize between 150 and 200 new planets.

- The APO Galactic Evolution Experiment (APOGEE) survey will use a fiber-fed cryogenic, H-band spectrograph with 300 fibers and a resolution $\lambda/\Delta\lambda \sim 20,000$ for 1.52 to 1.69μm to carry out a spectroscopic survey of 100,000 stars to $H \sim 13.5$ selected from the database of the Two Micron All-Sky Survey (2MASS). It will survey low Galactic latitudes, which are inaccessible to optical spectroscopy because of extinction, to study the structure and stellar populations of the disk, bulge, and bar of the Milky Way galaxy, and will occupy half the bright time from 1 January 2011 through 30 June 2014. APOGEE will provide detailed information on the individual abundance patterns in stars, far beyond the simple [Fe/H] and [α/Fe] measures of most earlier surveys.

"Dark time" observing will be scheduled for about 60% of the available hours each lunation. The requirements for observing time for the four programs will be balanced so that the scientific goals of all are optimized within the six-year duration of SDSS-III observations and so that the observing systems are always used with high efficiency, adapting to weather.

The top priority will be to ensure the highest possible scientific integrity of the Core Programs. Calibrations must be extensive and trustworthy. Moreover, the intent is that the survey will be well enough designed and the data of sufficient quality that they will remain of scientific interest for many years after the survey has concluded.

The main product of SDSS-III is the Science Archive, consisting of reliable and easily utilized data sets, data products, and software interfaces from all four surveys. SDSS-III will construct periodic public releases of validated and calibrated data according to a schedule devised in consultation with the funding agencies.

All SDSS-III participants will have access to all of the contents of the Science Archive. Participants may carry out whatever scientific projects they choose using SDSS-III data, subject to the policy guidelines discussed in § 3, 6, and 7.

3 Participation in SDSS-III

3.1 Membership in SDSS-III

Membership in SDSS-III is open to individual institutions. Collaborative arrangements among institutions will be considered on a case-by-case basis if there are compelling and

mutually beneficial reasons to do so. Membership in SDSS-III is recommended by the Advisory Council to the ARC Board of Governors. Membership in SDSS-III provides access to the data from all four surveys.

Full Institutional Membership includes data and publication rights for an unlimited number of Participants from the institution and any number of designated postdoctoral fellows and non-PhD personnel. To qualify, participants, postdoctoral fellows, and other staff must receive at least 50% of their annual salary from the institution, while students must be full-time students at the institution. The fee for a full Membership will be determined by the ARC Board.

"Participants" are understood to be long-term scientific staff, e.g. faculty (tenured and non-tenured), research-track scientists, and the equivalent.

To accommodate institutions that cannot commit to a Full membership, Associate Institutional Membership conveys data rights for a specified number of Participants, where the fee-per-Participant is set to one-fifth of the fee of a Full membership. These Participants are to be named individually. Participation rights can be moved from one researcher to another at the Associate institution with the consent of the Director in consultation with the AC. Each Participant at an Associate institution is allowed to share data-access rights with one postdoctoral fellow. Data rights for students or other non-PhD personnel at an Associate institution are limited to those working directly with a Participant; to qualify, students must be enrolled full-time at the institution while other staff must receive at least 50% of their salary from the institution.

A minimum of three Participants is required for an institution to be represented on, and vote in, the AC or to be listed as a member on official documents.

The project will also consider membership from "Participation Groups" (PGs). A PG is a collection of active scientists distributed across three or more separate institutions from the same country. Membership in a PG conveys rights similar to those of Associate Institutional members. However, to encourage such collaborations, the project offers the following incentives. First, data rights will be offered to one additional Participant (and one corresponding postdoc) for every 5 paid Participants in the PG. Second, the PG will receive one vote on the AC and CoCo for every 5 paid Participants. PGs are otherwise subject to the same rules as Associate Institutional partners; in particular, membership is based on a list of named Participants (including postdocs) that can only be transferred with the consent of the Director. Participants can work with an unlimited number of students, as defined for Associate Institutional partners. The payment schedule for PGs is the same as for other institutional members. Each PG should arrange for a central office that is responsible for signing the Memorandum of Understanding, that will appoint the representative(s) to the Advisory Council, that will handle the cash payments, that will ensure that the PoO are followed, and that will provide a point of contact in all other matters concerning the collaboration of the SDSS-III.

Individual MOUs may specify departures from these general guidelines for data access and publication rights.

A list of all Participants and other personnel authorized to access the SDSS-III Data Archives at a given time will be maintained by the SDSS-III Spokesperson and posted on

the internal SDSS-III website.

All Participants must read and abide by the PoO and are responsible for protecting the scientific integrity of SDSS-III and the data rights of other Participants.

The SDSS-III Director, upon approval by the AC, may designate scientists at other institutions to be "External Participants." Significant existing or potential contributions to the project as a whole will be given special consideration in deciding on External Participant status. Designation as an Architect (see §6.2) will generally be regarded as sufficient to earn External Participant status. Participants who leave a Participating Institution, or who otherwise lose their Participant qualifying status, retain their Participant status only with such a designation. Rights to share data access with postdoctoral fellows or others will be considered on an individual basis.

Any Participant can propose to sponsor an "External Collaborator," a non-Participant at a non-Participating Institution, who is granted access to SDSS-III data and/or co-authorship on an SDSS-III paper in order to assist with a specific project. The sponsor must present the proposal to the Collaboration Council (see §4.11), conforming to standards set out by them. The CoCo reviews the case and issues a recommendation, which the Spokesperson brings to the EMC for final approval. If granted, data access and/or co-authorship rights will be restricted to the specific person for the specific project. All such appointments will be reviewed annually by the Spokesperson to determine if continuation is warranted.

SDSS-III fully endorses the principles of professional conduct articulated in Article X of the Bylaws of the American Astronomical Society and expects all those associated with the project to follow those precepts. Specifically, SDSS-III communications (meetings, phone conferences, e-mail exchanges) are intended to "provide an environment that encourages the free expression and exchange of scientific ideas." It is the responsibility of members of the SDSS-III Collaboration to ensure that such discourse is "conducted in a professional atmosphere in which all participants are treated with courtesy and respect."

Full details of membership in the project will be described in the individual MOU with each institution.

Participation in SDSS-III is on a shared-risk basis. The project will make its best effort to meet the goals set out under "Scientific Program" above, but it cannot guarantee success for any particular specification listed there.

3.2 Contributions to SDSS-III

Fees for full institutional membership in SDSS-III will be set by the ARC Board of Governors. Contributions can be cash or in-kind, measured in US dollars. Direct costs and fringe benefits can be counted as in-kind contributions. All in-kind contributions must specifically address items in the Director's budget and must be approved by the MC and the AC. Waivers of institutional overheads and indirect costs on major work packages are not counted as in-kind contributions but may be considered on a case-by-case basis as a partial offset to a cash contribution. Such offsets must be approved by the AC and the ARC Board. Hardware and software developed previously for SDSS-I, SDSS-II, or the ET Pilot Program will not

be counted as an in-kind contribution for SDSS-III.

Institutional fees in SDSS-III will be paid over six calendar years, starting in January, 2008 and ending in December 2013. Annual contributions expected from each institution will be 1/6 of the total fee specified in the individual institutional MOU. Frontloaded payments will receive a small (3% per year) adjustment for anticipated inflation as a means to encourage earlier contributions. Additional rewards for early contributions can be considered by the ARC Board. The fee schedule for institutions joining after January 2008 will be determined by the ARC Board.

Annual payments from institutions must be received by SDSS-III no later than February 15 of each calendar year of the survey, beginning in 2008. Institutions whose payments are more than 60 days in default will have their rights to data taken after that time suspended. In consultation with the AC, the Director will deal with individual cases of default as they arise.

There can be no refunds of cash contributions in the event of descopes of the project or of an institutional withdrawal except in the event that the SDSS-III project is dissolved altogether, in which case residual cash would be distributed on a pro-rated basis.

It is anticipated that some data processing, archiving and release costs will be incurred in 2015. The SDSS-III project will strive to handle institutional contributions towards these expenses by careful forward budgeting, rather than by additional requests for funding.

3.3 Approval of Membership

The ARC Board must approve entry of all Participating Institutions into SDSS-III. Membership will be governed by a Memorandum of Understanding (MOU) to be drawn up with each institution. One element of that MOU will be the acceptance of these Principles of Operation.

4 Management

An organization chart for the SDSS-III project is given in the Appendix.

4.1 ARC Board

The ultimate responsibility for all aspects of SDSS-III rests with the ARC Board, including approval of annual budgets and requests for outside funding.

4.2 Advisory Council (AC)

The AC advises the Board on matters relating to the SDSS-III project. The AC consists of one representative from each of the Participating Institutions with three or more Participants. The Chair of the AC may invite additional non-voting attendees to any meeting, but

institutions with fewer than three Participants do not have regular representation on the AC.

The Chair of the AC will be appointed by the Board for a specified term. The Board will request nominations by the Participating Institutions for their representatives on the AC.

The AC members are the primary channel through which information flows between the Board and Participating Institutions. A majority vote of the AC is required before a recommendation to admit a new Participating Institution is made to the Board.

The AC will meet as deemed necessary, generally at least twice per year. Meeting dates will be set and announced well in advance to assure good attendance. The agenda will be distributed at least five working days in advance of the meeting to AC members, the ARC Chair, the ARC Secretary, the ARC Treasurer and the SDSS-III Director. The AC Chair is responsible for timely filing of approved meeting minutes with the ARC Secretary, and is responsible for informing the Collaboration of any decisions by the AC. The SDSS-III Spokesperson will ensure that a public version of the minutes is posted to the Collaboration in a timely manner.

A quorum of the AC will consist of a simple majority of the voting members. AC decisions will be approved by a simple majority of a quorum. Each voting member of the AC will have one vote. If an AC member is unable to attend a meeting, his or her institution may appoint an alternate to attend and vote in his or her place or may give its proxy to another AC member. The Chair may vote or not, at his/her discretion; the Chair may, but is not compelled to, break a tie vote.

Any action of the AC may be taken by electronic ballot. The electronic ballot period shall be no less than seven calendar days. The results of any electronic ballots will be distributed by email to the AC after the close of the ballot period and filed with the minutes of the succeeding AC meeting.

One of the important functions of the AC is to transmit the annual operations budget of the project, as formulated by the Director, along with its recommendations to the ARC Board for its approval.

It is the responsibility of AC members to ensure that their Participants and relevant institutional officers (e.g. Departmental Chair, Director of Sponsored Programs, etc.) are informed of SDSS-III policies and decisions.

4.3 The SDSS-III Director

The Board has delegated to the SDSS-III Director the authority for organizing and directing all aspects of the project, including development and delivery of all necessary hardware and software and for operation of the survey. To those ends, the SDSS-III Director is responsible for:

- creating job descriptions and making appointments of key personnel;
- keeping the AC informed on the status of the project, including any major problems and plans for resolving them;

- drafting MOUs with any new Participating Institution for concurrence by the AC and approval by the Board;
- formulating, with the assistance of the Project Scientist, the formal set of instrument, software, and data requirements needed to meet the scientific goals of the four surveys.
- supervising all financial aspects of the project;
- preparing, with the assistance of the ARC corporate office, annual budgets, to include the funds and in-kind services needed for all SDSS-III operations, as well as regular financial summaries of expenditures and obligations;
- leading the preparation of Proposals to fund the operations of SDSS-III (§ 7) and assisting the Board and AC in other relevant fund-raising activities as requested;
- working with ARC officers in conducting the project so as to comply with the terms of funding awards received by ARC from federal agencies and private entities.
- undertaking other responsibilities identified in this document

The SDSS-III Director will be appointed for a fixed term by the Board, taking into consideration the recommendation of the AC. The AC will identify and evaluate candidates for the position of SDSS-III Director when the incumbent's term is coming to an end or when the position is vacated unexpectedly.

The Director has final authority over the individual surveys as well as the authority to resolve conflicting needs between surveys, including allocation of fibers and distribution of observing time by lunar phase. The Director also has the authority to design and implement the detailed observing plan within the spirit of the goals described in Section 2.

4.4 SDSS-III Project Scientist

The SDSS-III Director has delegated to the SDSS-III Project Scientist the responsibility for providing the overall quality assurance for the project and ensuring its scientific integrity. From this perspective, he/she monitors the systems aspect of the project in all its phases and evaluates the scientific impact of changes or compromises made in the course of constructing the hardware, preparing the software, and developing the plans for commissioning and operations. The SDSS-III Project Scientist plays a leadership role in organizing and overseeing the scientific effort of the Collaboration.

The Project Scientist works to ensure that management decisions support the science goals and technical requirements of SDSS-III and that the four surveys function together cleanly. He/she will work with the four Survey Scientists to ensure that each survey develops detailed requirements and validates their data processing and data releases against those requirements. He/she is responsible for informing the SDSS-III Director and SDSS-III Program Manager of the state of compliance of Survey Operations with survey metrics.

4.5 SDSS-III Program Manager

The SDSS-III Program Manager assists the Director in the performance of his or her responsibilities. The Program Manager, with the support of the Project Office, is responsible for developing and maintaining project schedules. He/she is responsible for preparing annual and cost-to-complete budgets for consideration by the SDSS-III Director and SDSS-III Project Scientist prior to their submission by the SDSS-III Director to the AC. He/she is responsible for tracking project expenditures and reporting them, together with any deviations from the approved budgets, to the SDSS-III Director on a timely basis. He/she is responsible for preparing the quarterly reports that are distributed to the AC and for tracking expenditures against the approved budget.

The Program Manager coordinates the engineering effort at Apache Point Observatory with the efforts of the engineering groups at the Participating Institutions and the requirements of the observing program. He/she chairs the Internal Review Boards. He/she identifies resources at the Participating Institutions when additional resources are needed to meet schedules. He/she is also responsible for keeping the the SDSS-III Director and SDSS-III Project Scientist informed on the cost and schedule performance of Survey Operations.

4.6 The Central Project Office (CPO)

SDSS-III is managed by the Central Project Office, chaired by the Director and including the Program Manager, Project Scientist, ARC Business Manager, Technical Coordinator, Data Coordinator and Survey Coordinator. The CPO has final budget, schedule and technical authority in all matters.

The CPO is responsible for financial management of the project. It requests and receives annual payments from the Participating Institutions. It receives and manages funds from sponsoring governmental agencies and private sources. It disburses funds to the Project Team PI's and other project elements on established schedules. Details of CPO operations in these and other areas are given in the Project Execution Plan.

4.7 SDSS-III Management Committee

The Central Project Office is advised by the Management Committee (MC), which includes the above CPO members, all of the survey PIs, the three Coordinators, and the Collaboration Spokesperson, who is the elected representative of the full science collaboration. The Director has the authority to change the makeup of the MC or delegate specific areas of responsibility within the MC as he/she sees fit. Formal communications of the MC with the Board or AC are through the SDSS-III Director.

The Director, Project Scientist, Program Manager, and Project Spokesperson constitute the Executive Management Committee, which is authorized to make decisions in the event that it is not practical to convene the whole Management Committee.

4.8 Project Teams

For each Core Program (BOSS, SEGUE-2, APOGEE and MARVELS), there is an associated Team led by a Principal Investigator who reports to the Central Project Office and sits on the Management Committee. The efforts of each Team will be guided by a Statement of Work prepared by the Management Committee, containing a set of deliverables and a schedule for delivery.

Each of the Teams will designate a Survey Scientist, who is responsible, in consultation with the SDSS-III Project Scientist, for developing detailed scientific requirements for that Team's hardware, software, and data deliverables and for certifying that they meet the requirements. Each of the Teams will also designate an Instrument Scientist, who is responsible for the design, construction, test, and implementation of associated hardware.

Each of the three Teams undertaking instrumentation work (BOSS, APOGEE and MARVELS) will also employ a Local Project Manager, who reports to the SDSS-III Program Manager for schedule and budget performance.

The Teams also serve as centers of expertise to advise on matters of the optimal observing strategy, calibrations programs, necessary systems or software development, and data release content. A Team may propose improvements to the Project Scientist for calibration, analysis software, data processing software, and data distribution to the Collaboration.

4.9 Coordinators

Coordinators have primary oversight responsibility for particular deliverables and for ensuring proper technical interfaces between project elements.

The Technical Coordinator is responsible for the common infrastructure tasks.

The Survey Coordinator prepares the integrated, month-by-month observing plan for the four interleaved surveys and tracks the progress of each survey using quantitative metrics, both in terms of area or objects surveyed and in terms of data quality. Monthly reports will be submitted by the Survey Coordinator to the Project Scientist, the CPO, and its advisory bodies.

The Data Coordinator is responsible for leading the Data Processing and Distribution team, with members drawn from each of the four surveys. Data quality will be assessed using quality assurance tools at each step of the data processing and catalog assembly. Following the practices established for SDSS-I and SDSS-II, the CPO will monitor the progress of data releases, and the Director will retain the final authority to approve data releases to the Collaboration or to the public.

The Technical Coordinator, the Data Coordinator, and the Survey Coordinator all sit on the Management Committee.

4.10 SDSS-III Spokesperson

The SDSS-III Director has delegated to the SDSS-III Spokesperson the primary responsibility for fostering the scientific productivity of the Participants, representing SDSS-III to the outside world, raising the visibility of SDSS-III within the astronomy and physics communities, and maintaining good morale in the Collaboration. He/she is charged with formulating and implementing guidelines for project publications and for coordinating public presentations. The SDSS-III Spokesperson is elected by the Collaboration from a slate of candidates nominated by the Collaboration and approved by the MC.

4.11 Collaboration Council

The Collaboration Council (CoCo) advises and supports the Spokesperson concerning scientific matters. The Spokesperson chairs the CoCo. It consists of one member from each Participating Institution with three or more Participants plus one member who represents, and is elected by, the Associate Institutions with fewer than three Participants. The CoCo will usually meet on a biweekly basis.

4.12 Internal Review Boards

Review Boards are responsible for critical assessment of the readiness of hardware and software at each important step in their development.

An Instrument Board chaired by the Program Manager oversees the management of the BOSS spectrograph upgrade, construction of the APOGEE and MARVELS instruments, and related common technical infrastructure improvements. The Instrument Board will conduct technical reviews and monitor the schedule and budget performance of each major hardware task. Release of funds for construction activities will be contingent on successful Board reviews at each stage.

Software development is reviewed in a similar manner by the Software Board, which is also chaired by the Program Manager.

4.13 Change Control Board

It is inevitable that deviations from the intended plan will occur, and the project needs ways to deal with these as they arise. A standing Change Control Board (CCB) will be constituted by the Director that is charged with formal evaluation of any substantive departures from the Scientific and Technical Requirements. The CCB members will be chosen to provide expertise across a broad range of project components; temporary additional members may be added by the Director as appropriate.

4.14 Education and Public Outreach Coordinator

The EPO Coordinator will promote inter-institutional contacts and information sharing concerning the respective ongoing EPO efforts at the Institutions. The EPO Coordinator will also serve as the point of contact between SDSS-III and science museums or other entities that may undertake projects related to using SDSS-III data, with a view to enhancing the net impact of SDSS-III data for educational purposes.

4.15 Ombudsman

The ARC Board will appoint a standing Ombudsman for the project to help resolve disagreements arising in any aspect of the project in an informal manner. As a neutral third party, the Ombudsman does not advocate for the project or for either party in a dispute. The objective is to provide a process for achieving a fair and reasonable settlement working within existing policies and procedures. When a request for services is received, the Ombudsman will work with each party to identify appropriate alternatives that address the conflict and to achieve a mutually satisfactory resolution. Consultation with the Ombudsman does not preclude later pursuit of a resolution through formal channels if that is still desired.

5 Risk Management

The SDSS-III project includes hardware and software development at distributed sites. The project schedule includes delivery dates for critical items, which must function as defined by the Scientific and Technical Requirements. Normally, it is expected that any delays in the delivery or implementation of critical items will be absorbed by the contingency built in to the schedule.

When significant departures from the intended plan occur, the Change Control Board can be convened. The Director, as advised by the Management Committee, will determine when invoking the CCB is warranted. The Director will charge the CCB with providing a specific recommendation or set of options to address the problem while balancing the needs of the various programs. This may include schedule changes or descopes, for example, or a recommendation to redirect resources in a major way. The CCB may also be invoked to expand the Scientific and Technical Requirements in the event that some aspect of the project requires further definition.

CCB recommendations that alter the project goals or structure as described in these PoO must be submitted to the AC for its approval before they are implemented by the Director.

MARVELS will have an on-sky science performance review in summer 2009 that will be the basis for a decision by the Executive Management Committee on a recommendation to the AC concerning funding for the second ET instrument and the last four years of MARVELS team support.

6 Publication Policies

Any member of the project who is authorized to have access to the SDSS-III Science Archive has authorship rights on published papers as described in the policies and procedures specified below. Full details will be given in the document *SDSS-III Publication Policies*, to be developed by the CoCo for approval by the AC.

6.1 Research Projects and Publications

SDSS-III is intended to be an open collaboration, and members are entitled to work on any project undertaken within the purview of SDSS-III. Each research project must be announced to the Collaboration, specifying the subject matter, project leader, known collaborators, a contact person, and the anticipated duration of the project. Lists of proposed projects and publications will be maintained by the Spokesperson and made available on the internal project website. Student thesis projects will also be listed and will be protected within the collaboration. These policies apply only to data that have not been released to the public at the time the analysis was started. It is understood that people who join projects make themselves available to undertake appropriate tasks in support of the effort as assigned by the project leader.

Publications are expected to be posted for review within the collaboration a minimum of three weeks before being submitted to a journal or publisher.

As in SDSS-I and -II, the Director may, in consultation with the CoCo, designate Key Projects and Working Groups.

6.2 Authorship

- Any member of SDSS-III who is authorized to have access to the Science Archive may, at any stage of a research project within the SDSS-III collaboration, request that his/her name be added to the list of authors, with the presumption that permission will be granted if he or she has made any significant contribution to that specific research project.

- Scientists who have SDSS-III "Architect" status can opt to be co-authors on any paper based on proprietary SDSS-III data. Architect status is granted based on significant contributions, typically 1 year FTE effort, to the design, construction, execution, or management of SDSS-III. Requests for such status should be made to the CoCo, who will recommend the case to the MC for a final decision.

- By signing their names to an SDSS-III paper, all co-authors are understood to be accepting responsibility for the paper according to the guidelines given in the *SDSS-III Publication Policies* and the *Guidelines for Professional Conduct* of the American Physical Society (http://www.aps.org/policy/statements/02_2.cfm).

- Disputes concerning matters of authorship will be resolved by the procedure described in the *SDSS-III Publication Policies*. In particular, if an agreement cannot be reached, the matter will be referred to the SDSS-III Spokesperson. If the Spokesperson is a party to the dispute, the matter will be referred to the Director. In the event that the Director is conflicted, the matter will be referred to the AC, whose decision will be final.

6.3 Additional Guidelines for Implementation

The SDSS-III Spokesperson may develop more detailed guidelines concerning the implementation of the publication policies, in consultation with the CoCo. A copy of these guidelines will be available from the Spokesperson, and must be read and agreed to by the Participants, a relevant institutional officer at Participating Institutions, and collaborators. These guidelines must be consistent with and may not supersede the basic principles of the PoO. The SDSS-III Spokesperson is responsible for updating these documents.

6.4 Sanctions

The *SDSS-III Publication Policies* document specifies the sanctions that can be imposed for infractions of the stated policies. These include a delay in publication and, in extreme cases, debarment from access to SDSS-III data.

7 Proposals and Initiatives

7.1 Proposals by ARC As-A-Whole

Proposals submitted by ARC as-a-whole to government or philanthropic sources to secure funds to support the construction, operation, or scientific exploitation of SDSS-III require approval by the Board following a recommendation by the AC. Such Proposals take precedence over other SDSS-III-related Proposals by anyone, and the Board may take appropriate steps to protect them, with proper notification to the Collaboration.

7.2 Other Proposals to Fund Scientific Research

1. The following policies, procedures, and guidelines apply to Proposals by anyone that seeks substantial (more than $30K total) funding for the primary purpose of supporting research employing non-public SDSS-III data. The purposes of such strictures are to:

    - Protect the scientific integrity of SDSS-III;
    - Ensure that SDSS-III data are described in a technically responsible manner;
    - Foster equity and collegiality within the Collaboration;

- Present an organized, rational funding plan to financial sponsors and the scientific community;
- Effectively manage Proposals that might otherwise compete for the same funds;
- Ensure that Proposals do not contain items or describe arrangements that conflict with the PoO, MOU's, or agreements already in place with major SDSS-III funding sources;
- Ensure that the Proposals do not increase the cost of the Core Programs to Participating Institutions or require additional fund-raising by the Collaboration.

2. A Proposals List shall be maintained by the SDSS-III Spokesperson in an easily accessible format which lists, for each Proposal, the title, associated Core Program, brief research summary, list of team members, estimated total budget, and final disposition. It is the responsibility of the proposer to provide this information to the SDSS-III Spokesperson in a timely manner.

3. Proposing institutions or individuals are responsible for all incremental costs deriving from the proposed research.

4. Proposals submitted by a Participating Institution shall be carefully vetted by that institution to ensure that they do not contain items or describe arrangements that conflict with the PoO, the MOU's, or the agreements already in place with major SDSS-III funding sources.

5. Proposals submitted by non-Participating Institutions will be vetted by the Director for the purpose described in the previous paragraph. To this end, the proposer must send a summary of the Proposal to the SDSS-III Director in advance of the deadline for submission. The summary must give the anticipated budget, describe the overall scope of the proposed work, list any proposed projects that rely on SDSS-III data, and detail any implicit or explicit commitments to use or publish SDSS-III data or analyses of them. The submitted Proposal must be consistent with this summary. The SDSS-III Director may request a copy of the full Proposal for review prior to submission if he or she deems it necessary.

6. It is the responsibility of the members of the AC to ensure that their Participants and the relevant institutional officers (e.g. Departmental Chair, Director of Sponsored Programs, etc.) are informed of the above procedures, as is implied by that institution's acceptance of the PoO. This responsibility falls directly on the individual Participants if they are not at a Participating Institution. Such Participants are expected to enlist the advice of other relevant Collaboration members to ensure compliance with the above strictures.

7. Persons violating these policies may have their status as a Participant and other eligibility for access to the Science Archive revoked by the SDSS-III Director on the advice of the AC.

7.3 Initiatives for Extension Beyond the Primary Survey

Initiatives to use or augment SDSS-III hardware, operations, or data for purposes that are not part of the Core Programs may be approved by the SDSS-III Director after review by the SDSS-III Project Scientist to assess scientific merit and then by the SDSS-III Program Manager to ensure their technical appropriateness and assess their financial impact. Subsequent review by the AC and approval by the Board is required only if the SDSS-III Director determines there may be financial impact on the Collaboration or potential conflict with existing institutional arrangements. If there are deemed to be such impacts, the SDSS-III Director will determine any required modification of the PoO and will prepare a recommendation to the AC. The Chair of the AC will transmit the Initiative, the SDSS-III Director's recommendation, and the AC's own recommendations to the Board if necessary. Approval of the Initiative may be granted contingent upon the proponents securing the necessary financial resources.

7.4 Initiatives for Use of Intellectual Property

Initiatives to use the intellectual property of the SDSS-III Collaboration will be covered by the Intellectual Property Policy of ARC, Inc., a copy of which is available from the ARC Secretary.

8 The Observatory

1. SDSS-III facilities will operate on ARC's Apache Point site and share infrastructure and administrative staff with the 3.5-meter telescope, affording both projects the benefits of a broader skill mix. Shared staff and other common operations support costs will be apportioned between the projects by mutual agreement of SDSS-III and 3.5-meter directors.

2. SDSS-III will provide its own dedicated observing staff.

3. Data from SDSS-III and 3.5m environmental monitoring equipment will be available to users of both telescopes.

4. When the SDSS-III project is completed, operation and/or disposition of its facilities will be determined by the Board, with advice from the AC. Proper consideration will be given to any prior contributions to the capital value of the assets. Disposition of certain assets will be made in accordance with special provisions in individual institutional MOU's.

9 Appendices

- **ORG CHART**

- **LIST OF PARTICIPATING INSTITUTIONS**