



EARTHCUBE GOVERNANCE: CHECK AND ADJUST MEETING REPORT

Abstract

The Check and Adjust Meeting was held by the EarthCube Test Enterprise Governance Project in Tucson, AZ on January 26-27, 2015. The goal of this meeting was to assess the current status of governance, evaluate current processes and policies, and make necessary adjustments to better situate governance to reach its goals by the All Hands Meeting (May, 2015). This report highlights meeting outcomes on decision-making processes, priority governance issues, and decisions about how further work will continue with input from the EarthCube Community.

EarthCube Test Enterprise Governance Project

PI: M. Lee Allison

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Introduction

Meeting Overview

The Check and Adjust Meeting was held by the EarthCube Test Enterprise Governance Project (PI, Lee Allison) in Tucson, AZ on January 26-27, 2015. The goals of the meeting were to make decisions on specific aspects of EarthCube Governance that are critical for building a sense of alignment and commitment among stakeholders. The meeting brought together key members of the EarthCube Demonstration Governance including the Leadership Council, and representatives from all Committees, Teams, Working Groups, and most funded projects in order to assess the current status of governance, evaluate current processes and policies, and make necessary adjustments to better situate governance to reach its goals by the All Hands Meeting (May, 2015).

Governance Progress

Each of the following governance groups provided a short presentation about their work and progress to-date. After each presentation, meeting participants had time for reflection and discussion aimed to identify any issues or implications that relate to governance, which would be explored later in the meeting.

Leadership Council

The Leadership Council was fully constituted on January 1, 2015 with a representative from each Standing Committee and Team, and four at-large members. The group has elected Basil Gomez as its Interim Chair to lead their efforts on developing a strategic plan to address the *Charge to the Demonstration Governance*. (The *Charge* is a document, created by the EarthCube Test Enterprise Governance Award Team, and created in consultation with NSF, detailing the items that must be addressed by the Demonstration Governance body, Appendix 1). Much of the Leadership Council's work has consisted of revising and formalizing EarthCube's Mission, Vision, and Long-term Goals, other strategic/policy documents, creating a budget for the demonstration governance, approving working groups, and other activities to put EarthCube governance down the path toward becoming a successful and sustainable organization.

Science Standing Committee

The Science Committee maintains the connection between academic geoscience and technology communities in EarthCube, and ensures that end-user requirements are identified and prioritized. Since its establishment, the Science Committee has elected its co-chairs (Basil Gomez, University of Hawai'i, Mānoa and Emma Aronson, University of California, Riverside) and created three working groups. These working groups (Science Drivers WG, Funded Projects Assessment WG, and Scientific Grand Challenges WG) have developed a draft *Strategic Science Plan*, which identifies five overarching themes within the EarthCube science drivers to inform the technological development.

Technology & Architecture Standing Committee

The Technology & Architecture Committee (TAC) is also responsible for maintaining the connection between the science process and technical components of EarthCube. Other functions of the TAC

include seeking alignment of funded projects, developing a process of coming to convergence on EarthCube architecture, and identifying gaps in current cyberinfrastructure. Since its establishment, the TAC has elected its co-chairs (Yolanda Gil, University of Southern California, Information Sciences Institute, and Jay Pearlman, J&F Enterprise) and created four working groups based on its functions: Technical Requirements and Synthesis from Science Use Cases, Funded Projects Technology & Architecture Gap Analysis, EarthCube Components Test-bed Working Group, and the Standards and Standards Bodies Working Group.

Council of Data Facilities

The Council of Data Facilities (CDF) was formed prior to the Demonstration Governance Phase on January 14, 2014 and was formalized November 14, 2014 and has 33 founding members representing all types of data facilities within the geoscience community. Its first General Assembly Meeting was held January 9, 2014, during which its Executive Committee was elected including a Chair, Vice Chair, Secretary, and four At-Large Members. In the coming year, the CDF will focus on data sharing across facilities and has the potential to act as proving grounds for EarthCube products.

Engagement Team

The overarching goal of the Engagement Team is to identify and structure a communication and outreach plan to engage the broader geoscience community and provide a conduit for feedback. Since its establishment, the Engagement Team has elected its co-chairs (Marjorie Chan, University of Utah, and Denise Hills, Geological Survey of Alabama) and set up three subcommittees, which focus on: 1) providing ways for geoscience community to be aware of, access, and interpret EarthCube use-cases, 2) developing an internal communications strategy between all components of EarthCube, and 3) mapping the EarthCube community landscape.

Liaison Team

There is considerable overlap between both the work and the members of the Liaison and Engagement Teams because both groups focus on reaching out to those who are outside of EarthCube. However, the groups have established key differences in their target communities and outreach purposes, and therefore, have remained separate but cross pollinizing teams. Since its establishment, the Liaison Team has elected its co-chairs (Lindsay Powers, National Ecological Observatory Network, and Rick Ziegler, US Environmental Protection Agency) and begun a major effort to map the larger GEO/CI landscape. This map includes different agencies, data facilities, professional societies, and projects to begin to establish both formal and informal relationships to raise the profile of EarthCube and determine/leverage synergies with similar efforts.

Funded Projects Team

The Funded Projects Team consists of a representative from each EarthCube funded project (Building Block, Research Coordination Network, and Conceptual Design awards) and functions as a mechanism for the disparate projects to form a unified voice to the Leadership Council and NSF. Not much progress has been made by this group to date due to the lack of funding allocated for coordination within each of their awards. However, the group plans to coordinate in the future

through a workshop, or virtual meetings, or a suggested Funded Projects Coordination Working Group.

Office

The EarthCube Office consists of three project coordinators and the Office Manager (Bruce Caron). The Office is the support arm of the Governance Structure and is responsible for managing the day-to-day logistics necessary for that structure to function. Logistical support includes running the website, managing listservs, creating newsletters, and helping coordinate and organize all of the governance groups' work and meetings.

Meeting Outcomes

The second day of the Check and Adjust Meeting was focused on tackling the issues and implications that came out of day one discussions. Participants chose what priority issues they wanted to work on, formed small discussion groups, and then reported out for approval by the entire group. Most of the decisions identified below are final and will require amendments to the EarthCube Demonstration Governance Charter.

Agreement on Decision-Making Processes

The meeting participants approved several decision-making processes described below using the Responsibility Assignment Matrix or RACI Matrix (Appendix 2). Each process identifies several key items:

- 1) the stakes of the decision (high, moderate, or low)
- 2) who approves the decision (final decision-maker)
- 3) who is responsible for implementing the decision
- 4) who is consulted in the process
- 5) who is informed of the decision

Refining the Vision, Mission and Long-Term Goals for EarthCube

Refining EarthCube's vision, mission and long-term goals is a high-stakes decision. The Leadership Council is responsible for developing and implementing a document outlining the mission, vision, and long-term goals. All Standing Committees and Teams (including the CDF) are consulted in the process. EarthCube members are consulted through an ongoing feedback process, and will approve the document through community vote on the mission, vision, and goals document. However, NSF is consulted early and often in this process, and provides final approval.

Outcome: The Leadership Council will form a small working group to refine and finalize the Vision, Mission and Long-Term Goals.

Products, Tools, and Services Included in EarthCube

There are multiple options for including a product, tool or service in EarthCube. Different criteria and processes will be employed for each type of inclusion under consideration:

1. Documentation in EarthCube

2. Publicity by EarthCube
3. Supported or Maintained by EarthCube (this item may include financial support, however it is currently unclear whether financial/resource support will be a possibility).

In all cases, the Technology and Architecture Committee (TAC) will provide final approval. In addition to the TAC, the CDF and Funded Projects are responsible for implementing the decision. The LC is responsible for implementing the decision in cases requiring NSF consultation, as the LC is the communication link between EarthCube governance and NSF.

The Science Committee and Liaison Team, along with the CDF and Funded Projects, are consulted during this decision-making process. NSF is also consulted regarding the financial implications about sustaining developed tools, defining opportunities and constraints. The Office, Engagement Team, and EarthCube membership is informed of the final decision.

Outcome: Process approved. The TAC will refine and finalize.

Science Strategic Plan

The *Science Strategic Plan* was in draft form when the Check and Adjust Meeting was held. It is not a standalone document, as it will be just one of many governance policy and roadmap documents, which are part of the overall EarthCube strategic plan. The Science Committee is responsible for the development and implementation of the Science Strategic Plan, while the Leadership Council provides final approval. The TAC is consulted during the process, as well as end-user workshop PIs and other appropriate members of the EarthCube community. All other EarthCube governance bodies are informed once the document is finalized.

Outcome: Process approved. The Science Committee will refine and finalize.

Revisions to the Science Strategic Plan

The Science Standing Committee is responsible for deciding if revision(s) to the Science Strategic Plan are needed. If revisions are needed, Science Committee will follow the process outlined above.

Outcome: Process approved. No further work is needed at this time.

Website/Web Media

The EarthCube website and web media (such as EarthCube social media and newsletter) are key assets to the effectiveness and success of EarthCube as a virtual organization. Decisions regarding EarthCube's web presence revolve around:

- 1) Requirements and design of the website
- 2) Content strategy and vision
- 3) Updates and progress from EarthCube projects

Requirements and design

Identifying web requirements and designing of the EarthCube website is a very high-stakes decision. Work is done through a new, crosscutting working group composed of members from every Standing Committee and Team, as well as representatives from the Funded Projects, NSF (for guidance on NSF-related content), and the Office (web designer). The Leadership Council provides approval of

the decisions made by the new WG, and the Office implements these decisions. All other EarthCube governance bodies are informed.

Outcome: Process approved. The Leadership Council will refine and finalize.

Content Strategy and Vision

Decisions regarding the content strategy and vision of the EarthCube website are also high stakes, as they form the overall message of the website, which is one of the primary mechanisms for reaching a virtual community. Work is done by the crosscutting website working group. Decisions are approved by the Leadership Council and carried out by the Office. All other EarthCube governance bodies are informed.

Outcome: Process approved. The Leadership Council will refine and finalize.

Informative Content

Decisions about the informative content (such as funded project progress, upcoming events, etc.) included on the EarthCube website and web media, however, is a lower-stakes decision. This work is developed, approved, and carried out by the Office. All other EarthCube governance bodies are informed.

Outcome: Approved. The Office will continue current work.

Decisions about Standards

Will EC have required standards, make recommendations or identify best practices?

The first decision on the topic of standards is whether EarthCube will have required standards, make recommendations, or identify best practices, or some combination of these. This is a high stakes decision, as it will have a major impact on how participants will interact with EarthCube on a technical level. The Leadership Council and NSF provide final approval, but the Science Committee, TAC, CDF, and EarthCube members are all consulted. The TAC is ultimately responsible for implementing the decision. All other EarthCube governance bodies are informed.

A second decision process will be needed to decide what happens if a submitted product, tool, or service does not align with adopted EarthCube standards.

Outcome: Process approved. The TAC (WG) will refine and finalize.

Which standards or best practices will be adopted by EarthCube

Deciding which standards, recommendations, or best practices will be adopted by EarthCube, whether they are required or recommended, is a moderate stakes decision because it can be adapted and will not impact all of EarthCube. However, this decision could have a substantial impact on several groups including current and potential end users, as well as those developing tools and services as it impacts what components can be adopted and made available for end users. The TAC Standards Working Group is responsible for the development and implementation of the decision, while the TAC as a whole provides final approval. The Science Committee, CDF, Liaison Team (to review any outside groups' similar work), and EarthCube members are consulted about the decision. All EarthCube governance bodies and NSF will be informed of the decision.

Outcome: Process approved. Leadership Council will refine and finalize with input from TAC (Standards WG).

How do standards, recommendations, best practices get revised?

The TAC Standards Working Group, as well as the CDF, can recommend that a standard, recommendation, or best practice be revised. When this takes place, the same process as above is to be followed.

Outcome: Process approved. No further work is needed at this time.

Resolving Priority Issues

The following topics were identified as priority issues for governance. They were discussed in small-groups, and were then approved by the large group. Please note that it is indicated exactly what the group voted on for each issue. In some cases, the decision remains to be finalized and approved by the associated governance body.

Membership

An EarthCube Member is someone who registers on the EarthCube website. When a person registers, they will be required to provide the following information:

- 1) disciplines/domains
- 2) where they work
- 3) key words
- 4) interest in participating in Governance teams/committees

All EarthCube Members can vote in at-large elections, provide feedback on documents, or vote to approve documents or topics, such as the EC Governance Terms of Reference, By-Laws and Charter, and other documents/topics likely to have an impact on most members or involve changes to the mission of EarthCube. EarthCube funders (NSF) constitute the only exception to this decision, as they cannot be voting members due to the high probability of conflicts of interest. There will be a re-registration notice several months in advance of each annual All Hands Meeting. This notice will also be used to solicit feedback on the AHM, identify critical issues that will be addressed at the AHM, and go to a vote after the meeting.

It was suggested that the Engagement Team continue work on identifying/messaging the value of membership. The Liaison Team will work on issues of institutional membership and partnerships.

Outcome: Approved for Leadership Council to finalize. Will require a Charter revision.

Coordination across EarthCube Governance

The EarthCube Office is responsible for coordinating efforts across EarthCube governance. The Office will implement the following items:

1. Send out a weekly Monday governance update email to all governance participants containing important information such as upcoming meetings, agendas, and reports of decisions and action items from meetings the previous week.

2. Assess the current distribution of active participants across all governance components and identify the individuals who can serve as natural brokers of information across components ('bridging people') following the process outlined below:
 - a. A 'bridging person' is responsible for surfacing overlapping issues between or among groups, and triggering joint meetings as needed
 - b. If no bridging person is identified between two or more groups, the lead of the working group/committee/team is responsible for outreach will reach out to the other working group/committee/team (s)
 - c. If the bridging process does not successfully resolve the overlapping issue, the problem is escalated to the next level of governance (e.g., working group to the committee/team, committee/team to the Leadership Council)
 - d. Decisions made at higher levels of governance are explicitly reported back down to the originating group(s)
3. Highlight potential overlaps and points of collaboration among and between governance components, and refer those to the Leadership Council.
4. End all meetings with a final review to identify if meeting outcomes should be brought to the attention of one or more governance components.

Outcome: Process approved and finalized.

Technology Coordination

To improve coordination and communication among funded projects, 'Funded Project Templates' will be added to the website. Templates will include existing high-level descriptions of each project, plus new in-depth technical specs and references to relevant papers and standards. The templates will also identify relevant Governance Working Groups.

Furthermore, a Tech Hands Meeting (workshop) will be convened to identify and discuss the technology used in EC projects. All funded projects are encouraged to attend, as well as all those interested in the technology side of EarthCube. This meeting will coordinate efforts among funded projects, link technology ideas with other governance work, and to make decisions about the organizational structure needed to foster ongoing technological conversations.

Finally, a working group will be established to coordinate the three Conceptual Design projects.

Outcome: Referred to TAC for review and next steps.

Scope of EarthCube and EarthCube Governance

The scope of EarthCube builds on the vision statement and is expected to evolve over time, as EarthCube evolves, to continue to document those things that are a part of EC. A new working group will work to answer the questions about what EarthCube is, what it is governing, and expectations about what is within EarthCube's scope. While a final plan for developing the scope was not approved, it was decided that draft answers to these questions should be developed and made available for community comment before it is voted upon by the Leadership Council or Membership at large.

Outcome: The Leadership Council will convene a working group to address questions about what EarthCube is, what EarthCube Governance is governing, and expectations about what determines whether a component is a part of EarthCube. This group should include

representatives from EarthCube membership outside of the Leadership Council. The final decision mechanism for approving the scope of EarthCube and EarthCube Governance is yet to be determined.

Priority Issues Requiring Further Work

Call for Participation

Several priority governance issues identified by meeting participants were left unresolved or unaddressed at the end of the meeting due to lack of time, the complexity and breadth of the issues, and/or underrepresentation in the room. The table below outlines each unresolved issue and which governance body will work on it in the coming months. The meeting participants agreed that input from EarthCube members who did not attend the meeting should be encouraged. Anyone interested in providing input and helping the work on these topics should contact the EarthCube Office (contact@earthcube.org).

Priority Issue	Assignment
Communicating about Decision making	Engagement Team (with support from Office)
Metrics of EarthCube progress, inclusive of Governance progress	Leadership Council
EarthCube Office Roles and Responsibilities	Office Roles and Responsibilities Group** (Lead by Office, and includes representative from each Governance group)
EarthCube management implementation of direction	Leadership Council and Office Roles and Responsibilities Group**
Transition from demonstration governance to long-term EarthCube governance	Leadership Council
Engaging the funded projects [in Governance]	TAC (same group working on the Tech Conference)
Engaging and diversifying sustained governance participants	Engagement Team
Coordinating and using new content purposefully	Leadership Council (work with Website WG)

ECTEG Project Insights and Recommendations

As mentioned above in the Introduction, the Check and Adjust Meeting was organized and convened by NSF's EarthCube Test Enterprise Governance (ECTEG) Project. All outcomes of the meeting apply to the Earth Cube Demonstration Governance, which the ECTEG Project oversees. The

following are insights and recommendations that the ECTEG Project Team has for the Demonstration Governance moving forward into the next several months until the EarthCube All Hands Meeting 2015.

Greater Legitimacy in Leadership

The transparency, inclusivity, and legitimacy of the EarthCube Leadership Council and its decision-making processes were a concern that was consistently highlighted in the Evaluation Team Baseline Governance Survey. Discussions affirmed that these concerns are both valid and must be addressed moving forward. The ECTEG Project Team recommends that the Charter be amended to include language to ensure leadership is inclusive and representative of the community as a whole in order to prevent any group or individual from granting themselves more power, and to increase general accountability and transparency in elections. The Project Team also recommends that the Leadership Council engage Joel Cutcher-Gershenfeld as a resource in assisting the drafting and revising of by-laws, policy, and charter documents.

The ECTEG Project Team recognize the need to revisit the timelines for the Committees, Teams, and Working Groups to ensure all alignment with the ECTEG Project's NSF deliverables and the transition to a fully operational status after the Demonstration Governance Phase is over. The ECTEG Project Team is developing a set of basic questions for the LC, Committees, Teams and Working Group chairs to provide input by May 1, 2015. These questions will focus on each group's progress toward stated deliverables and budget needs, so that this information can be include in the ECTEG Project Team's reports to NSF.

All-Hands Meeting, May 2015

According to the project timeline, all governance-related deliverables (recommendations to NSF, policy documents, etc.) will be in final draft form and will require finalization and approval from the EarthCube community at the All Hands Meeting (AHM). As such, the AHM will be an EarthCube Community Meeting (as opposed to a Governance meeting).

Mohan Ramamurthy and Lindsay Powers will form a small AHM organizing committee. The Office will coordinate with the committee in its early stages to share lessons learned from the 2014 AHM and will attend as one of many funded projects represented at the meeting.

Initially, the Project Team recommends that the AHM Organizing Committee focus first on identifying the desired outcomes of the meeting, which will determine the agenda and criteria for the funded project demonstrations.

Moving Forward from Check & Adjust 2015 Meeting

Inclusivity of EarthCube Community

The issue of inclusivity in EarthCube goes beyond leadership. It is important that the community as a whole has a hand in shaping EarthCube during this vital developmental phase. Meeting participants emphasized the importance of involving EarthCube members not present in the work that was started at this meeting. The ECTEG Project Team recommends that each member of the Leadership Council

put out a call for participation to their Committee, Team, or Community to engage interested stakeholders to help with their assigned tasks. This will not only help address the issue of inclusivity, but will provide additional support to Leadership Council members.

Appendix 1:

Charge to EarthCube Demonstration Governance

*Prepared by the EarthCube Test Enterprise Governance Project
and the National Science Foundation*

December 30, 2014

I. Purpose of this Document

The EarthCube Demonstration Governance organization is established under the auspices of the National Science Foundation sponsored project, “EarthCube Test Enterprise Governance: An Agile Approach” (the “Project”), through a cooperative research agreement with the University of Arizona.

Under the terms of the agreement, the Project is tasked with exploring, developing, and evaluating governance paradigms. At the end of a 24-month award, 1) an appropriate and community-agreed governance framework will be delivered; 2) this EarthCube Enterprise Governance framework will be vetted with the community; 3) the specific charter, by-laws, and terms of reference of the governance framework will be demonstrated and evaluated in a pilot; and 4) proposed next steps for implementing governance will be recommended.

The Leadership Council has requested that the EarthCube Project and Program Office supply guidance as a framework to help focus its efforts in this year. In response, this document describes the charges to the Project from NSF, along with the resulting charges to the Demonstration Governance organization as a whole (encompassing the committees, teams, and other formalized bodies within the governance framework), with the intention of achieving the goals of the Project and meeting its required deliverables to NSF.

II. Project deliverables to NSF

The Project plan for carrying out the terms of the agreement are described in the report, “EarthCube Demonstration Governance: A Community Proposal for Establishing a Demonstration Governance Organization,” delivered to NSF on July 21, 2014. NSF subsequently approved formation of the EarthCube Demonstration Governance organization under the terms of this proposal.

III. Priorities for Demonstration Governance

As determined at the 2014 EarthCube All-Hands Meeting (June 2014), the following priorities were identified for the initial tasks of organizational units of EarthCube. The participants at the All-Hands Meeting determined that without these priorities, EarthCube would be unsuccessful during the demonstration phase. The organizational unit identified for initially taking on the activity (within the governance workflow) is identified in parentheses following the priority.

- Refine the Scope and Vision for EarthCube (*Leadership Council*)

- Engage the scientific community and determine the structure of Working Groups (*Science Standing Committee*)
- Create a policy and/or strategy on EarthCube Data Management Plans (*Science Committee*)
- Consensus on EarthCube Architecture (*Technology & Architecture Standing Committee* in close coordination with the *Council of Data Facilities* and *Science Standing Committee*)
- Coordinate a testbed for EarthCube components (*Technology & Architecture Standing Committee*)
- Determine potential shared services through geoscience data providers (*Council of Data Facilities*)
- Identify and structure the Liaison Program focusing on national, international, and consortia collaboration (*Liaison Team*)
- Create science success stories (*Engagement Team* in conjunction with the *Science Standing Committee*)

IV. Charges to the EarthCube Leadership Council

During the Demonstration Governance Phase (Year 2 of the ECTEG Project), the Leadership Council will be responsible for developing a strategic plan to be presented for review and critique at the All-Hands Meeting, after which there is a planned period of refinement and adjustment before the final strategic plan is presented. The Leadership Council is also responsible for developing methods of assessment for itself and for the other portions of EarthCube, including the funded projects, teams, committees, and the membership model and process.

Communication and cooperation will also be fundamental to the operation of the Leadership Council, both internally and externally with the broader EarthCube community. It will be a critical function of the Council to foster communication between the different committees and teams, as well as across the domains represented by NSF's Geoscience Directorate. The Leadership Council is also the single point of contact between EarthCube and funding agencies, including NSF, and will need to be able to communicate assessment of the program and projects to those agencies.

Long-term Charges

The EarthCube Leadership Council will operate within (but is not limited to) the general scope outlined below.

1. Being the voice of EarthCube to NSF
 - a. Describing the state of EarthCube development and progress in achieving EarthCube goals
 - b. Providing a set of priorities for cyberinfrastructure development that can be considered by NSF in shaping the EarthCube solicitation and other opportunities
 - i. These priorities will be developed based on the current status of cyberinfrastructure in the geosciences, and assessment of EarthCube awards and activities.
 - ii. This will be done on a yearly basis at minimum. Given the flexible structure of the EarthCube solicitation, new amendments may be added throughout a fiscal year pending availability of funds.
2. Setting and maintaining the strategic direction of EarthCube

- a. Articulating the vision and goals of EarthCube as well as its benefit and value to the geosciences
 - b. Providing oversight and governance of ongoing EarthCube activities, which may include:
 - i. Facilitating convergence on an enterprise architecture
 - ii. Developing guiding principles and standards
 - iii. Assessing gaps in infrastructure
 - iv. Adjudicating tests of prototypes or other EarthCube developments
 - c. Providing direction to governance bodies, such as committees and teams
 - d. Assessing and changing the governance structure as needed to reach strategic goals
3. Representing and communicating with the academic geosciences community, cyberinfrastructure community, and other stakeholders
 - a. Articulating EarthCube vision and goals to the community
 - b. Being complete, thorough, and inclusive of the academic geosciences and CI domains
 - c. Working with individual communities in the manner that suits each community to incorporate their scientific output into EarthCube
 - d. Determining how to communicate to the geosciences community EarthCube results that they can use in their respective fields

Specific Charges for the First 18-Month Phase

The Demonstration Phase is the opportunity to stress test the EarthCube Governance structure and assess whether it is able to provide meaningful priorities in its current state. The Interim Leadership Council of 7 members and 2 team representatives will have a term of 18 months after full population.

The following responsibilities are the charge to the Interim Leadership Council during this term, and the Leadership Council has been given funds to support work to accomplish these responsibilities. Funds can be spent to support the following types of activities (not an exhaustive list):

- Workshops
- Working groups (face-to-face meetings, cloud computing, or other required expenses, etc.)
- Participant support for attending EarthCube or other geoscience/cyberinfrastructure meetings
- Funds allocated to EarthCube governance leaders and committees to be used at their discretion for similar activities
- Activities determined as valuable by the liaison and engagement teams
- Recognition of volunteers
- Similar activities sponsored by the Council of Data Facilities

The rules and processes developed to prioritize, authorize, and account for funds are a part of the responsibilities to be developed in the following section.

1. Work with ECTEG to formulate and test the governing charter by-laws and rules for this body, as well as for their interactions with the committees, teams, funded projects, and administrative functions.
 - a. This will be accomplished by June 2015
 - b. Define the rules for election of Leadership Council members in conjunction with ECTEG and NSF and oversee the transition to the next Leadership Council near the end of the Interim Leadership Council term.
2. Refine the Scope and Vision of EarthCube.

- a. Articulate the EarthCube vision and goals, including science and cyberinfrastructure drivers
 - b. Be responsible for the first iteration of a long-term strategy for EarthCube (including convergence on an architecture, setting priorities, and the sustainability and integration of funded projects).
 - i. Create the initial plan using already existing input from the end-user workshops, All Hands Meeting, roadmaps, and other EarthCube documentation. Assessment of gaps in these materials, such as communities that still require outreach, may be included in the plan.
 - ii. Task working groups, committees, teams, and office personnel with actions required to develop this long-term strategy.
 - iii. ECTEG may provide models for reaching a long-term strategy, such as from the Belmont Forum or other activities that have similar goals.
 - iv. The timeline for this activity should coincide with other milestones in the demo phase, but there will be flexibility in the timeline for delivering the long-term strategy.
3. Develop a framework through which NSF funded work in EarthCube will be assessed and how to implement new principles/standards.
- a. Guide active awardees towards appropriate outputs for the all-hands meeting.
 - b. Determine appropriate next activities following the all-hands—this includes follow on from the current Building Blocks, RCN and Conceptual Design awards, as well as activities that may already be possible within existing support. Next steps should not be retreads of current activities.
 - c. Task Committees to determine gaps in funded projects, assess progress on architectural concepts and assemble user requirements, and translate this into priorities for NSF to inform future solicitations. This must be accomplished by August, 2015.
 - d. Task the Liaison Team to understand the role other initiatives/activities can play in this framework.
 - e. Articulate the value of the volunteer work in EarthCube and the intersection of this with funded project work. Determine ways to recognize/reward volunteers.
4. Continue engagement of academic geosciences communities.
- a. Short-term
 - i. Task the Engagement team to re-engage the end user workshops (and/or RCNs) as groups to define next steps for sharing data in those communities. This may include pointing them to appropriate funding mechanisms, Liaison groups, etc. to make progress.
 - ii. Assess whether there are geosciences communities that have not had workshops or other mechanisms for engaging with EarthCube and develop a strategy for engaging those communities
 - iii. Consider what end-user geoscientists could do with EarthCube now.
 - b. Longer-term
 - i. Determine how to translate EarthCube results to the geosciences community in a way they can use.
 - ii. Advise the community on next steps/next stages for EarthCube.

IV. Functions of the EarthCube Leadership Council

The following set of functions were determined by the EarthCube community at the 2014 EarthCube All-Hands Meeting:

- Set, implement, and revisit as needed the strategic direction of EarthCube, including identifying what is within and outside of the scope of EarthCube. This includes monitoring of metrics and adjusting course as needed, thereby ensuring the governance organization improves over time.
- Ensure consistency and transparency in policies, procedures, and decision-making, including providing multiple ways for people to participate in the process of making decisions, and communicating outcomes of decisions to the broad EarthCube community.
- Enable communication between governance organizational units to close gaps, eliminate duplication, and build synergies.
- Establish and manage Standing Committees and Working Groups as needed to perform critical functions.
- Foster business models to sustain and maintain the infrastructure of EarthCube.
- Establish, facilitate, and maintain policies and procedures.
- Provide for public dispute resolution and proactive management of risk and conflicts of interest.
- Act as the single point of communication for coordinating with and making recommendations to the NSF and other funding agencies on behalf of EarthCube.
- Develop methods of assessment for itself and for the other portions of EarthCube, including the funded projects, teams, committees, and the membership model and process.

V. Guidance to the EarthCube Leadership Council

The following needs have been recognized by the EarthCube community as important aspects in demonstrating EarthCube's value.

1. There is a need to demonstrate *competence*.

Governance competence

- The ability to make decisions that are transparent and defensible
- An ability to make decisions in a timely and deliberate fashion
- An ability to engage the community in the governance effort

Leadership competence

- The ability to recruit and select (elect) leaders
- The ability of leaders to effect actual work
- The ability to distribute leadership across the membership

Office support competence (Program Office/Project)

- The ability to offer resources as needed and help keep work on track
- The ability to support website and other media

- The ability to account for funds spent and reimburse members in a timely fashion

2. There is a need to demonstrate *vision*.

Science vision

What does “EarthCube enabled” science look like? How does this add value to the lives of domain scientists? How does this match the science vision articulated by the NSF? How does this open up new trans-domain data use and modeling? What are the impediments to achieving this vision? (Includes next phases for funded projects and efforts).

Technology/Architecture vision

What are the technologies and best practices that define an EarthCube approach to the geosciences? What is the process to insert these into science practice? Where are standards being produced that might help this process? How much new learning is required for scientists to be fluent in these technologies? How can EarthCube build capacity in this arena? (Includes next phases for funded projects and efforts).

Cyberinfrastructure for the geosciences vision

How can EarthCube bring domain scientists, data scientists, software engineers and computer scientists into a productive conversation about a common future? How can existing/funded cyberinfrastructure efforts be leveraged? What are the gaps that EarthCube is positioned to fill?

3. There is a need to demonstrate a *plan for growth*.

Participant growth

Planning, capacity building, and pilot activities to expand EarthCube participation and engagement, particularly among domain scientists including early-career and mainstream (“long-tail”) scientists. Also includes efforts to discover needs and to help members communicate.

Volunteer growth

An ability to recognize and reward volunteer efforts. The combination of funded projects and volunteer efforts can be problematic unless there is a visible sense of where volunteer community efforts add value beyond what might be directly fundable. Some of this value needs to return to the individual volunteers.

Growth of active connections with other efforts

Active conversations with data providers and external NSF funded science programs (LTERs, DataOne, international associations, etc.) are essential for EarthCube to understand how it can best position itself to provide value to the geosciences. Active liaisons extend the value of EarthCube to the work of partner organizations, while it leverages this work for EarthCube members.

Tenets of EarthCube Governance

The additional guidelines that follow serve to illustrate the framework in which the Demonstration Governance Organization should be operating:

1. **Alignment:** Guide EarthCube via its governance to support the work of its stakeholders toward a common agenda. Alignment refers to whether or not the work of EarthCube as a whole and under the guidance of EarthCube Governance supports the work of the stakeholders and the work in their field. Alignment relates to the creation of a common goal, which is particularly important for network structures, where multiple individuals or organizations come together to solve a problem.
2. **Inclusivity:** Foster a broad level of community engagement that is balanced and representative of EarthCube participants and stakeholders. Inclusivity refers to the perception that there is a broad level of community engagement, and that a balanced and representative spectrum of the community has an active voice in decision-making. Inclusivity is especially important for EarthCube, as EarthCube is a bridging together related, but separate, disciplines from the geosciences and cyberinfrastructure. On top of supporting participant buy-in and commitment, a high level of inclusivity also increases the likelihood of receiving valuable input to drive effective policies and decisions.
3. **Transparency:** Establish clear lines of authority, define who has decision-making power, and implement two-way communication. Transparency around decision-making is highly influential in building the trust of stakeholders. To be effective, governance must not only be clear about how decisions were reached but also create an atmosphere where stakeholders are willing to share their insight and ideas.
4. **Decision quality:** Establish clear criteria for selection processes and decision-making including assessing multiple options. Decision-making quality underlies the effectiveness of governance, which has been defined as a match between the expectation of the constituents and how the processes and outcomes evolve.
5. **Confidence:** Foster trust in and perceived confidence in decision-makers and the EarthCube governing processes. Confidence from stakeholders in the decisions made by governance is based on trust in and perceived competence of governance members or other decision makers. Confidence effectively begets internal legitimacy of a governance structure with its members and constituents.
6. **Commitment:** Encourage the use of EarthCube products and external products, both within and outside EarthCube. Involvement of EarthCube-funded projects as well as groups external to EarthCube and to NSF that are doing similar things will help ensure that EarthCube is not only aligned in the cyber-ecosystem but that similar work from other programs can be leveraged.
7. **NSF's Role:** Examine what the role of EarthCube could be or will be in NSF's geoscience cyberinfrastructure initiatives. The EarthCube community through its governing process could provide NSF with advice on and responses to approaches, concepts, requirements, and priorities.
8. **Principles or guidelines:** Propose and foster adoption of a set of principles or guidelines around which the EarthCube system will be based. A set of guiding principles could help organize existing and future projects into contributing to a collaborative infrastructure and provide frameworks for governance, architecture, and processes for consideration and adoption.

This material is based upon work supported by the National Science Foundation under Grant No. 1340233. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.



Appendix 2:

RACI: Decision-Making in the Context of EC Governance

Decision Roles

<p>For each decision type/activity, there can be only one:</p> <ul style="list-style-type: none"> • A: Accountable party/ Approver (the one who makes the final decision/ judges the quality of the work completed) 	<p>For each decision type, there must be at least one:</p> <ul style="list-style-type: none"> • R: Responsible party (the one who implements the work, does the legwork to prepare for the decision) 	<p>For each decision type, there may also be:</p> <ul style="list-style-type: none"> • C: Those who are Consulted before decisions are made (two-way communication) • I: Those who are Informed about the decision (one-way communication)
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Stakes of Decisions

<p>A decision is high stakes when it:</p> <ul style="list-style-type: none"> • Sets the overall direction; • Lasts for a long time; • Is difficult or impossible to change once made; • Has a major impact on participants; and/ or • Is highly controversial. 	<p>A decision is moderate stakes when it:</p> <ul style="list-style-type: none"> • Has a major impact on how operations function; • Lasts for months to a year or two; • Is resource intensive to change course; and/or • Is somewhat controversial or is not controversial, but is difficult to talk about. 	<p>A decision is low stakes when it:</p> <ul style="list-style-type: none"> • Is focused on the day to day work; • Is short-term or one-time in nature; • Can be changed with minimal disruptions or resource commitments; and/or • Is non-controversial and easy to discuss.
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Decision Makers

<p>NSF: National Science Foundation LC: Leadership Council Office: EarthCube's Office CDF: Council of Data Facilities</p>	<p>SC: Science Committee TAC: Technology & Architecture Committee LT: Liaison Team ET: Engagement Team</p>	<p>FPT: Funded Projects Team FP: Funded Projects individually Memb.: EarthCube Membership ?: Any other decision-makers missing?</p>
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Some of Types of Decisions Currently Underway in EarthCube Overall & Governance Specifically

Content Decisions	Funding	Policy & Leadership	Operational
<ul style="list-style-type: none"> • Directional – major decisions shaping all other content decisions • Targeted – major for some stakeholders, such as funded projects, but not necessarily for users • Operational – nuances about how pieces fit together, within context set by Direction and Targeted decisions 	<ul style="list-style-type: none"> • Awards – Overarching at the level of new awards • Governance Specific – Within the overall governance award • Governance Discretionary – Within a subset of governance dollars deemed flexible/ongoing discretionary funding 	<ul style="list-style-type: none"> • Final selection of elected members (Leadership Council, chairs of committees/teams) • Membership structures • Charters for overall Governance and each subcomponent 	<ul style="list-style-type: none"> • Communications channels • Communications content • Staffing for Governance • Travel and other spending guidelines • Working group practices • Membership management practices • Meeting agendas

Appendix 3:

Baseline Evaluation of the Emergent EarthCube Governance

Structure

January 2015

Prepared by Spark Policy Institute
on behalf of EarthCube Enterprise Test Governance