

## CONCLUSION

Throughout this primer, we have provided a number of best practices, learned “in the saddle” by directors of very large SES projects. We hope that you find this primer useful and will refer to it periodically as you lead your own project to success. Our purpose is to provide a succinct guide with the ideas and resources that have helped us move our own projects forward. We have identified challenges and issues for which you should be prepared as a director. Our hope is that by making the issues and approaches familiar, this primer can help you carry on with more confidence. When you suddenly are funded or summoned into a leadership role, there may not be time to examine the vast literature on leadership, project management, and interdisciplinary thinking. Your time will be very constrained by a big slate of responsibilities. Everything seems to happen at once! This primer aims to help you at that juncture by providing an efficient, informal help to your finding a way to success. As noted at the outset, each section of this primer is independent and can be consulted as needs arise – no need to read the primer through, ever! Furthermore, each section has its own flavor reflecting the points of view and approaches of the authors of that section. Nonetheless, the work is a whole, conceived by us collectively and iteratively reflecting our shared insights throughout. We refer to these as the “cross-cutting themes” of the primer, comprising the unifying philosophy and key messages we hope to convey. We close by summarizing these themes.

### Shared vision & goals

Many of the sections in this primer mention how critical it is for the project team to have shared vision and goals. A team cannot succeed unless all of its members understand the overarching goal of the entire effort and take this as a source of professional and personal inspiration. You are the standard bearer of the vision; cultivating a shared vision among your team members is your job as director. Approaches to achieving this are varied, but it is critical to involve members in formulating, refining, and owning this vision. It is important that you as director refer to the project’s vision and goals often, articulate them as a means of encouragement, and to help the team find its way when disagreements, fragmentation, or confusion threaten cohesiveness. You will be called upon to convey this repeatedly to your team; outside supporters or detractors; and institutional and stakeholder representatives. And as director, you need to help other team members do the same and reinforce one another.

### Culture of collaboration

By example and through design, you will need to establish and nurture a culture of collaboration within your project. To maintain a collaborative culture, the project director will need to regularly assess group function. This will involve creating and overseeing the space and conditions for working jointly while utilizing tangible and intangible incentives to systematically and intentionally sustain this culture. A hallmark of a culture of collaboration is understanding of the importance of *co-learning by all participants*, a social process of mutual learning among members of a project which is central to building effective collaboration. Not only must each team member share the vision and goals, each member must understand and contribute to an environment that supports collaboration, communication, and a sense of collective achievement. Success of a large project requires effort on the “*taskwork*” – achieving objectives, milestones, outputs,

and outcomes - and “*teamwork*” – communicating clearly, valuing diverse contributions of team members, practicing effective rules of engagement, and taking time to find common ground for working together, which constitute the “transaction costs” inherent in large team cohesiveness. As director you can support this by valuing both teamwork and taskwork, providing resources and support for growing both of these across your project and putting in place assessment mechanisms that pertain to both. Assessment methods and the assessment specialist (and most projects will have one) assist the team in monitoring the effectiveness of the project structure, processes, and activities as well as the performance outcomes and accomplishments. This systematic feedback to you as director and the whole team can help refine and redirect efforts to improve the project and guide it forward to greater success.

### Continuing effective group function

Large SES projects can continue for 5, 10, or more years, so their successful functioning will require relentless attention and support of the mechanisms that sustain this. Some activities to achieve this include the following; *Face-to-face* group and all-project meetings are necessary at healthy intervals to build and maintain team cohesiveness. You must work to help your team in developing trust and increasing communication efficiency to accelerate idea generation. With the anchors of trust and relationships sustained by face-to-face meetings, *virtual technologies* help sustain these and permit effective collaborative work of all kinds.

### Setting, communicating, and meeting expectations

The success of all projects requires a focus on initially promised and *planned milestones and deliverables*. The project's management plan clearly delineates measurable project deliverables and milestones and spells out the mechanisms for assessing progress and completion. Developed by the team under your leadership, the plan should include expectations for rules of engagement and for *participant accountability*, procedures for *conflict resolution*, expectations for earning *authorship*, and rights to *intellectual property*. The plan can be facilitated by establishing clear timelines, reporting requirements, and associated rewards and consequences for each participant and each subteam at the outset. This must also be revisited throughout the project lifecycle with the leadership team and members. In addition, you, the team members, and stakeholders must *establish levels of commitment and expectations* of involvement early on. Above all, be **REALISTIC** in your assessment of how

much work people can do in designing and sustaining the project organization, taking into consideration the *transaction costs* of participating in a large project. There are temptations from proposal development to reporting and engaging with stakeholders to commit to too much. If you do that, holding your team accountable will become difficult and a source of tension and discouragement. A project-wide understanding that *adaptive management* will occur provides flexibility and allows milestones and deliverables to be modified as situations change, new learning occurs, and the project evolves.

### Distributed leadership

In addition to your own significant leadership role, you will need to enlist and cultivate a team of leaders for the different elements of your project. You will not be infinitely available at all times to all people, and few project directors have all the knowledge and skills needed to effectively direct a large multi-disciplinary project. Create a *shared and distributed leadership* that includes members from disciplines different than



Student crew in the USDA-NIFA sponsored REACCH project during the wheat harvest at R. James Cook Agronomy Farm near Pullman, WA. Credit: David Huggins

your own who are respected by team members; can help fill gaps in your own skillset and social network; have good people skills; are committed to the vision of an interdisciplinary/transdisciplinary project; and you can count on to take initiative and follow through. This *shared leadership* serves as social glue for the collaborative building process. When *staffing your project*, you will need co-PIs who can serve as mid-level managers to keep the entire project going smoothly. The culture within the team should mirror what you wish to see across your project and be founded on a good understanding of differing responsibilities and a respectful and collaborative approach to guiding the project. Together, you will need to assess how many and what kind of people you need in each area to complete the proposed tasks.

### The management team

Staffing your project with *the right project manager* is perhaps your most important early decision. This person will be a right-hand for you throughout the work. You should strive to identify someone who complements your strengths – a detail person if you need support there, a task-oriented organized communicator if you need support there. This person must be able to see the big picture along with you and faithfully transmit your vision and approach to leadership through all aspects of project operation. Some projects will also have other persons in the management team such as a communications specialist, accountant, data management specialist, or others. Your core operations team must be highly competent, work well with others, be self-starters, and take initiative but check-in and communicate routinely with you and other members operations team so as to be united and cohesive the in work of the project.

## Cultivating and communicating with partners, stakeholders, and collaborators

As project director, you will need to involve stakeholders to ensure that the project's science is actionable and needed. *Engaging partners and stakeholders* from the beginning to the end of a project will help improve the outcomes and make you and your team more successful on this and future projects. Leverage the professional network of your core leadership team to create a diverse, committed, high-profile board of *partners and stakeholders*. Establishing an advisory board is one of the most effective ways to build social, intellectual, and political relationships as well as obtain *complementary funding* for the project. Push involvement of your advisory board aggressively from day one. They have agreed to serve the project because it interests them; foster and strengthen their excitement and commitment by working with them to match niche or broad aspects of the project to their own skills and interests. Some projects have identified multiple advisory groups to support them, for example, one that represents the diverse stakeholders of the project and another representing the disciplinary and transdisciplinary science being pursued by the team.

Large projects often require *collaborators* to communicate frequently with others outside their discipline, to attend the increased number of meetings usually necessary to coordinate large groups, to navigate *virtual communication for geographically separated participants*, and *share data* across disciplinary and institutional boundaries. These *transaction costs* (additional time, effort, and energy) are a standard and necessary element of large SES projects that need



The 2011 cohort NIFA climate CAP Directors comparing notes during a regular virtual meeting to coordinate activities among projects. Left to right: Sanford Eigenbrode, Tim Martin, Lois Wright Morton. Credit: Sanford Eigenbrode

to be planned for and balanced with *competing demands on project participants' time*. You may be working with a group of several universities, perhaps government laboratories, and companies, consultants, government agencies, and/or civic organizations. Each of these entities has its own organizational culture, its own standard practices and its own expectations of employees. You will need to learn to navigate *these differences among partner institutions*, and you may even be able to *leverage institutional support* and/or *find complementary funding*. Large projects involving many institutions and funding sources have a complexity you will need to learn to navigate. Often, there are *differences among partner institutions* in the rules, processes, and paperwork associated with day-to-day procedures. The lead and co-PIs' collaborating institutions can be leveraged for support, including moral support as well as many types of in-kind and financial resources. You must get to know the people in your institutional partners, what is important to them, and their unique and quirky ways if you are to successfully build a culture of collaboration.

## Data management

Large collaborative SES projects involve the generation of two distinct types of data, those generated from the research effort and those derived from the monitoring of team efforts used to track and quantify activities and accomplishments, write reports, make management decisions, and ensure project accountability to funders. Both of these uses need staff, computing resources, and a data management plan that defines the location, form, and protocols for storing and accessing those data. The plan for supporting the research component will likely entail assembly of pre-existing data and the collection of new data involving the biophysical and social sciences. For some scientists in your project, the collaboration necessary to develop protocols for collection, harmonization, and use of shared data will be a new experience. While scientists generally understand the value of shared data, this has not historically been a norm for all disciplines and the academic reward system for sharing has been weak. There are likely to be a few bumps as the team works out philosophical as well as practical aspects of constructing the data management plan and all members become proficient in contributing to the data base. However, the central database for a project can be one of its most valued

resources, and a concerted and well-executed approach can overcome time constraints, diverse skill levels, reuse concerns, and other barriers in ways that move the project toward transformative science. A skilled data analyst and systems programmer who work in concert with the project manager or co-PI to manage the database are necessary core personnel. They can help you and the leadership team to identify and agree on the infrastructure needed to allow sharing of files, editing of content, and revision control; a system for data entry, review, analysis, and long-term storage; and a team-wide shared website for interactive deposit, editing, and export of internal content (Herzmann et al. 2014).

### Teaching and training within the very large SES project

The project director must create a project-wide culture that encourages *mentoring* across the project and throughout its duration. It is important to incorporate the mentoring ethic and define mentoring opportunities, tools, mechanisms, and expectations within the proposal. This mentoring pertains not only to the undergraduate, graduate, and postdoctoral researchers affiliated with your project, but to every member of the team as he or she acquires new skills to improve professionally and contribute to project success. Providing learning and training opportunities during and after team formation can be crucial to ensure your team is high performing. Training can incorporate many different themes and levels; for example, training from HPT level 101 all the way to learning how to build a team. Additional topics might be leadership development and conflict resolution. Evaluation of case studies can help identify success factors and lessons learned, and could include the six attributes identified in Table 1 as well as other areas self-identified by the team.



A lab group in USDA-NIFA sponsored PINEMAP enjoy lunch together.  
Credit: Anonymous

### Have Fun!

What? Yes, directing a very large SES project will likely present you with challenges and demands on your time and energy like you have never experienced before in your professional career, but it can and should be “fun,” too. Meeting new challenges as a director and participant in a high performance team can be exhilarating. Your work will be generating outputs and impacts at a level you may not have achieved previously as a scientist. The team, however large, is a social unit comprised of a variety of relationships that will change over time. Over the course of your project, students and young faculty will mature personally and professionally. On the other side of the long hours, hard work, and gamut of difficult decisions are the joys of achievement and personal satisfaction. The authors of this volume can attest that these rewards are real and we wish them on you, good directors all.

Herzmann, D. E., L.J. Abendroth, L. D. Bunderson. 2014. Data management approach to multidisciplinary agricultural research and syntheses. *Journal of Soil and Water Conservation*. 69(6):180A-185A.

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