9.3 ADMINISTRATIVE MANAGEMENT

Administrating a multi-institution Engineering Research Center (ERC) involves several special challenges. Paramount among them is building and maintaining a strong relationship among the academic, strategic, and industrial partners.

Effective communication is the key to maintaining a cohesive and focused Center. The management teams—Governing Board, the IAB, the SAB, research managers, education program directors, outreach coordinators, industrial liaisons, and administrators—need to understand their roles and objectives in the changing environment typical of the ERC. Weekly management team meetings, composed of members of all the groups within the ERC, keep everyone on the same page. Regular meetings of the GB, IAB, and SAB tune the strategic focus.

The ERC events (IAB meetings, Center-wide research symposia, Retreat, NSF ERC program annual meeting, NSF Annual Report, and Site Visit) are coordinated efforts that require the cooperation of academic, strategic, and industrial partners. The administrative and financial infrastructure must be designed to be flexible and robust.

9.3.1 Administrative Challenges Unique to Multi-Institution ERCs

The challenges for multi-institution ERCs are obvious. They are more intricate organizations, composed of many institutions with different systems, complex administrations, and varied financial needs and accounting systems. Getting things done requires cooperation, communication, and talented administration.

9.31.1. Increased Complexity of Multi-institution Centers

There are many aspects of this greater complexity:

- There are additional stakeholders and layers with differing priorities, agendas, and institutional cultures.
- There is an increased need to manage expectations when there are competing demands for resources, i.e., balancing the Center's core work of producing research results and educating a diverse future engineering workforce with creating and maintaining the management and administrative infrastructure needed to accomplish both that work and NSF deliverables.
- Process- and consensus-building takes more time, effort, and shepherding at all levels, but is critical to achieving the collegiality and cohesion needed to think and work as a Center, versus with an institution-specific mindset.
- The cost of doing business (e.g., administration, operations, marketing expense) is higher and requires a larger percentage of funding. Managing a geographically distributed enterprise with multiple partners requires a more sophisticated administrative structure and additional resources. For example:
- Administrative overhead/infrastructure funds for administrative personnel, facilities, and information technology support are needed (at least part-time) at each campus.
- There are substantial travel-related costs (hotels, airfare, and meals) for Center-wide events such as NSF Annual/Renewal Site Visits and IAB Meetings, the NSF ERC Annual Meeting in Washington, D.C., and periodic Center operating meetings such as Retreats and Executive Committee Meetings.

CASE STUDY: *Each core partner institution of the Center for Subsurface Sensing and Imaging Systems (CenSSIS) is usually represented by approximately 20-25 faculty researchers, students, and senior administration personnel at its annual NSF Site Visit and annual Research and Industrial Collaboration Conference; smaller groups meet in person at other times during the year.*

CASE STUDY: *At CPES, the NSF Site Visit is held in conjunction with the Center's Annual Conference and review by industry. The Annual Conference, which includes tutorials, invited presentations, technical sessions, a poster session, and industry-student forum, is organized by a multi-institutional committee of students. The CPES Annual Conference typically attracts approximately 250 attendees per year from around the world. In recent years, this annual event also provides a forum for strategic planning workshops involving industry as well as faculty and students from lead, core partner and outreach institutions.*

Tip: Consider scheduling IAB meetings and NSF Site Visits back-to-back to minimize travel-related and other costs. Since Site Visits may be conducted at the partner institutions, rotate the fall IAB meeting among partners to spread the burden and maximize industrial members' familiarity with the Center's "branches."

- Telephone conference calls needed to conduct the Center's administrative business, research, and technology transfer increase the cost of doing business.
- Infrastructure at the university level for administrative/operating support can vary greatly from institution to institution. Expect the Center to build, buy, or outsource solutions for Center operations to meet NSF deliverables, which are unique and complex.

9.3.1.2 Agreements Between and Among the Partner Institutions

At a minimum, the lead institution will enter into a subcontract with each of the partner institutions to provide them with their NSF ERC and industrial funds and bind them to the requirements of the Cooperative Agreement with NSF.
Many multi-institution ERCs also execute a Memorandum of Understanding (MOU) among all the partners. This agreement can address a range of issues but almost always includes a statement about how the Center's intellectual property (IP) will be handled.
The lead and partner institutions also need to agree on how the industrial partnership agreements between the Center and an industrial partner will be handled. Typically, these agreements are signed by the lead institution on behalf of all the partners but the policy needs to be clarified and documented by mutual agreement among the partners.

CASE STUDY: *CenSSIS established an Academic Partnership Agreement from the onset that was executed by the lead partner and the other three partner institutions; the CenSSIS Academic Partnership Agreement points to the Center's Industrial Partnership Agreement that is executed with member companies. A separate Intellectual Property Agreement was drawn up by the ERC's Industrial Liaison Officer and the lead university's Technology Transfer Office after substantial discussion with all the partner institutions.*

CASE STUDY*: CPES established intercampus agreements for Distance Access of Courses and Exchange of Graduate Students. In preparation for graduation from the NSF ERC program, CPES also established an intercampus agreement for continued post-award collaboration of the lead and core partner campuses.*

9.3.1.3 Effective Communication Is Key to Achieving Multi-institution ERC Cohesiveness and Focus

Multi-institutional weekly meetings via teleconference or videoconference are critical to operational success. Timeliness and frequency of meetings are important considerations. It is best to establish a consistent time and place, where appropriate, so meetings become routine.

CASE STUDY: *CenSSIS has a weekly management meeting accessible via a toll-free call-in number that is open to a broad constituency. The Director is highly involved in shepherding these meetings and personally emails out the agenda in advance and the meeting minutes afterwards. He often contacts key personnel beforehand to encourage meeting participation by remote attendees.*

Tips:

- Encourage participation by key people.
- Prepare and follow an agenda that is sent out in advance.
- Follow up with minutes and action items.

Face-to-face meetings throughout the year in addition to those required by NSF increase the quality of communication.

CASE STUDY: *The CenSSIS Executive Committee meets two to three times annually to make funding allocation*

and other high-level, Center-wide decisions. One of these meetings is the Strategic Planning Retreat attended by the Center's Senior Management, key researchers, and BOD (composed of partner deans and strategic industrial/government partner members).

CASE STUDY: *CPES conducts a weekly management meeting which involves all key personnel within the leadership team. The CPES Executive Committee, which includes all leadership team members, campus directors and thrust leaders, meets on a monthly basis. Discussion topics include: upcoming events, annual reporting, funding allocations, strategic planning issues within the Center's research, education, and industry collaboration programs, and other Center-wide decisions. Each November, a retreat is conducted for all Center PIs to discuss strategic planning within the research program.*

Information technology is the tool that the local and distant partners use to generate, communicate, and store their information. The local area networks (LAN), Internet, and the associated administrative staff are indispensable to a multi-institution ERC.

Electronic media—email, internet, file transfer protocol (FTP) and WebEx—are timely, inexpensive, and useful to expedite communication.

CASE STUDY: *At CenSSIS, email is the predominant means of communication among academic, strategic, and industrial partners, used to announce events and transmit the CenSSIS newsletter.*

The Internet and the CenSSIS website are used to keep partners and interested parties aware of the work being done and informed about the calendar of events. The Internet is also used to obtain data (registration and personnel information) and distribute it (forms and documents).

The FTP site is used to obtain and send large files between CenSSIS partners.
WebEx is used for sharing documents in real time, distance learning, seminars, and video conferences.

CASE STUDY: *Beginning approximately a calendar quarter prior to the NSF Annual Report due date, CPES has a weekly conference call for administrators only, as a forum for discussion about data collection, documentation, and reporting.*

Tips:

- Explore and use appropriate tools and technology to facilitate administrative communication.
- The Administrative Director should participate in the meetings related to formulation and review of the Annual Report.
- The Administrative Director should become familiar with the NSF ERC library (part of the ERC website operated by NSF contractor QRC), enhancing access to and consideration of NSF-ERC outputs, including Annual Report guidelines and the ERC database.

9.3.1.4 Multi-institution ERC Activities Are Complex

ERC activities (Retreat, Site Visit, Center-wide conferences, Annual Report preparation, and IAB, SAB and GB meetings) occur during the academic year (September through May). The ERC's calendar should be created two to three months before the beginning of the academic year. It is important to schedule the ERC's activities so that (if possible) the ERC is not conducting more than one activity at a time. Further, it is important to avoid institutional event conflicts.

Creating a multi-institution ERC calendar can be a challenging process.

Tips:

- Establish calendar dates for events and deliverables as early as possible in the year and make the event timing as consistent as possible from year to year. Cementing mutually agreeable dates can be difficult to accomplish with multiple institutions and different academic calendars.
- Institute mechanisms and timelines to report data (via QRC, the NSF database contractor) and in print form) to NSF

centrally by lead partner, but with input and supporting documentation from partner institutions. Personnel activities can be more difficult to track with multiple contributing institutions, particularly for students and more ancillary Center contributors.

CASE STUDY:*To prepare for Annual Report data submission, CPES disseminates to all contributors a complete copy of the report and indicator table guidelines as soon as the final versions are received from NSF. This provides an electronic template and detailed instructions for data submission based on NSF expectations. Each partner university is asked to submit the required data PLUS back-up documentation for each item to a centrally-administered ftp site that is established specifically for this purpose. Contributors and advisors have access to the FTP site and can provide input or suggestions for refinement throughout the development of the report document. The back-up documentation is required for file record and to ensure that the data submitted has been thoroughly reviewed by the submitting institution for applicability and correctness. Approximately six weeks prior to the Annual Report deadline, the CPES Executive Committee meets to jointly review and discuss the data and text submissions, both as component parts and as a whole. In the six weeks following this review meeting, CPES centrally gleans each partner institution's data submission, checking for errors, duplication, or inconsistencies with current or previously gathered information. Communication with the partner institutions during this period is via any and all means available, frequent, and quite detailed to ensure accurate reporting of the activity, both during the reporting period and cumulatively. Finally, the data are finalized in the indicators database and submissions are merged by CPES central into the final NSF-prescribed format.*

CASE STUDY: *At the VaNTH ERC, partner institutions begin working on data submission approximately four months prior to the Annual Report deadline. Templates and instructions for the tables required for the indicators database and the Annual Report are developed and provided to each partner institution at approximately two-week intervals. In particular, the instructions emphasize the reporting periods for financial and non-financial data. Individual deadlines are established for each of the tables and data for a particular table are analyzed and verified before the template for the next table is provided to the partner institution. As tables are completed, the Administrative Director atVanderbiltUniversity (the lead institution) accumulates the data in linked Excel spreadsheets for each of the VaNTH institutions into the combined table that is required for the indicated database.*

9.3.1.5 Multi-Institutional Education Programs, Diversity Programs, and Financial Systems

Education programs at a multi-institution ERC can be difficult to establish and operate. Institutions may be on semester or quarter calendars. Course set-up is similar to that at single-institution ERCs, but agreeing on course credits, registration process, course calendar, and course execution can be challenging. Agreeing on a lecture forum (real-time webcast, videotape, etc.) can be an issue, as can implementing the forum.
Establishing a diversity program can vary in difficulty across ERCs, depending on the maturity of the diversity programs at each institution and institutional support of the effort.

Developing a financial system for a multi-institution ERC is difficult. The various institutions and NSF all have different accounting, reporting, and calendar systems and treat overhead, fringe, capital, expense, and travel differently. Each institution typically provides different information in a different form from a different software program. The NSF calendar and reporting period often do not coincide with those of the institutions and may change during the life of the grant. In a multi-institution ERC, receiving relevant information on schedule is also problematic. Finally, inputting the financial information from the multiple institutions into the NSF annual reporting system is difficult.

9.3.2 Structure and Roles of the Administrative Staff

An administrator is required at each partner's location to expedite communication and coordinate Center activities. The administrative staff performs a variety of tasks to carry out the Center's business. The same tasks continue during the life of the Center, but the amount of effort needed in each area varies and the staffing level required to complete the tasks varies accordingly.

9.3.2.1 Functional Elements

A mature multi-institution ERC needs sufficient staff to carry out the following administrative tasks, programs, and activities:

- General Office Management and Administration
- Conference and Events Planning and Management
- Information Technology Planning, Development, and Management
- Database Planning, Development, and Management
- Accounting/Financial Planning, Development, and Management
- Program Grant/Contract Administrator
- Graphic Arts Support

9.3.2.2 Lead Institution Staffing

Normally this comprises at minimum two full-time administrators at the lead institution (and often more). Dedicated (at least part-time) administrative support and grant/contract personnel are necessary at the lead institution to administer the NSF contract and assist with the budget/accounting.

9.3.2.3 Administrative Staff at Partner Institutions

There should be an administrative staff member at each partner institution to expedite the necessary financial, personnel, and other data for the Annual Report; assist with event planning; and provide a central point of contact for ERC faculty, staff, and students. Without such administrative support, partner faculty will need to provide a wide range of data and services to support the ERC activities.

CASE STUDY:*When the Center for Collaborative Adaptive Sensing of the Atmosphere (CASA) became an ERC in 2003, the University of Puerto Rico at Mayagüez (UPRM), a CASA core partner, established a central ERC office that supports not only CASA, but also UPRM's three other ERCs, CPES, CenSSIS, and the ERC for Structured Organic Composites at Rutgers. This enables highly beneficial teaming and sharing of knowledge and approaches.*

9.3.2.4 Staffing for Center Life Cycle Stages

Start-up Stage: Minimal staff, analogous to a business venture start-up. Start staffing up and establish systems early, optimally before NSF ERC funding begins, so that the Center is positioned to get off to a good start and hit the ground running. This can help preclude complicated, time-consuming problems later.

Ramp-up Stage: Period of Center growth and specialization of administrative job functions. Particularly needs to be well staffed by the end of years one and two as the Center moves toward year three renewal, a major Center milestone.

Steady State: Begins at approximately year four, as work proceeds towards year six renewal through approximately year eight.

Ramp-down Stage: At about years eight through ten and beyond, preparation for self-sufficiency intensifies in anticipation of NSF's phase-down of support and graduation after year 10. Administrative support must meet the NSF deliverables contract. The needs at this stage tend to center on financial/accounting, personnel management, and information technology functions. Ideally, the Center begins to enter a new enterprise stage—e.g., a spin-off company, receipt of support from a new source—during which the administrative structure will need to be assessed and adapted.

9.3.3 Center-wide Systems, Procedures, and Operations

Established systems and procedures are needed to conduct the IAB meetings, major research symposia, Retreats, and the Annual Reports and Site Visits. Establishing a reasonable and achievable calendar is a first step.

The most time-consuming administrative event is the Annual Report. To effectively manage the Annual Report preparation process:

- Develop a database and data entry system for the personnel database.
- Develop a system for obtaining the accounting data from partner institutions.
- Develop a procedure for obtaining the project reports.

The Site Visit is the next most demanding administrative event, and arguably the most important. The renewal year visits, the third and sixth years, are crucial. The Site Visit and industry research symposium require a comparable level of administrative effort. These events require clear communication with Center partners (academic, strategic, and industrial) via effective communications media. Phone calls, teleconferences, email, websites, and ftp sites are the primary media. An important administrative function is to keep the media up and running and easy to use. Face-to-face meetings can also be important.

9.3.3.1 Annual Report Systems

The most important points and suggestions are as follows:

- Thoroughly review the current Annual Report Guidelines.
- Data collection for NSF reporting is complex and may require an individualized system at each Center. Developing a personnel database is difficult and costly. Review the Annual Report data collection system to understand the demographic and financial data requirements.
- Links to the most current versions of the Annual Reporting Guidelines and the Database Guidelines can be found on the ERC Library website at https://www.erc-reports.org/
- Detailed timelines for each part of the Annual Report, including individual project reports, proposals, and thrust reports, must be publicized well in advance. Timelines should contain deadlines for submitting initial and revised reports, and should provide adequate time for the review and selection of proposals to submit as part of the next annual funding request.
- Templates for both the project report and proposal are strongly suggested. In addition, the Center should develop a standard questionnaire for each project Principal Investigator to complete. Create a system to collect and assemble report materials by email, ftp site, snail mail, etc.

9.3.3.2 Site Visit Planning Logistics

The Site Visit usually is the one event of the year that the NSF attends. It occurs five weeks after the delivery of the Annual Report. The administrative priority is to ensure that the event runs seamlessly. The two events, Annual Report and Site Visit, form the peak of administrative activity in the year.

Arranging and preparing the written materials for the Site Visit is not difficult, because they are excerpted from the Annual Report. Every third year is a funding renewal year; hence, it is especially important for these meetings to run exceptionally well.

Practicing the Site Visit presentations with some reviewers external to the ERC is highly recommended. Commit several days to the review that can be used to strategize, practice, and edit presentations from the partners. Coming together at a single location and running through the presentations from beginning to end can be helpful, as can a Red Team (composed of the IAB and SAB) review of these presentations.

Careful attention must be given to communicating details about technical set-up (audiovisual, etc.) so that the presentations run smoothly. Make sure that presentation format requirements are well understood by all participants in advance.

Collecting presentations for printing the required Briefing Book means advanced coordination, since many participants are likely to be traveling on the day the materials are in production.

9.3.4 Maintaining Strong Relationships Among Partner Institutions

Developing and maintaining strong relationships within the multi-institution ERC is necessary to accomplish the groups' activities and goals. Communication among the partner institutions on a weekly basis maintains focus and helps to develop a multi-institutional culture.
A Center culture and orientation versus an institutional orientation must start at the Director and senior levels and permeate the organization, so that the administrative activities are carried out seamlessly throughout the consortium.

The Center needs to invest in occasional in-person opportunities for Center personnel to interact, such as Center-wide retreats and conferences, to help form relationships that will expedite day-to-day activities. This approach can be taken for smaller subsets of the ERC faculty and staff as well. For example, CPES holds quarterly campus meetings of its five Campus Directors.

The administrative staff carries out the Customer Service function for all of the partner institutions to accomplish the groups' activities. Dedicated customer service is particularly needed for a distributed Center where the partners are geographically distant and most Center business is done remotely.

Each ERC institution should have a "go-to" person who gets things done and provides administrative support. This person acts as a conduit for communicating and providing materials to the other ERC participants in the institution and to the other partner institutions.

Tips:

- Rotate the location of Center meetings among partner institutions.
- Include Administrative and Grants and Contracts personnel from partner institutions at occasional meetings to ensure that the administrative staff is acquainted with all ERC institution members.

CASE STUDY: *CPES representation at Administrative Directors' Summer Retreats has included the AD from CPES's partner institution, Virginia Polytechnic Institute, and the Administrative Coordinator from partner institution Rensselaer Polytechnic Institute.*

CASE STUDY: *CenSSIS invited Grants and Contracts personnel to planning meetings from all partner institutions; joint Center Retreats have been held near partner institutions RPI and UPRM, as well as Woods Hole Oceanographic Institution. These Retreats include the Senior Management Group and its Board of Directors.*

9.3.5 Financial Management

Creating a common financial calendar can be a multi-institutional administrative issue. It is important to recognize that there may be several different financial calendars among the partners. Institutions might be on a government, academic, or annual calendar.

Establishing the chart of Accounts and Budget Account Management Structure is critical to Center operations. It is critical that the lead institution and all of the partners understand the financial reporting requirements for the Annual Report at the outset. Each partner will have to account for funds on a project-by-project basis as well as accumulate costs to the appropriate research thrust or program as required. It may not be possible for the partner institutions to establish the same kind of accounting system as the lead institution, so the partners may need to consider an appropriate "shadow" system. This system should be reflected in the partner's invoices so that the lead can determine costs by task/thrust/program.

Cost-sharing and industrial memberships must be certified for the entire Center by the lead institution, which is the legally responsible entity for the ERC; partner institutions are considered to be subcontractors. While recognizing that partner institutions may not meet deadlines, the requirements and schedule for invoicing should still be tight; timeliness is paramount. Monthly invoicing using a standard invoice template that includes cost-sharing by task/thrust/program and line item is recommended, certified through signature of an authorized organizational representative. This serves the dual purpose of: (1) enabling monitoring and follow-up that cost-sharing expenditures are occurring throughout the year to meet cost-sharing commitments at each institution, and therefore as a Center; and (2) facilitating reconciliation of fiscal information for the Annual Report, thereby streamlining the required annual certification of cost-sharing by the lead institution.

There are subcontract management and invoice timing implications for the Annual Report tables. It is important that the lead institution understand the requirements for reporting expenditure data in the Annual Report. The lead institution, for example, has not actually expended any funds until it has paid a partner’s invoice. Therefore, if subcontractors are tardy in submitting their invoices, expenditure data for the lead will lag and cause concerns at NSF. It is important that the subcontract include language requiring timely submission of invoices.

The lead institution should work closely with the office on campus responsible for writing and issuing the subcontracts to the partner institutions. The subcontract language will help clarify the requirements that each subcontractor must fulfill, and ensure that data and certifications are available for the Annual Report. The lead institution should decide, for example, whether the subcontracts will include detailed individual task orders for each project at the partner institution or whether the partner institution will receive a lump sum to allocate to individual projects.