Cyber-ShARE Retreat Summary

November 1, 2012

The Cyber-ShARE Center of Excellence held a six-hour retreat on October 20, 2012 to develop a plan for reaching the outcomes that they set in their proposal for renewal of NSF funding. During the retreat, the team refined the Center's vision, mission, and five-year outcomes. Using SWOT analysis, the Cyber-ShARE team analyzed their strengths, weaknesses, opportunities, and threats. This document presents a summary and analysis of the retreat information-gathering activities.

Attendees: Patty Esparza, Ann Q. Gates, Frank Osuna, Deana Pennington, Rodrigo Romero, Craig Tweedie, Aaron Velasco, Leticia Velazquez, and Natalia Villanueva-Rosales

Vision and Mission

The vision of the Cyber-ShARE Center is to become nationally and internationally recognized for innovative cyber-enhanced research and education to enable collaborative, interdisciplinary science and engineering.

The mission is to advance and integrate cyber-enhanced, collaborative, and interdisciplinary education and research through technologies that support the acquisition, exchange, analysis, and integration of data, information, and knowledge.

Outcomes

The following are the expected outcomes of the Center five years out.

- The Center is invited to actively engage in local, regional, national, and international efforts.
- The Center has an established record of transformative research.
- The Center enables synergistic, collaborative, interdisciplinary research and disseminates results that are widely adopted.
- The Center is recognized for graduating outstanding students who are CI-knowledgeable professionals and who represent the 21st century demographics.
- The Center has an established network of Cyber-ShARE collaborations.
- The Center provides training that builds capacity at the university and externally in the areas of the Center's expertise.

Cyber-ShARE's Differentiating Advantage

The Center's resources and capabilities contribute to Cyber-ShARE's distinctive competencies and this yields its differentiating advantage. This section outlines each of these.

Distinctive Competencies

Cyber-ShARE's distinctive resources are as follows:

- Models for conducting interdisciplinary and collaborative research and education
- Hardware infrastructure
    - Visualization wall
    - Database and Web servers
    - Field instrumentation (elaborate on this)
    - High-performance computing cluster
- Tools to support collaborative efforts in research and learning
    - Workflow-driven ontologies
    - Visualization of product derivation
    - Learning Commons
    - Data sharing and management tools
    - Mapping tools
- Model for locating environmental towers (?)
- Tech-savvy students with experience in working in interdisciplinary teams
- Training opportunities
    - Professional, communication, research, and technical skills
    - Visualization tools, e.g., Paraview, Display Cluster, xx
    - Cyber-ShARE tools
    - Geospatial applications
    - Semantic Web technologies

Cyber-ShARE's distinctive capabilities are as follows:

- Collaborative science
- Constraint uncertainty management
- Data delivery and analysis systems

- Data integration and exchange
- Data quality assurance and control
- Environmental multi-scale remote sensing
- Interdisciplinary and collaborative research teams
- Knowledge management systems
- Knowledge engineering
- Numerical optimization
- Seismology
- Semantic web technologies (ontologies, provenance, and workflows)
- Sensor systems for environmental monitoring
- Software engineering (formal software specification and verification)

Differentiating Advantage

Cyber-ShARE's differentiating advantage is its ability to conduct collaborative, interdisciplinary research, as well as its ability to put together a team efficiently and effectively to address to research and education challenges and respond to opportunities. The Center's expertise is crosscutting and allows the Center to work on different projects that requires integration of knowledge from multiple disciplines.

The Center has a focus on student quality that is reinforced through role models along with a mentoring and student development framework based on the Affinity Research Group model.

SWOT Analysis

A. Gates described the steps in conducting a SWOT Analysis:

- Internal Analysis: Strengths, Weakness
- External Analysis: Opportunities, Threats

A. Velasco led the group in an activity to define the strengths and weaknesses of the Center. The results are presented in Tabled 1-4.

Table 1: Strengths-Opportunities

Strengths	Opportunities
Interdisciplinary research and education	1. Create a track in the Computational Science program for data science (acquisition, exchange, analysis, and integration of data, information, and knowledge). Investigate certificate program. 2. Seek collaborations and funding opportunities with individuals and groups outside the center who can contribute to the center's mission. 3. Expand existing collaborations to incorporate additional Cyber-ShARE capabilities (Kenya, Arctic, Indonesia, South Africa, and industry partners)
Existing capacity in computing infrastructure and tools—Visko, WDo, CI Server, Probe-It, Expertise, Communities, Mets-ShARE, VLC, mapping tools, algorithms.	1. Develop videos and training materials, elevator speeches, examples for all tools—set deadlines 2. Increase exposure of Cyber-ShARE and its resources in particular using semantic web technologies. 3. Identify and develop new ways of using and leveraging Cyber-ShARE tools in various settings (including education). 4. Examine EarthCube and identify how tools/approaches can be applied to these communities. (engage Salamah and Irbis in data quality) 5. Concentrate on the long tail of data; 6. Use our own CI technologies to carry out administrative work of Center.
Tech-savvy and interdisciplinary students	1. Actively recruit students with particular attributes to ensure that we sustain the Center's capabilities; 2. Plan a comprehensive training program with timeline for developing professional, technical, and research skills. 3. Diversify our grant portfolio to fund students, including international students. 4. Seek opportunities through Cyber-ShARE alumni
Research capabilities: Theory and application of expertise in optimization, interval computation, uncertainty, semantic web; collaborative science; multidimensional and scaled analysis	1. Add Center personnel profiles to UTEP's expertise system and tie to the Center 2. Promote faculty accomplishments on website 3. Invite strategic visitors to visit the center and present talks 4. Identify and plan to submit proposals that strengthen the Center
Models for professional, technical, and research skills	1. Promote expertise in collaboration science across UTEP through courses and publications 2. Plan to offer ARG workshops on a regular basis . 3. Publish workshops.
Social capital-long-standing collaboration and recognition in communities	Sponsor round table discussions that are branded as Cyber-ShARE (possibly in faculty lounge and lunch with the chef).

Table 2: Strengths-Threats

Strengths	Threats
Interdisciplinary research and education	Lack of successional planning, loss of faculty and students; Admin policies regarding tenure promotion not supporting interdisciplinary research; Sustainability of center w.r.t. funding; competition
Established collaborations: Kenya, Arctic, Indonesia, interval computation, semantic web	Sustainability of ES program; Sustainability of center w.r.t. funding
Existing capacity in computing infrastructure and tools	Sustainability of center w.r.t. funding
Venue for Distinguished Lectures	
Tech-savvy and interdisciplinary students; focus on student quality; role modeling and mentoring	Lack of successional planning, loss of faculty and students
Theory and application of expertise in optimization, interval computation, uncertainty, semantic web; collaborative science; multidimensional and scaled analysis	Sustainability of ES program; ability to keep current and balance between cutting edge and established research; competition
Problem solvers; adaptive with quick turnaround	Ability to deliver on promises in a timely manner – products and publications; Lack of response from personnel in a timely manner to report within the center
Social capital	
	Administrative inefficiencies

Table 3: Weaknesses-Opportunities

Weaknesses	Opportunities
Spread too thin, not enough interdisciplinary faculty	Engage UTEP faculty
Engagement of UTEP faculty	Advertise role of center and how it operates; connect through students
Physical capacity for interdisciplinary collaboration	
Education component	Stronger ties with Smithsonian, cyber-learning, ISS, connecting with insights museum, study abroad
Insufficient training	
Lack of awareness of center-wide efforts within subprojects and UTEP awareness (academic silos)	Webpage/marketing
Data management expertise	Build relations with Raytheon and RCES
Not enough relations with industry	
Funding diversity	Stronger ties to development , GRFP, Cyber-ShARE policies to go for other sources of funding, NEON, other opportunities with OK, TACC, UTRC, geo-prisms, DOE, EarthCube, Datanet/DataOne
Application of theory examples, technology transfer, working prototypes	
Scalability of working prototypes	Introduce SE practices and leverage SE and MSSwE program;
Loss of expertise with students graduating	Recruitment of students; stronger ties with SACNAS, CAHSI; expand collaborations with NMSU/TTU/UACJ/UT system/Cal State
Lack of postdocs	Seek NSF funding; university funding
Dissemination/marketing, e.g., website	Create UTEP's global footprint map; link to UTEP Centennial
Reporting, archiving, planning	Streamline processes

Table 4: Weaknesses-Threats

Weaknesses	Threats
Spread too thin, not enough interdisciplinary faculty	Lack of successional planning, loss of faculty and students; Sustainability of center w.r.t. funding; Ability to deliver on promises in a timely manner – products and publications; Ability to keep current and balance between cutting edge and established research
Engagement of UTEP faculty	Admin policies regarding tenure promotion not supporting interdisciplinary research; Sustainability of center w.r.t. funding
Physical capacity for interdisciplinary collaboration	Sustainability of ES program
Education component	
Insufficient training	Ability to keep current and balance between cutting edge and established research
Lack of awareness of center-wide efforts within subprojects and UTEP awareness (academic silos)	Admin policies regarding tenure promotion not supporting interdisciplinary research
Data management expertise	Competition
Not enough relations with industry	Sustainability of center w.r.t. funding
Funding diversity	
Application of theory examples, technology transfer, working prototypes	
Scalability of working prototypes	
Loss of expertise with students graduating	
Lack of postdocs	
Dissemination/marketing, e.g., website	
Reporting, archiving, planning	Lack of response from personnel in a timely manner to report within the center; Administrative inefficiencies

Strategic Actions: International

- Ann: South Africa, follow up – student applying for funding to come to UTEP; dissemination of tools
- Natalia: Follow up with Mexico, have university-university agreements, grants, conacyt students
- Natalia: Canada – semantic web community in health sciences (more opportunities for NIH funding)
- Aaron: Kenya (student exchange and entrepreneurship), geoprisms, DOE (data sharing internationally), Bhutan (link with centennial?) 3D modeling
- Miguel: Industry partnerships (repsol), students and research professors from Venezuela, Colombia
- Vladik: Joint research, student exchange; Russia/St. Petersburg MOU, start collaboration, seek grant funding; Germany, funding opportunities
- Craig: Indonesia -- transfer tech from cybershare1, study abroad, deploy surplus equipment, faculty onsite visit; EU funded project – international exchange of researchers, cyberinfrastructure sharing; Canada – support of researchers to visit arctic; UK – deploy ArMap; Mexico, BECC Guillermo Rauda; Russia – donated equipment; SPECNET
- PASI – NSF
- PEER – NSF, international collaborators to write grants to work with us

Strategic Actions: National

- Datanet, Earthcube
- Art – Leonardo magazine; Cyber-learning; showcases of touch-screens, visualization wall, Insights museum (STEAM), Smithsonian, Creative Kids
- MOU with national collaborators
- Supplements for workshops that highlight our expertise at conferences
- ESIP – engage staff/faculty from Cyber-ShARE about technical efforts; Deana to connect with Leo/Natalia
- Frank: rank cluster in 500 HPC machines
- Craig: Follow up on formally join Ameriflux, highlight prototypes
- Students to document efforts, scenarios, videos on how technologies can be used; Cyber-ShARE publications
- All: Postdoc recruitment and funding
- RCN – NSF: Innovation science, sustainability science (Deana)
- MOUs to recruit students

- Miguel to follow up with Exxon
- All: Industry and national labs
- Ann: Foundations -- Connect with Fisher

Strategic Actions: Resources + Marketing

- Vladik, Miguel, Leticia: To push algorithms into the resource space
- PI meeting about CI server and workshop with students
- Modular documents describing individual student efforts, with lightweight review process
- Resource review process
- Photo gallery
- Open house, tied to BOA
- Round table – BOA
- University communications, awards
- Highlight grants routed through Cyber-ShARE – website tab listing funded projects
- Action Item (Ann): Talk to ORSP about notification of awards

Strategic Actions: Education

- Ann/Aaron: K-12, institutional mechanisms of outreach, GAAN proposal for student scholarships
- Rodrigo: Professional workshops, e.g., data management
- Threads through courses, strategically think about this during PI meeting
- Deana: Cyber-learning
- Deana and Ann: Plan professional development workshops