Collaboration: A Critical Orientation for Today’s World

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The Experience of One World

- Apollo 8 Mission - December 1968
- Transformed humanity’s view of our world
Impact of Systems Theory

- Principles of open living systems (e.g. Earth, human cultures, families, organizations, physical bodies, cells)
  - more than the sum of their parts
  - self-maintaining
  - self-organizing
  - exist as systems nested within larger systems and containing smaller systems
Increasing Rate of Change Local and Global

- Social pressures - common problems
- Economic pressures - common needs
- Ecological pressures - common challenges
- Political pressures - common threats
Importance of Collaboration

- Creativity and innovation recognized as important responses to rapid change

- These qualities are stimulated by collaboration, stifled by hierarchy and segmentation/isolation
Emerging Collaborative Emphasis

• Government
  – collaborative teaming
• Business
  – strategic partnering
• Non-profit world
  – resource maximizing
• The community
  – building alliances across differences
• Education
  – collaborative interdisciplinary learning
Collaboration Reflects a Change in Culture

• A culture change regarding attitudes, values and social practices

• Challenges to collaboration
  – If voluntary participation: No real consequences
  – If mandated participation: Often met with resistance

• Successful collaboration requires a strategy to acquire and sustain buy-in

• Bioastronomy/astrobiology exemplifies a culture change toward collaboration
  – Across disciplines, institutions, and distances
  – Between government, academia, industry, public
Steps to Successful Collaboration

• Opportunities for interaction
  - face to face and virtual
• Identification of mutual interests, needs and concerns
• Venues for on-going communication
• Motivation/willingness to participate based on expectations of benefit
• Establishment of “communities of practice”
• Experience of benefits/practical outcomes
Support Collaboration with Technology

• Synchronous -- real time meetings, interactive work sessions, file and application sharing

• Asynchronous - discussions over time, co-authoring of documents, building and sharing of knowledge
The Social Challenges of Collaboration

- Differences of language
- Differences of culture
- Time pressure
- Degree of common interests/goals/purposes
- Uneven access to collaborative opportunities
- Intellectual property and attribution issues
- Learning curve regarding shared knowledge
The Technical Challenges of Virtual Collaboration

- “Ease of use” concerns
- Platform incompatibilities
- “Bandwidth” limitations (access speed)
- Differential access to equipment
- “Continuum of Enthusiasm”
  - nay-sayers
  - neo-phobes
  - early adopters
  - "power" users
- Limited IT support
NAI’s Collaborative Culture: Ideal Values and Behaviors

- Shared intellectual interests
- Common research goals/objectives
- Recognition of importance of collaboration
- Willingness to participate and work together
- Regular communication within/across teams
- Willingness to use new technologies
- Minimum bureaucracy
- Increased productivity
- Successful reporting of results
NAI User Requirements for Technology

• Cross-platform compatible
• Tools available from desktop
• Web-based accessible
• Easy to use
• High-speed
• Reliable
• Secure, private
• Reasonable cost
Summary:
Important Action Steps

• Develop cultural awareness
• Build consensus for choices
• Identify best practices
• Master the social skills
• Master the technical skills
• Conduct regular evaluation
NAI Education & Public Outreach

Collaborative Solutions
Science Education Assumptions

- Science-literate populace will make more informed choices and grow culture
- Younger generations are not enrolling in science degree programs at the rate necessary to continue and extend discovery
- Modern culture is increasingly dependent upon scientific discovery
- Science education is not achieving desired results
Education and Science communities have common goals and threats

- Science education has incredible competition for student attention
- Science education reform is slow and cumbersome
- Resources are, or are perceived as, unavailable
Educator/Scientist Partnerships

• Science teachers often have 6 courses or less in their disciplines
• Scientists often do not translate their expertise well

• Can partnerships enhance student opportunities to learn, potentially leading to a more scientifically literate populace, more students enrolling science degree programs, and ultimately better chances for discovery?
Astrobiology is ripe for collaboration

• K-4: Many US schools do not allow time for students to do science
  – Teachers are not trained but students are interested
  – Science is offered in “informal” venues at museums, science centers, and youth clubs

• 5-8: Interdisciplinary science courses make the grade
  – Teachers have very little, if any, science background but astrobiology offers questions which do not need discipline-based approaches
Astrobiology is ripe for collaboration

• 9-12: Discipline-based science courses leave students unprepared for the future world of science where expertise must be shared to get answers to “big” questions
  – Students can access data & work on real inquiry
  – Teachers need engaging ideas to attract student interest (astrobiology & Star Trek are related, right?)

• 12+: Astrobiology offers opportunities to discover answers to human questions
  – Scientists claim the opportunity to grow & learn as the big draw to the field.
Collaboration Makes Sense

• Scientists involvement should improve science education
• Required by some funding sources
• Helps build societal recognition of importance of science (leading to crucial dollars for support)
• Brings future collaborators and researchers who will make the new discoveries
The Steps

• Contact between potential partners
• Identifying reasonable targets (assessing needs)
• Discussing expectations and outcomes
  – Incorporating cultural/linguistic (both personal and professional) differences
• Developing plans
• Garnering commitment
• Evaluating progress
• Tweaking targets
Outcomes

• Expected outcomes must be achievable while allowing for growth
• Failure is a must
• Outcomes must be measurable (by more than standardized tests?)
NAI’s EPO Collaborations

• Organizational through co-funding projects
  – SETI’s VTT
  – Astro-Venture

• Programmatic
  – Lead Team EPOs
  – Cross-team Projects

• Cross-Discipline
  – Teacher Workshops
  – Direct Involvement

Images courtesy of (clockwise): SETI, NASA Ames, National Science Teachers’ Association, JSC, ASU, PSU, MBL
NAI’s EPO Collaborations: Web-based

- **Ask An Astrobiologist** connects users to researchers via astrobiology questions.
- Career questions led to **Astrobiology Pathfinder**—students can find out more about opportunities and courses as well as read/view profiles of current astrobiologists.

http://nai.arc.nasa.gov
NAI's EPO Collaborations: Web-based

- UW plans to create a "ProjectAstroBio" based on Project Astro model

- QUEST, online projects including webcasts, videos, classroom activities, and archives
  - science projects and role modeling
  http://quest.arc.nasa.gov
Summary: Important Action Steps - NAI EPO

Key: □ = Currently working on it
√ = Almost accomplished
! = Way behind targets

□ Develop cultural awareness
✓ Build consensus for choices
□ Identify best practices
! Master the social skills
✓ Master the technical skills
! Conduct regular evaluation
Where do you fit in?