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Information Management Committee: GIS, Technology, and Changing Organizational Structures

- Nicole Kaplan (SGS), Corinna Gries (CAP), Karen Baker (CCE & PAL), Don Henshaw (AND), Theresa Valentine (AND) and John Vande Castle (LNO)

Recently, the LTER Network Office (LNO), the Information Management Committee, GIS working group, LTER Technology Committee, and LTER Executive Board (EB) explored the potential for broadening the focus of the IMC to include the activities of two other groups, the GIS/RS working group and the Technology Committee. This was driven by several factors including the considerable overlap of focus and participants among committees, the availability of resources for face to face meetings, new video conferencing tools, recent dips in activity in several committees, and the perception that the different committees were working independently rather than interactively. The discussion considered that this broader committee focus would better allow for achievement of integrative science as put forth in the ISSE (Integrative Science for Society and Environment, A Strategic Research Plan), and allow for coordination of activities across these groups. The suggestions generated a lively discussion across the community of information managers, GIS and IT professionals considering governance structures, group identities and improvement of collaboration among the diverse specialists.

Although the scope of this article is not the history of LTER information management, we will give some background information on the different groups of interest before discussing the new challenges and opportunities we are facing. LTER Data Management has a long and interesting history which can be explored in reports from workshops and meetings dating back to 1988 (see Shugart 1988, Gosz 1989, Foster and Boose 1991). Reviewing these documents provides insight into how information management and the implementation of new technologies have developed to meet the needs of diverse ecological research projects. The digital arena was informed by many early works including research in Scandinavia on information systems (Langefors, 1973) and in the US on computer systems (Friedman, 1989; see Good Read this issue). By the late twentieth century, professional opportunities were being identified for work with data and information. Research Information Management (RIM) was becoming recognized as a scientific discipline with curricula at the BS, MS and PH.D level combining biology and ecology with computer science. (Andrews et al. 1992; Abbott 1988). Reviewing the old reports reveals how within the LTER system, working groups organized around specific information technology related subjects. Early on these committees were formed ad hoc and with changing membership according to the subject under consideration until LTER implemented greater formalization for some committees (LTER 1994).

After a phase of organization that started in the early 1980's and continued with the establishment of regular annual meetings, the information managers developed a vision statement (LTER 1995, 2001) and were recognized as a standing network-wide Information Management Committee (IMC) by the Scientific Steering Committee of the LTER network. All LTER Standing Committees provide regular reports and recommendations to the LTER Network Science Board. By the late 1980's a minimum standard installation for sites was under discussion which developed into the establishment of a working group to design and develop the Network Information System (NIS; Baker et al 2000). This working group developed a framework for cross-site modules including the personnel directory, publication bibliography, site description directory, and site climate database. In addition to addressing committee organization, data sharing, metadata, and communication issues, the committee worked to establish the Network Information Advisory Committee as a forum for dialogue about research needs and information management.

In conjunction with the growing role for technology within a distributed network such as the LTER, a Technology Committee self organized and was established as a standing committee in the 1990's to provide leadership on applications of technology within the LTER Network and to seek out new technologies that would advance ecological science. The Committee considers existing and emergent technologies and attempts to define new measurement needs where no applicable technology exists. A list of recommendations was developed, many of which have been implemented over the last few years, including direct internet connectivity at LTER research sites, training in, adoption and deployment of wireless communication and data transmission with various sensor deployment by a number of LTER sites, and important computer infrastructure for support of LTER Information System implementation. The Technology Committee initiated registration of all sites for high resolution reconnaissance data with the Global Fiducial Program and gathered new information related to MODIS time series data, more regular photographic surveys from the International Space Station, and LIDAR data for LTER sites.

Another group, focusing on Geographical Information Systems (GIS) was developing throughout the 1990's. GIS technologies, including Global Positioning Systems (GPS) became available to some sites. At annual workshops and meetings GIS software and hardware were demonstrated and GIS data requests continued to increase at a steady pace. A Network GIS/RS lab was made available for ecologists to perform analysis on different LTER sites using satellite imagery and training workshops were organized. GIS coverage and access to GIS data grew (Adams et al. 1995). The IMC recognized the importance of spatial data with respect to information management activities and hosted a one-day geospatial data symposium in Seattle in 1994 inviting speakers to the annual meeting. GIS professionals across the network met several times and reported GIS issues related to LTER Network Information System development to the IMC. It was recognized early on that in the area of data management the IMC and GIS working group had similar needs and problems. However, the groups were not working together enough for sharing ideas, solutions, and development costs (Valentine 2002).

This brief excurse into the development of Information Management and Technology at LTER shows the degree of overlap in focus of the three committees. However, it also makes clear that increasingly expert knowledge in the areas becomes essential for successfully meeting future challenges. Accordingly, in meeting the challenge to better integrate efforts we are considering the proposal to add members from the GIS/RS and technology leadership to the Information Manager's steering committee (IMExec) and expand the next annual IMC meeting to include representatives from the other two committees. One focus of the meeting will be GIS/RS data management. At the meeting discussions will take place regarding structures for efficient communication among the now larger number of participants, meeting venues to associate with groups other than the ESA, increased exposure of LTER IM to the different science disciplines and collaboration with LTER scientists.

The 20-year NSF review of LTER (NSF 2002) brought greater attention to the need for synthetic activities; the LTER community designated the third

LTER decade as the “Decade of Synthesis”. The information management community is now challenged with supporting cross-site and synthetic research and integrating diverse datasets over various platforms. Accordingly, there is a strong interest to coordinate existing and advanced technologies across LTER sites and a need to develop common approaches to integrating and analyzing new and traditional types of information holdings. The management of a variety of data types – from field study data to GIS and remote sensing data as well as, but not limited to, streaming sensor, high volume analytical instrument outputs, and social science data - will continue to play an important role in cross-site, regional, and global data synthesis and analysis.

In the coming years, the members of the broader Information Management community will be challenged to design practices and cyberinfrastructure to incorporate and integrate new data and technologies. Our community has already been successful in collaborating as members of interdisciplinary teams and bridging across interdependent science, data and technology issues. The expansion of IMC responsibilities to include spatial data issues and sensor technologies will demand better planning and communication with other informatics and science disciplines. New joint efforts will create opportunities to foster communication across fields related to data as well as to actively develop new collaborative approaches to information management and infrastructure building (Baker and Millerand, 2007) as concepts, strategies, technologies, and research questions are identified, formulated, and then change.

References:

Abbott, A. 1988. The System of Professions: An Essay on the division of expert labor. The Univ of Chicago Press, Chicago.

Andrews, M., K. Baker, B. Benson, E. Boose, J. Brunt, C. Bledsoe, J. Briggs, G. Calabria, A. El Haddi, D. Henshaw, R. Ingersoll, T. Kirchner, M. Klingensmith, L. Krievs, J. Laundre, R. Lent, E. Melendez, W. Michener, B. Nolen, R. Nottrott, J. Porter, S. Stafford, C. Veen. 1992. Proceedings of the 1992 LTER Data Management Workshop.
(http://intranet.lternet.edu/modules.php?name=UpDownload&req=viewsdownload&sid=6&min=10&orderby=dateD&show=10)

Adams, P., K. Baker, B. Benson, D. Blodgett, J. Briggs, C. Bristow, J. Brunt, G. Calabria, H. Chinn, D. Chang, M. Easter, J. Gosz, M. Hartman, J.Hastings, B. Hayden, D. Henshaw, R. Ingersoll, T. Kirchner, K. LaFleur, R. Lent, E. Melendez, B. Nolen, R. Nottrott, J. Porter, S. Stafford, M. Tomecek, J. Vande Castle, C. Veen. 1995. Proceedings of the 1995 LTER Data Management Workshop.
(http://intranet.lternet.edu/modules.php?name=UpDownload&req=viewsdownload&sid=6&min=10&orderby=dateD&show=10)

Baker, K.S., B. Benson, D.L. Henshaw, D. Blodgett, J. Porter and S.G. Stafford, Evolution of a Multi-Site Network Information System: the LTER Information Management Paradigm, BioScience 50(11):963-983, 2000.

Baker, K.S. and F. Millerand. 2007. Articulation Work Supporting Information Infrastructure Design: Coordination, Categorization, and Assessment in Practice. Proceedings of the 40 th Hawaii International Conference on System Science. Pp 1530 – 1605.
http://cce.lternet.edu/docs/bibliography/026ccelter.pdf

Foster and Boose 1991. Technology Development in the LTER Network:
http://intranet.lternet.edu/archives/documents/reports/Technology-reports/techdev1991.html

Geospatial data symposium in Seattle 1994 report:
http://intranet.lternet.edu/archives/documents/reports/committee_reports/Data-management-committee/1994-DM-committee-report/im_1994_report.pdf

Gosz et al. 1989. LTER Technology Report for the LTER Strategic Plan:
http://intranet.lternet.edu/archives/documents/reports/Technology-reports/goszrpt.html

LTER 1994 Fall Coordinating Committee Meeting Minutes: http://intranet.lternet.edu/modules.php?name=UpDownload&req=viewsdownload&sid=1

LTER 1995 Data Management Workshop:
http://intranet.lternet.edu/archives/documents/reports/committee_reports/Data-management-committee/1995-DM-committee-report/im_1995_report.htm

LTER 2001 Ecoinformatics Vision Statement: http://intranet.lternet.edu/archives/documents/vision_statements/ECOINFORMATICS.htm

LTER Intranet 2006. LTER Intranet webpage: http://intranet.lternet.edu/

Michener and Stafford, 1988. Report to LTER Coordinating Committee: ’Summary of LTER Data Managers’ Workshop:
http://intranet.lternet.edu/archives/documents/reports/committee_reports/Data-management-committee/1988-DM-committee-report/1988DMreport.pdf

NSF 2002 20-year review of LTER report: http://intranet.lternet.edu/archives/documents/reports/20_yr_review/

Shugart et al. 1988. Report Of The NSF Advisory Committee On Scientific And Technological Planning For Long-Term Ecological Research Projects:
http://intranet.lternet.edu/archives/documents/reports/Technology-reports/Shugart/shugart.htm

Valentine, T. 2002. LTER GIS Meeting Summary. http://www.lternet.edu/technology/ltergis/working_group1/index.html