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Using Library and Information technologies and Resources to Support Sustainability Projects

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Abstract:

This is a case study about how libraries and librarians participate in a sustainability research project, and use Library and Information technologies and Resources to support the project. The Research Coordination Network for Climate, Energy, Environment and Engagement in Semiarid Regions (RCN CE^{3}SAR) – is a NSF funded South Texas sustainability project. RCN CE^{3}SAR's goal is to develop an innovative model for conducting interdisciplinary, region-specific, sustainability research closely tied to the needs of highly-engaged local stakeholders. A project librarian collaborates with Texas Digital Library and Mary and Jeff Bell Library provides services to RCN CE^{3}SAR project from the following aspects.

1. Building an innovative information platform to support the collaboration and outreach for RCN CE^{3}SAR network institutions and members. The platform integrated serials of information technologies such as project web presence, project management system, digital repository, virtual communication system, conference management system, and wiki. 2. Supporting sustainability research by data management, bibliography, and information retrieval services.3. Supporting sustainability education by developing a learning object repository to manage and provide open access to sustainability learning objects produced via the project. 4. Promoting sustainability practices. For example, providing technology support for using WebEx as an online conference tool for RCN CE^{3}SAR meetings so that to reduce gas emissions from transportation; using "Save A Tree" as a slogan to encourage RCN CE^{3}SAR institutions and members to save and recycle papers; and advertising campus sustainability innovations and practices.

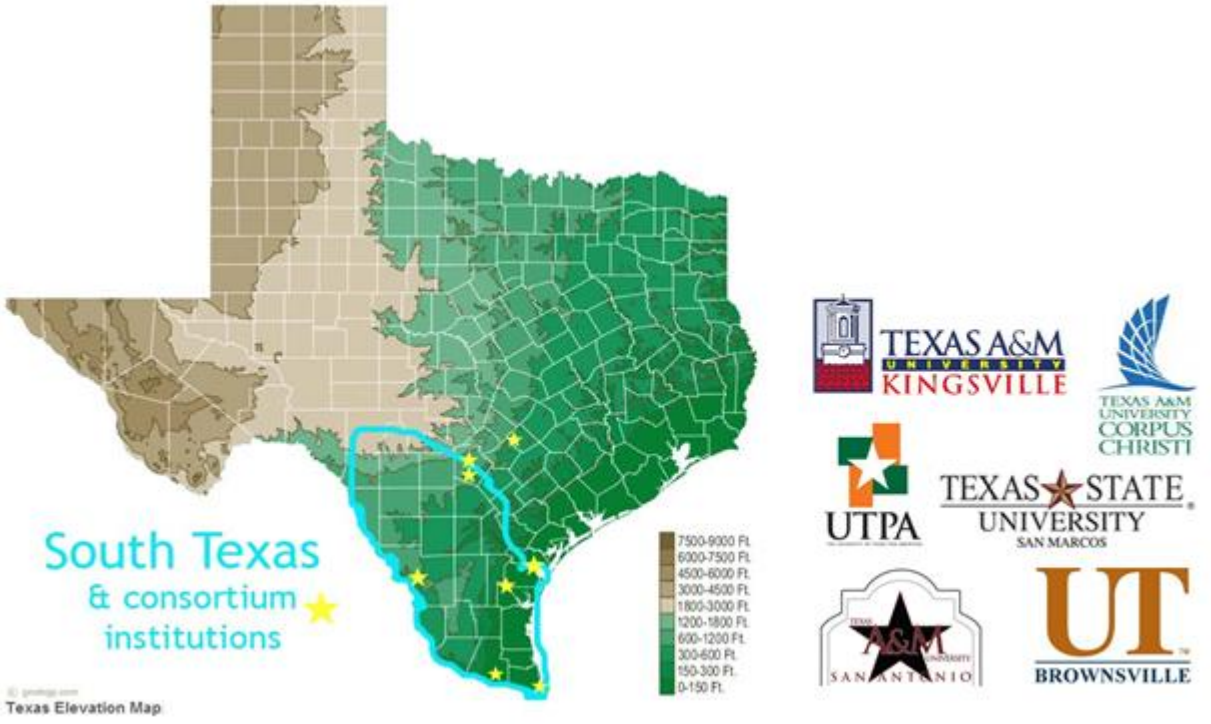
Keywords: digital library, institutional repository, green library, research network, sustainability.

Introduction

A library or librarian may play an important role in environmental sustainability, not only by applying sustainability practices in the library itself, but also by using information technologies and library resources to support sustainability projects. This study uses a case study method to explore how a librarian directly participates in and provides services to a sustainability research project, the Research Coordination Network – Climate, Energy,

Environment and Engagement in Semiarid Regions (RCN CE^{3}SAR). The main purpose of RCN CE^{3}SAR is to develop an innovative model for conducting interdisciplinary, region-specific, sustainability research closely tied to the needs of highly-engaged local stakeholders. RCN CE^{3}SAR tries to build a research network in South Texas that aggregates regional research capacities specific to sustainability in semiarid climates contiguous to the Gulf of Mexico while leveraging research expertise from outside the region (RCN CE^{3}SAR Website, 2012).

The network is led by Texas A&M University-Corpus Christi, in partnership with Texas A&M-Kingsville, Texas A&M International University, University of Texas-Brownsville, University of Texas-Pan American , and Texas State University, all Hispanic-serving or minority-serving institutions. Partners bringing expertise to the network from outside the region include the Southwest Research Institute in San Antonio and Texas A&M University in College Station. The participators are researchers, stakeholders, and faculty members. Picture 1 shows RCN CE^{3}SAR network institutions.



Picture 1: RCN CE^{3}SAR network institutions and South Texas

The overarching goal of the RCN CE^{3}SAR is to form a robust research, educational and engagement network of regional universities and research centers and institutes focusing on the use of sustainability science to meet the regional needs of South Texas.

In order to achieve the goal, the RCN CE^{3}SAR collaborates with the library at Texas A&M University – Corpus Christi (TAMUCC). They hired a project librarian to directly participate in the project for supporting the RCN CE^{3}SAR by Library and Information technologies and Resources

Information needs

As a sustainability project, the RCN CE^{3}SAR has unique information needs. The key for providing good library and information services is to identify the project's information needs.

The project librarian interviewed 15 RCN CE^{3}SAR members who are RCN CE^{3}SAR steering committees, principle investigators, faculty, or researchers. Based on the interview results and the goals of RCN CE^{3}SAR, the project librarian identified serials of information needs, which are listed as the following.

- Project presence: Full-featured website to present the project, announce news and events.
- Scholarly Communication: A way to communicate with the project participants, such as conferences.
- Management tools: A tool to exchange ideas among the project participants and manage sub-projects.
- Institutional repository/learning object repository: Preserving data and learning objects, and disseminating scholarly works.
- Information retrieval: Locating sustainability information to support research and teaching.
- Bibliography service: Editing sustainability bibliography to support research.
- Feedback: Collecting feedbacks from RCN CE^{3}SAR members by surveys to improve the function of the project.

According to the information needs, the librarian surveyed existing library and information resources and services and then decided to collaborate with Texas Digital Library (TDL) and Mary and Jeff Bell library (TAMUCC library) to support the RCN CE^{3}SAR project.

TDL is a consortium of higher education institutions in Texas that provides services in support of research and teaching. From 2005, TDL has supplied research tools and services to faculty and students across multiple universities in Texas. Many of the tools and services necessary to facilitate research collaboration and teaching have been investigated by TDL, or are already in place, such as website, wikis, data management services, etc. (Texas Digital Library, 2016). The experience of TDL in supporting research and teaching is valuable to the project, so TDL is a good choice to meet the information needs of RCN CE^{3}SAR project.

TAMUCC Library has a mission to support research, teaching, and study. The Library houses a collection of printed materials and also provides electronic access to thousands of electronic journals, newspapers, data bases, and other library resources. Strong media collections and special collections of South Texas provide a strong support for faculty and researchers to conduct research and educate students on sustainability in South Texas (Texas A&M University-Corpus Christi, 2016).

Based on TDL and the Library's information technologies and resources, the librarian developed the strategy to provide the following services.

- Building an innovative information platform.
- Supporting sustainability research.
- Supporting sustainability education.
- Promoting sustainability practices.

Building an innovative information platform

The main goal of RCN CE^{3}SAR is to form a robust network for research, educational and engagement. The expected outcomes of the network are the following:

- To communicate with network institutions and members and the public;
- To coordinate research efforts across disciplinary and institutional domains;
- To engage new researchers in the network;
- To provide training and education for students on sustainability areas.

The outcomes are expected to be achieved via an innovative information platform. The platform integrated serials of information technologies and services such as project web presence, project management system, digital repository, virtual communication system, conference management system, wiki, and survey tool. Picture 2 shows the information platform.

- Project Presence: The project uses full-featured website to present the project, announce news and events. The website is also a portal to access other technologies and resources. The RCN CE^{3}SAR website was built by the web software, WordPress.
- Scholarly Communication: Research products of the project need to be shared through scholarly communication, such as conferences. The platform uses the Open Conference Management System, provided by TDL, to organize and manage conferences and workshops organized by RCN CE^{3}SAR. TAMUCC information technology development provides online meeting software, WebEx, for faculty and researchers meeting online. Take the advantage of this service, WebEx becomes the main online meeting tool for RCN CE^{3}SAR members. Before July 2013, we also used the TDL's Media Wiki service for RCN CE^{3}SAR members to collaborate in scholarly production. Now we mainly use the project management tool for collaboration. We also edit and disseminate monthly newsletter to share latest news and events with the network members.
- Project Management Tool: The project participants exchange ideas and develop sub-projects through engagement and collaboration. There is a need for project management and collaboration. Redmine is a web-based project management tool. It manages multiple projects by wiki, issues, forums, progress charts, calendar, and email notification (Lang, 2006). TAMUCC information technology department provides technology support for Redmine installation.
- Institutional Repository: RCN CE^{3}SAR Repository is built on an open source software platform, DSpace. The repository collects, preserves, and distributes digital data and scholarly works related to or produced by RCN CE^{3}SAR.
- Information Retrieval: The librarian locates learning objects to support course development, uses In4grant application to retrieve grant opportunities to support research, and uses Google News to retrieve and share latest sustainability news with RCN CE^{3}SAR members.
- Bibliography Service: Using TAMUCC Library recourses to edit sustainability bibliography to support research and teaching.
- Feedback: We use LimeSurvey, open source survey software, to collect opinions from RCN CE^{3}SAR members so that to improve the events and activities of the project. The LimeSurvey application is provided by Texas Center for Digital Knowledge (TXCDK).

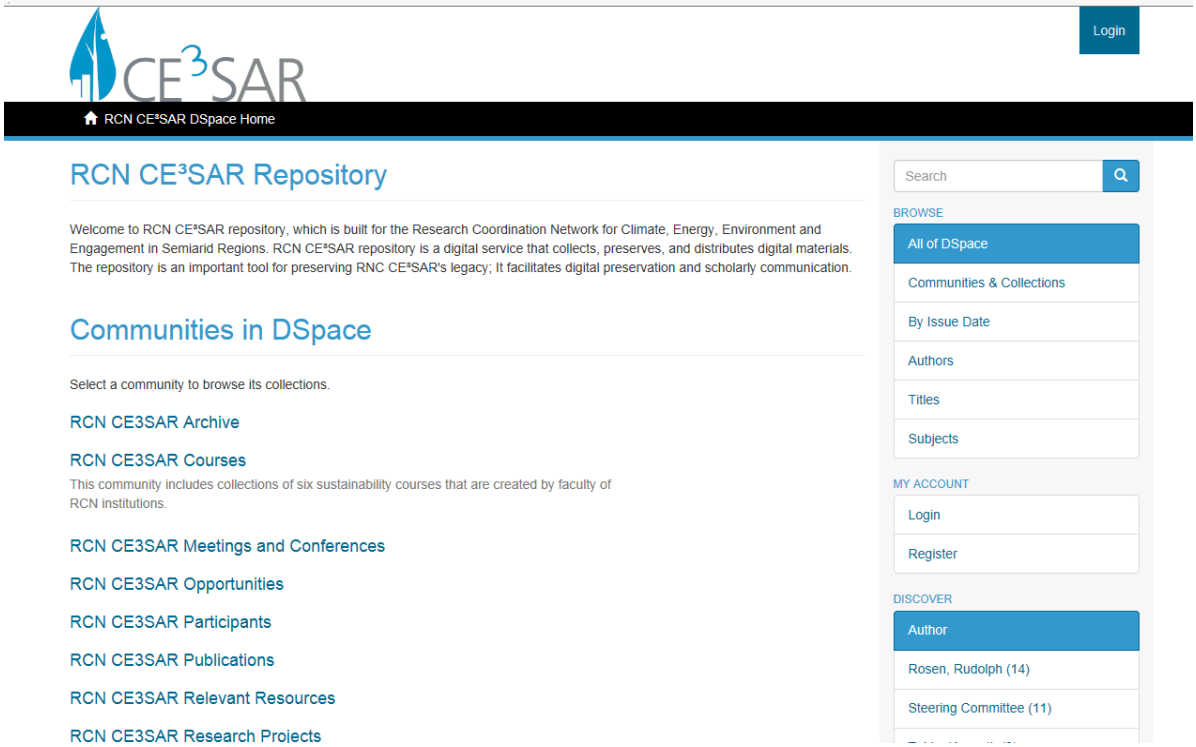
The RCN CE^{3}SAR information platform innovatively integrated serials of information technologies and services. Because of the innovation information service, The RCN CE^{3}SAR information platform obtained the Excellence Award for Innovation in Digital Libraries, issued by TDL in 2013.

Picture 2. RCN CE^{3}SAR Information platform

Supporting sustainability research

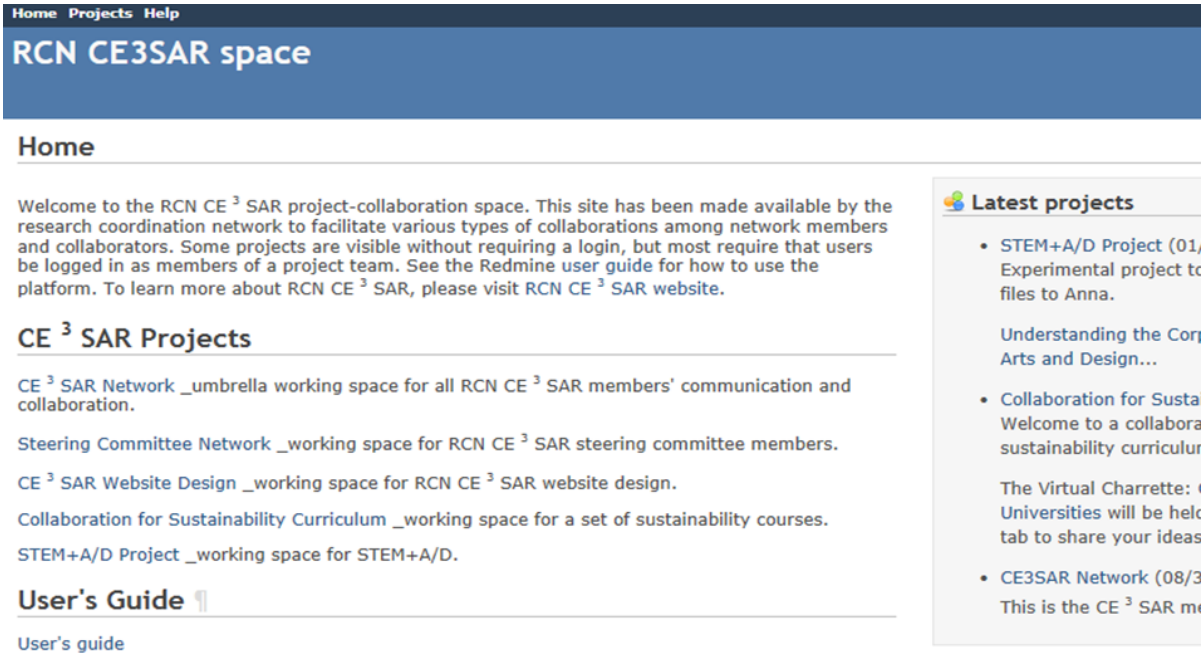
As a NSF project, a data management plan is indispensable for RCN CE^{3}SAR. The NSF requires "proposals submitted or due on or after January 18, 2011, must include a supplementary document of no more than two pages labeled 'Data Management Plan'" (National Science Foundation, 2014). A data management plan describes data, gathered for or resulted from a study or project, to be "organized, preserved, and shared and which procedures are needed to access and use them" (University of Nebraska-Lincoln Libraries, 2014). According to a study (Vines et al., 2014), 90% of raw data for 20-year-old studies cannot be found due to poor data management. Therefore, a good data management plan is very important for RCN CE^{3}SAR project. It ensures the data resulted from the project to be preserved properly and to be disseminated and accessed by the both network members and future users. TAMUCC library and the project librarian designed the data management plan for RCN CE^{3}SAR project. The librarian conducts the data management for the project and TDL provides RCN CE^{3}SAR Repository service to archive the project data management. The RCN CE^{3}SAR data management is mainly performed via RCN CE^{3}SAR Repository. Picture 3 shows the data organization in RCN CE^{3}SAR Repository.

RCN CE^{3}SAR Repository is built on an open source software platform, DSpace. TDL provides technology support for DSpace installation and maintenance. The repository collects, preserves, and distributes data related to or produced by RCN CE^{3}SAR. These data include research data, conference and activity documents, courses materials or learning objects, and scholarly works produced through the project. The individual members of RCN CE^{3}SAR institutions have full rights to access the results of research projects that emerge from collaborations developed through the network. Participants are also expected to share results and data with other network participants. The repository supports open access to research data, learning objects, and most scholarly works of the project by internet users. For certain materials, we use authorization control to protect security access.



Picture 3. RCN CE^{3}SAR Repository

We also use RCN CE^{3}SAR Space to facilitate collaboration on research among the network members. The RCN CE^{3}SAR Space is a project management tool for the project members, which is built on Redmine, an open source software package. This service has been made available by the research coordination network to facilitate various types of collaborations among network members and collaborators. Picture 4 shows the RCN CE^{3}SAR Space for collaboration.



Picture 4. RCN CE^{3}SAR Space

RCN CE[3]SAR Space supports sub-projects management and facilitates the project members' communication, working together on proposals and papers, working process control, task management, etc. We have successfully managed several sub-projects and activities via the Space, such as CE[3]SAR website design, collaboration for sustainability curriculum, and STEM+A/D conference.

Supporting sustainability education

One important goal of the RCN CE[3]SAR project is to develop sustainability courses and course modules to be shared across the network. These online materials will allow continuous updating of materials online to reflect the evolving nature of sustainability science and the specifics of that science to the South Texas region and its students. According to a survey result of sustainability course interests from faculty of the CE[3]SAR network, faculty are very interested in curriculum they can incorporate into their courses and somewhat less interested in building a full courses to be offered elsewhere. Based on this need, the project librarian introduced the concepts of learning objects and learning object repositories to the network faculty.

A learning object (LO) is "any digital resource that can be reused to support learning" (Wiley, 2000, p.) An LO is in digital format and reusable, and has instructional value (Xu, 2011). It fits the need of the network faculty for sustainability education. A Learning Object Repository (LOR) is a digital collection of learning objects, and it stores, manages, and makes accessible not only LOs but also associated metadata (Matkin, 2002). An LOR may effectively facilitate faculty using LOs. RCN CE[3]SAR Repository has the function of an LOR, in which the LOs developed via the project are deposited.

In order to promote the sustainability LOs development, the project librarian conducted a research on the usability of LOs and LORs in 2013. The librarian interviewed 10 instructional designers and 16 faculty who are interested in teaching or designing sustainability courses from 4 network universities. These universities use Blackboard, Sakai, or Angle as the learning management system. The results of the interview show both instructional designers and faculty are confident in combining LOs in a course or managing LOs via Blackboard, Sakai, or Angel. The instructional designers would like to help faculty using LOs and LORs. The librarian also identified several faculty who are interested in sustainability LOs development.

The RCN CE[3]SAR steering committee accepted the proposal of the librarian on LOs development and appointed the librarian to coordinate the sustainability course (LOs) development. The LOs focus sustainability issues such as water, energy, air quality, oil spill prevention, and environment. These LOs are in various formats, such as webpages, images, PowerPoint slides, animations, video and audio clips, etc. The LOs are preserved in the RCN CE[3]SAR courses community (https://rcn-ir.tdl.org/tamucc-ir/handle/123456789/11) at the RCN CE[3]SAR Repository that serves also as RCN CE[3]SAR LOR. The LOR's streaming service greatly facilitates faculty using video LOs. The LOR uses two Dublin Core (DC) metadata terms, dcterms: audience and dcterms: extent, to describe the LOs' end user role and typical learning time besides the default DC metadata elements in the DSpace. The LOs can be searched by titles, authors, and subjects. The subjects are indexed by keywords.

A serial of sustainability courses will be built up on the LOs, which will be team taught by faculty from the applicable disciplines and made available to CE[3]SAR participating institutions, and will form the basis of a certificate program on sustainability. The LOs may also be reused by faculty in any discipline courses for sustainability education.

Supporting sustainability practices

As a sustainability project, we make every effort to promote the good sustainability practices. In order to reduce gas emissions from transportation we use WebEx for virtual meetings. The WebEx is an online communication tool. It supports online meetings, whiteboard working, screen sharing, and virtual conferences (Cisco Website, 2016). TAMUCC provides WebEx services for faculty, staff, and students. Taking this advantage, we use WebEx as our main online communicate method. The WebEx works very well for virtual communication. For example, we conducted a virtual conference in 2013. The conference had 5 sessions and started at the same time. About 30 attendees from 7 universities join the virtual meeting online rather than driving or flying. The attendees highly evaluated the WebEx functions for virtual conferences.

In order to build a sustainable environment, we use "Save A Tree" as a slogan to encourage RCN CE^{3}SAR institutions and members to save and recycle papers. When we conduct onsite meetings, we use printed agenda as little as possible. Before meetings we post agendas on website or attach agendas with emails.

We join the Texas Regional Alliance for Campus Sustainability, and share the good sustainability practices of other campuses with the RCN CE^{3}SAR members via newsletters and website posting. The TAMUCC Library is a public area visited by most students. We put flyers for sustainable activities on the advertisement board in library to encourage students to attend these activities, for example, the oyster recycling program, etc. Through the sustainability good practices promotion, RCN CE^{3}SAR members are educated and involved in suitability practices.

Conclusion

RCN CE^{3}SAR project is a case that shows librarians and libraries may play important roles in sustainability projects. They can directly participant in sustainability research and education. Librarians are information professionals. They may provide consultation on latest information technology, data management, open access, and digital repository services. Libraries have rich information resources that may be used to support sustainability research and education. Librarians may also act as ambassadors for promoting sustainability good practices and preforming sustainability education to the public.

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