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Learning and engaging the information values of a Karst community of practice.

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Title: Learning and Engaging the Information Values of a Karst Community of Practice

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Abstract:

The Communities of Practice model is an innovative means to explore a local knowledge community and how informal practitioners contribute to karst science. By exploring the information values, this article strategizes how the Karst Information Portal can promote trust, engagement, and expand the scientific understanding and protection of karst environments.

Keywords: *Communities of Practice, Karst, Caves, Information Portals, Florida*

Article:

The Karst Information Portal (KIP)[1] is a publicly-accessible Internet portal for karst literature and data, hosted by the University of South Florida (USF) libraries. It was created to foster interaction and collaboration among the karst community by identifying, acquiring, and facilitating access to karst literature in a single, centralized location. Karst is a type of terrain typified by soluble rocks, such as limestone, gypsum, and dolomite, where solutional processes are dominant, forming sinkholes, depressions, caves, and enhancing underground drainage. The karst community consists of formal researchers working in academic or governmental institutions along with an informal cohort of recreational caving enthusiasts. Both halves of this professional and recreational community seek to explore caves and broaden our understanding of this environment; accordingly, both the formal researchers and informal cavers have something unique to contribute to the growing understanding of karst environments. The Communities of Practice (CoPs) model is a valuable means to assess knowledge development, sharing, and management among an informal association of individuals. In this article, we explore the variety of karst data and knowledge collected and organized by the recreational cavers in West Central Florida. By exploring the competing information values surrounding karst information, this article proposes strategies for the Karst Information Portal to promote trust, community engagement, and expand our scientific understanding and protection of karst environments.

Communities of Practice

Bound together by a shared passion and expertise, the concept of Communities of Practice (CoPs) describes an informal web of relationships that facilitates learning through social interaction, knowledge sharing, problem solving, information production, and the development of innovative techniques.[2] The notion of “practice” connotes the endeavor, within a historical

and social context. In this context, the activity acquires meaning thereby defining membership, the proper methods to conduct the activity, what information should be collected, and how it should be communicated.

Over time a CoP will develop a shared set of resources such as the methods and tools to conduct the activity.[3] Through the cooperative use of these resources, the CoP can promote creativity, improve its practices, create innovative techniques, and expand their knowledge base. Repositories of information are created when the CoP requires a more formalized system to manage, share, and build upon the methods and knowledge surrounding their shared activity.[4]

CoPs are valuable for their ability to manage knowledge assets, but also for their utility[5]. Organizations value their ability to save time and money, expand the knowledge base, develop standardization of practices, and create innovative solutions to problems. Members of a CoP receive short term benefits by getting help with their activities, receiving guidance from a variety of perspectives, and receiving community support for their risk taking. In the long term, the members of CoPs develop greater expertise while staying abreast of the latest developments surrounding their activity.

The Karst Information Portal

Karst science faces information-related challenges that are not commonly found in other scientific disciplines. While karst-related research regularly appears in the peer-reviewed journals read by practitioners of these disciplines, examination of raw karst data often requires scouring difficult-to-find gray literature sources. As with any other scientific field, the advancement of karst science is tied directly to access to existing karst-specific data and knowledge. Examples of important forms of knowledge in karst science include articles published in academic journals, unpublished government or technical reports, cavers' maps and

notes, or oral histories. Except for published journal articles, which are relatively easy to acquire, much of the existing body of karst-related knowledge is stored in various locations all over the world, and can be notoriously difficult to acquire; in particular, important and unique cave data are often controlled by amateur speleological clubs that may lack the resources or the inclination to make that data available to the wider karst community. Integrating and linking these information sources with the broader karst community is the first step in learning to address karst-related environmental issues without significant duplication of effort among researchers.

It was with this goal in mind that the Karst Information Portal (KIP) was developed. KIP is in the process of locating and acquiring karst-related content,that have historically proved to be difficult for researchers to find. KIP was conceived in 2005 and rolled out two years later, in mid-2007, as a partnership between the International Union of Speleology, National Cave and Karst Research Institute, University of New Mexico, and University of South Florida. The project's goal was to promote integration of karst knowledge through the creation of a comprehensive, community-driven centralized knowledge repository. This repository includes gray literature, raw data, and published journal articles. KIP combines features of a web portal (i.e., it provides connections and links to information and data available elsewhere on the World Wide Web) and a traditional database (i.e., it stores some data locally, which can then be searched and retrieved by users). By collecting this material together in a single space on the Internet, KIP both facilitates and guarantees long-term access to these resources. This is especially useful in instances where resources that have previously been available only in hard copy form are converted to electronic format and uploaded to the portal.

KIP is a browser-based, platform-independent application powered by SQL databases. Navigation within the portal is conducted via a series of tabs, each providing access to a different content group, and is facilitated by static links in the footer. Users can conduct federated

searches of the entire portal, or conduct more focused searches within a particular section of the portal (i.e., the catalog, the forum, or news). Searches may also be refined based on geographic location, document type, language of resource, or the inclusion of specific terms based on UIS Speleological Subject Classifications. The information core of the KIP project is accessible via the ***Resources*** tab, which contains links to, and tools for, searching the entire KIP catalog. Users have direct access to current and archived content for several online karst-related peer reviewed publications, including *Speleogenesis*, *Journal of Cave and Karst Studies*, and *Acta Carsologica*.

The ***Community*** tab houses features that are intended to open lines of communication and build linkages between members of the cave and karst communities. For example, users can use the ***Forum*** to initiate and participate in conversation threads on karst-related topics. The Forum is open to all registered users of KIP. Users are strongly encouraged to register with KIP, and may do so in a matter of minutes via the portal's main page. While it is certainly possible to use KIP without registering, one is required to register in order to contribute to the collection and to participate in the community-based features of the portal. KIP managers consider the portal's collaborative and community-building aspects to be among its most important features; as more and more users register, these features will become more robust.

Methodology

Through qualitative, in-depth interviews, 14 key informants within the local West Central Florida karst CoP were interviewed with regard to their data collection, knowledge sharing, and their awareness and prospective use of the KIP. These key informants were recreational cavers knowledgeable and experienced with caves in West Central Florida and were active in creating, collecting, archiving, or controlling karst related information. In addition, several informants' professional lives involved karst; participants included a biologist, a geologist, a county planning

manager, and university graduate students. Informants were interviewed in person and the interviews were recorded during the summer of 2007. These coincided with the initial public testing of the KIP, but preceded the formal public release. The interviewer also met or communicated (in person, through email, and phone) with several informants since their interview and has had ongoing discussions on Florida karst related events, the KIP, and information sharing. All interviews are unattributed to hide the identity of the informants.

West Central Florida's Karst Community of Practice

The karst community consists of two distinct components: professionals (i.e., scientists, researchers and academics) and amateurs (generally cave enthusiasts). Karst research is conducted in public settings like universities and government-funded institutes, as well as private organizations, such as insurance companies and environmental consulting firms. While it is the professional karst community that generates the bulk of the scientific knowledge of karst, cavers are often able to provide detailed field notes of karst sites that include maps and painstaking descriptions of caves.

The karst community is an active CoP with both formal and informal modes of organization. Caves are a fragile but dangerous environment.[6] Serious caving accidents occur throughout the United States. Caves can be a magnet for illicit activities. Cave environments are also easily disturbed by numerous visitors and individuals who enjoy destroying fragile formations or vandalizing the environment. As such, the knowledge of cave locations is carefully guarded throughout the United States. To limit disturbance, cave locations are exempt from the U.S. Freedom of Information Act and the National Speleological Society (NSS) discourages its members from publicizing or publishing cave locations.[7] On the local level, CoP

activities are fluid and informally structured. Many grottos (local NSS recreational caving groups) were formed as social clubs but also act as the organizational guardian of cave locations.

To the lay person, a caver is someone who goes into caves; however, to recreational enthusiasts a "caver" is defined as someone with a deep interest in caves who is willing to develop the techniques and attitudes that allow him or her to cave safely and sensitively without disturbing the cave environment.[8] By this definition, people who enter caves with the intent to vandalize are not considered cavers.[9] Cavers are also defined by their participation in the social activities of caving, such as being members of a local grotto or the National Speleological Society and actively caving and building up their karst knowledge and technical expertise.[10] Florida currently has four active grottos, the Central Florida Grotto (based in Orlando), the Flint River Grotto (Northern Florida Panhandle), the Florida Speleological Society (a former University of Florida Student Group in Gainesville), and the Tampa Bay Area Grotto. The Florida Cave Survey (FCS), a non-profit organization, is essentially a database of Florida cave locations and descriptions.

Caving offers individuals a variety of recreational experiences such as hiking, crawling, swimming, and photography. Several cavers described the thrill of exploring new places that potentially no human has ever entered[11] and the need to fill in the "knowledge gaps" about the unexplored underground environment.[12] Several informants concentrated on "ridge walking" and looking for "blowing air," meaning they regularly searched for new caves by feeling the ground for air coming out of the earth representing some sort of underground void.[13] Another informant said that he was primarily interested in exploring and mapping caves, trying to see how far a cave system could extend.[14] One caver liked conducting biological inventories of a particular karst area, both inside a cavern and above the cave system.[15] All of the cavers interviewed placed a great value on the exploration and study of the karst environment. What

follows in the next section, is a description of variety of local data collection and knowledge produced by recreational cavers in West Central Florida.

Karst Knowledge Collection and Development

Many cavers document their caving activities and trips through a variety of means. Some keep a database of the caves that they have visited; many others upload their photographs onto web photograph sharing sites such as Flickr. All four of the Florida grottos maintain their own websites and publish reports about fellow members' activities, trip reports, management plans, and other activities such as cave cleanups and gating. While all of these activities chronicle the social, recreational, and management caving activities, several key individuals have collected, produced, and organized more extensive information.

Many of the recreational cavers are active photographers, both amateur and professional. For example, one recreational caver[16] regularly photographs caves and grotto caving trips. As he developed into a cave conservation advocate, this caver increasingly began to share his photos in public forums such as local newspapers, county planning hearings, and the photo sharing website Flickr. Outside of her caving activities, another informant[17] is a professional photographer and has applied her skill to photographing caves in Florida and throughout the world for several decades.

Over several decades, an extensive private library of cave books, maps, photographs, articles, and technical reports has been amassed by a professional geologist[18] and active caver. As part of the recreational caving community, he has collected the maps, surveys, and inventories from his fellow cavers. As a professional geologist, he has kept all the reports from his karst consulting business, as well as collecting technical reports and scientific publications from his colleagues at the Florida Geological Survey, the United States Geological Survey, the

University of Florida, and the University of South Florida. For the past several years, he has been actively organizing this information in an Excel database and has been creating a pathfinder for every known cave in Florida. Every cave is coded and linked to all the documents that reference that cave.

Since retirement from his career as a professional biologist, the hobby of another informant[19] has been to conduct biological inventories of cave fauna such as crayfish, salamanders, and bats in several Florida state parks. With this data, he has created a personal biogeography database. While this work is his recreational activity, he also gathers his data for several formal organizations. For example, when he finds an unidentified species, he collects a sample and sends it to a taxonomist, cave crayfish and bat sightings are sent to the Florida Natural History Museum biogeography databases, and a copy of his cave maps are sent to the Florida Cave Survey.

Once organizations, such as local grottos, the National Speleological Society, cave conservation organizations, and state parks begin to actively manage their caves, one of the first projects is to create a management plan.[20] The management plan 1) describes the organization's cave related goals; 2) documents the caves history; 3) assesses its biological, geological, hydrological, paleontological, archeological, and historical resources; 4) develops an access policy; and 5) outlines a resource management plan for the cave and the land above. These cave management plans can range from a simple brochure, to a website, to a formal publication with annual reports to a conservation organization or to the park managers.[21]

Exploring and mapping caves is a key interest of several informants.[22] Cave maps are a popular gift to private landowners who allow the recreational cavers on their property. Citing the lure of more exploration, some cavers continually date and label their maps as "draft," hoping at some point that they can find new tunnels or caverns and expand the size of the cave.[23]

Publishing these maps in public forums like personal websites, Flickr, or in newspapers is generally discouraged. However, many of Florida's underwater caves (explored and mapped by cave divers) are openly available on the internet[24] and many recreational cavers send their maps of popular or newly discovered air filled caves to the NSS News.[25]

The Florida Cave Survey (FCS)[26] is a compendium of information on the location and character of caves and notable karst resources in Florida. The FCS is primarily for recreational purposes, and serves as a means for Florida's recreational cavers to share information among its members about cave locations and access issues. The key bits of information are the cave name, location (longitude and latitude, or a general description of how to get there), cave ownership (public, private), whether it is a wet or dry cave, the cave size (length, depth and map if available), access issues (is the cave gated or not, who has the gate key, do cavers need to sign a liability waiver), and notes on the characteristics of the cave (biological and geological features). The FCS has identified approximately 4000 air filled and underwater caves in Florida.[27] The biggest shortcoming of the FCS is the lack of consistent cave information.[28] For example, the cave entrance information could range from GPS coordinates to a vague description such as, "park at the end of the road, walk west for 30 minutes, and the cave entrance is on your left." The FCS members are attempting to improve the consistency in the cave names and descriptions and to that effect have adopted a standardized data key.

In 2004, the Florida Geological Survey began a project called the Florida Cave Database[29] to collect cave maps and make them compatible with other GIS-based hydrogeological databases. The purpose of the Florida Cave Database was to help the state agency monitor water quality and quantity as well as improving the state's planning and zoning activities. While a laudable goal, due to COP disputes that will be discussed in the following

section, this database remains incomplete, listing only 31 of Florida's underwater caves and has not been updated since 2004.[30]

Information Management Issues: Mistrust, Memory, and Competing Visions

Sharing and disseminating karst data and information is not as positively perceived by many members of the karst COP. As mentioned earlier, caves are fragile and may prove dangerous. In addition, most cavers are worried that land owners and cave managers will deny access because of concerns over liability should an accident occur. As such, cavers need to trust that others will be careful, not become claustrophobic, and have the technical expertise to crawl, twist, and otherwise maneuver through tight spaces. The cavers also need to trust that other cavers will take any scrapes and minor injuries in stride, and not threaten to sue the property owner, the cave manager, or their caving companions. Finally, caving frequently involves trespassing on private property, thus the size and timing of caving groups must be controlled in order to avoid drawing unwanted attention or scaring the landowners.

Several informants iterated that they only trust cavers that they know or with whome they have personally caved. This trust is developed through recognition of expertise and participation in cave related activities. Beyond the commercial caves or a few well known caves on public lands, individuals interested in caving need to contact a grotto to learn about cave locations. But grottos are very protective of their information and don't give out the cave locations easily.[31] Cave location information and invitations on caving trips are also carefully doled out to newer cavers. A manager[32] of several caves regularly denies access to people who had been on fewer than five caving trips; while a recent recreational caver[33] found that demonstrating concrete improvement in his caving ability was necessary before the more experienced grotto members would invite him to explore new caves on a regular basis.

While most of the cavers valued the importance of developing caving skills and expertise, many criticized the restrictive aspects of the relationship building process. Some individuals who approach the grottos or the Florida Cave Survey became very frustrated with the secrecy and control over cave location information.[34] Many of these individuals do not become grotto members. In addition, even grotto members can become frustrated with the membership vetting process. When a karst graduate student,[35] a member of grotto A tried to gain access to a cave managed by grotto B, the president of grotto B required him to be interviewed about his caving experience, the purpose of his caving request, and mandated that the graduate student attend grotto B's meetings, an inconvenient two-hour drive away. The graduate student circumvented this vetting process by asking a friend to ask another friend who was a member of Grotto B for the key to the cave gate. In another example, a grotto member[36] similarly circumvented the FCS's membership process by asking a member friend for cave location information, rather than waiting a year for the end of his FCS probationary period. Meanwhile a local karst researcher[37] was only able to do his research of caves throughout Florida because he caved with members of all the grottos without ever officially joining any single grotto. In this way, he avoided becoming identified with any one group. Thus, we can question how effective a COP is when it's lengthy and secretive initiation processes are easily and actively circumvented by many of the community practitioners.

Another problem faced by the COP is a lack of adequate institutional memory. As much of the community originally developed as an informal caving recreational and exploration society, all the CoPs members' efforts are voluntary. Hence, the interests and dedication of individuals can change over time; members move to new places, new activities, or new social groups; and the information they amassed can get lost. For example, the Florida Cave Survey began in 1964 and has since gone through four different versions.[38] Before the current version,

the FCS was created, recreated, and lost three times. The original FCS was a shoebox of index cards while the latest version is loaded in an Excel database and distributed to the membership on compact disks. Members can also access the FCS online through a password-secured database. While the grotto members and FCS are trying to increasingly formalize their activities, the lack of CoP consistent information management and institutional memory has hampered the exploration and study of Florida's karst environment.

Collective control over individually amassed cave information is also a sensitive topic. While some informants have great technical or scientific expertise, some of the individuals who control the information through the Florida Cave Survey do not.[39] Furthermore, while only a few members of the FCS actually generate new cave knowledge, other recreational cavers expect to have complete access and control over the information and dissemination process. Some of the most prolific CoP members were in greater favor of sharing cave related information with a broader audience and engaging interested individuals who were not directly part of the local recreational CoP. But these information creators also wanted recognition for their activities and greater control over the dissemination and use of their knowledge products.

The argument over whether to share the cave information with governmental officials or the general public highlights the competing visions over the future role of the CoP's collective information. As a means of addressing this lack of formalized community memory, members of the Florida Geological Survey[40] approached the Florida Cave Survey's executive members to discuss whether they could incorporate the FCS's cave maps and data into the new state database. This request divided the FCS members. Some informants argued that the FCS should remain as a recreational database and that the cave locations should be kept secret to all but the membership. While other FCS members[41] vehemently countered that public officials, scientists, and state environmental and planning agencies would greatly benefit by knowing the locations of

Florida's caves and sinkholes. Other recreational cavers, less concerned with the science, believed that all interested individuals should have the right to access caves, particularly those located on public lands.[42] All members of the community worried about the repercussions involving cave conservation and human safety if the FCS became publically available. Ultimately, the FCS decided against sharing their database due to worries about the Florida Sunshine Law and the ramifications of cave locations entering the public domain.

According to the Florida Sunshine Law,[43] every person has a Constitutional right to inspect or copy a public record at the state and local level. Public records are any materials made or received by a state or local agency and can consist of traditional written documents as well as other media such as photographs, film and sound recordings. Some exemptions to this law exist; for example, the Florida Legislature approved the exemption of archaeological sites. However, when the FCS and Florida Geological Survey approached the governor to gain exemption for cave sites similar to that of the archaeology sites, they were rebuffed. Consequently, all discussions transferring the FCS to the Florida Geological Survey have been shelved, until the Florida Governor and the legislature grant caves exemption status under the Florida Sunshine Law.

Discussion: Building a Bridge to the Karst Information Portal

Ultimately, the relationship between KIP and the West Central Florida caving CoP are characterized by inherent tensions between competing information values. Certainly the karst community benefits from the open distribution of karst information from a readily-accessible, centralized location. However, the very behavior it seeks to promote—the sharing of karst data and information—are directly tied to some of the challenges increasingly confronted by the CoP. The main question to the Karst Information Portal and this local community of practice is how to

diminish the tensions regarding the sharing of information to support public safety efforts, cave conservation, and promote the research of karst in Florida. While the KIP does not want to manage the karst CoP, it does want to fulfill the traditional role of libraries by preserving, storing, and organizing information, while expanding into the role of facilitating knowledge communities. This can be achieved by improving the trust, community engagement, and by establishing protocols for information sharing.

Trust is a critical component in getting buy-in from the caving CoP. As described previously in this paper, cavers have expressed reservations about publicizing cave locations. This secrecy was considered during KIP's design phase. Because KIP staff recognized that there would be situations in which information owners would agree to share their information only under the condition that access to it was restricted in some way, the designers made it possible to specify which category or categories of KIP users (everyone, registered users, researchers or project partners) have access to uploaded catalog items. Generally, by restricting access to researchers and project partners, cavers could be assured that their cave location data is not likely to leak out beyond the karst community; indeed, many cavers who are registered users of KIP do not even have researcher-level access themselves. Certainly, in order to overcome cavers' antipathy toward sharing sensitive data, KIP would have to make a much stronger effort at caver outreach and education regarding the security protocols of the portal.

Access to cave locations may continue to emerge as an issue for karst researchers. Currently, much of the graduate students' karst research depends on being able to access caves. While some individuals have successfully bridged the divide between researcher and recreational caver in the karst scientific community, future students may have difficulty gaining that level of trust. Unless lawmakers modify the Florida Sunshine Law in a way that exempts cave locations from the public domain, karst scientists will vigilantly protect the locations of sensitive sites and

refrain from disclosing them to public officials or governmental stewards for the environment.

One option that protects the sensitive data from broad disclosure while assuring that locations are not "forgotten" within this small network would be to deposit such information within a designated academic library's archives and special collections department. These areas of the library are well versed in managing such information. The archivist or librarian could negotiate a custodial agreement specifically dictating the deed of gift for any sensitive cave information. Although libraries generally encourage free and open access, archives have the ability to work with donors hoping to preserve information for long-term posterity that requires clearly articulated and time-specific restrictions. Examples include restrictions on accessing manuscript collections of authors or politicians until a period of time after their death, as well as access restrictions due to the controversial nature of certain materials (medical records, legal documents, items available exclusively to the donor's heirs for a period of time, etc.). Accordingly, the copyright to the cave information would continue to reside with the donor, thereby circumventing the Florida Sunshine Law dictates for all materials held by state agencies. In a clearly worded agreement with the repository, a donor could designate who could access the information, while shielding the information from the general public. The deed of gift would also designate the institution's responsibility to archive the information, preserve the integrity of the data and the location of the cave sites represented by the data. As such, within the very framework of the KIP's categories of users and the USF Libraries Special Collections Department, there is a means to protect sensitive cave information while ensuring access to relevant members of the community.

In spite of the advantages of collecting and archiving karst data in a single location, use of the portal has been limited. It is important to ascertain why the community-driven aspects of the portal have so far gone underutilized. The amateur karst and cave enthusiast community

seems to be less eager to participate in KIP than do members of the professional karst community. An examination of the affiliations of KIP's list of registered users bears this out, as most indicate some kind of professional institutional affiliation rather than an affiliation with a speleological club. To date, KIP staffers and project partners have taken a traditional approach to promoting the portal and engaging the karst community, via presentations at national and international karst-themed meetings and conferences (for example, the annual meeting of the National Speleological Society) and outreach efforts to relevant groups and audiences. There has also been significant reliance on informal personal networks and using those to spread awareness by word-of-mouth; yet much of this has been focused on the professional karst community.

On the local level, this case study found a general lack of awareness about KIP among the West Central Florida recreational karst community. Bridges between the scientific, professional, and recreational community are a great means to raise awareness of KIP and to advocate for its utility and community. Many people in the caving CoP are likely to be familiar with a few famous names in karst research, but not necessarily with the larger, younger, and more intellectually diverse generation of karst researchers. Recreational cavers who attend the National Speleological Society's annual meetings often attend lectures from and interact with some of the less well-known names in karst. Faculty and graduate students in the karst sciences are uniquely positioned to promote KIP among both the caving CoP and the professional karst community. The nature of their studies brings these students into contact with professionals in the karst world on a regular basis; the fact that they are often avid cavers themselves enables them to cross the line between the amateur and professional karst communities without being seen as an "interloper." Increasing the role of graduate students in outreach for KIP could help overcome caver concerns about information sharing, especially since the students are often already trusted members of the CoP.

Proposed new features of the portal are envisioned to directly balance the demands for individual information, while still ensuring community access. One example is functionality that will make it possible for users to view databases within KIP, and to add new records or modify existing records within these databases. However, most owners of karst-related databases would be hesitant, if not outright hostile, to the idea of allowing anyone with access to KIP to potentially corrupt the value of these databases by making incomplete, ill-advised or just flat-out incorrect additions or modifications to the existing data. In this particular case, the solution is to require approval from the database owner for each modification to the database. In this way, the original owners of the information retain control over how the information is shared, while portal users gain access to valuable, potentially unique datasets. One trade-off is that such an arrangement requires the database owner to continue maintaining it. If this is not feasible, another possible means of control and verification could be accomplished via Wikipedia-style tagging, where all changes are uploaded as they are made, but administrators retain the ability to revert back to the original version.

From the -outset, the creators of the Karst Information Portal have set a high priority on engaging the karst community, yet it is precisely these aspects of the portal that have been slow to find acceptance. Perhaps the foremost examples of this are the discussion forums. It was initially hoped that a certain percentage of portal users would frequently visit the discussion forums, where they would initiate and drive online conversations with their colleagues from around the world. Other users could then follow the conversations or participate, if they chose to do so. Nearly a year after rollout, this has not happened. As of this writing, the KIP forums feature a total of seven topic threads, with a total of seven comments attached to them—five of which are in the thread that discusses the design and functionality of the portal itself. The

majority of these threads and comments have been generated by KIP project partners, and not by members of the wider amateur and professional karst communities.

Obviously, increasing this sort of participation is not simply a matter of adding a new page or feature to the portal. CoP members will participate in the interactive portions of the portal only to the extent they are willing to use it in the first place, which is directly tied to issues of comfort, value, and community niche. For academic researchers, discussing research via the KIP could be slower than other means of communication. Furthermore, many researchers might not want others to know about their work before publication. For recreational cavers, currently they have many other discussion forums where they can engage, primarily those hosted by the National Speleological Society. Presumably all of these participants are members of the national CoP, NSS members, and caving enthusiasts. The desire to extend the caving forums to both these recreational cavers and karst scientists might cause discomfort as participants question authority, expertise, motive, and lack a personal connection to other forum participants.

Innovative and attractive portal features, capturing a universal appeal of karst and cave information could engage both scientists and recreational cavers. One such project, currently in the planning state, is the Great Karst Trail, an effort to build an online trail system in which users contribute locations of trails in karst areas worldwide. This system will also be interactive, as each trail segment will be assigned links to research articles, images, or any other relevant information, and will include a *wiki* (a web-page-generating database that can be expanded and edited by users), designed to permit KIP users to comment on trails or refine information that others have left. This visual means to explore caves throughout the world, enables all members of the CoP to display their photographs and exploratory feats, while simultaneously unifying the community and increasing engagement in the KIP. Furthermore, the emphasis on KIP's collaborative nature and international reach distinguishes this project from others, highlighting

the KIP unique community niche of mutually engaging the CoP and centralizing access to karst-related information.

Conclusion

Through this research, the authors actively seek to understand the information values and practices that shape the distinctive practitioners, scientists, and professional community that the Karst Information Portal serves. Applying the Communities of Practice model is an innovative means to explore a local knowledge community and learn how to best adapt and engage the portal design to expand our scientific understanding and protection of karst environments. While libraries need to respond to the changing needs of their scholarly communities, understanding the broader Community of Practice context is also of critical importance.

References

1. Karst Information Portal Web Site. http://www.karstportal.org (accessed June 9, 2009).
2. Wenger, Etienne. *Communities of Practice: Learning, Meaning, and Identity*. New York: Cambridge University Press, 1998.
3. Stein, Eric.W. "A Qualitative Study of the Characteristics of a Community of Practice for Knowledge Management and its Success Factors." *International Journal of Knowledge Management*. 1, no.3 (2005): 1-24.
4. Koeglreiter, Gerlinde, Ross Smith, and Luba Torlina. "The Role of Informal Groups in Organizational Knowledge Work: Understanding an Emerging Community of Practice." *International Journal of Knowledge Management*. 2, no.1 (2006): 6-23.
5. Wenger, Etienne, Richard McDermott, and William M. Snyder. *Cultivating Communities of Practice*. Boston, MA: Harvard Business School Press, 2002.
6. van Beynen, Philip.E., and Kaya Townsend. "A Disturbance Index for Karst Environments." *Environmental Management.* 36, no. 1 (2005): 101-116.
7. Kramer, Jacob A. "Preventing the Destruction of America's Cave Resources: Enforcing Cave Protection Legislation Against Vandals and Profiteers." *The Environmental Lawyer*. 9, no. 3 (2003): 725-762
8. Interview with a cave manager, March 15, 2007.
9. Interview with a grotto member, March 15, 2007.
10. Interview with a recreational caver, April 3, 2007.
11. Interview with a karst researcher, March 24, 2007.
12. Interview with a biologist, June 12, 2007.
13. Interview with a recreational caver, April 3, 2007.
14. Interview with a recreational caver, March 24, 2007.

15. Interview with a biologist, June 12, 2007.

16. Interview with a recreational caver, March 3, 2007.

17. Interview with a cave photographer, July 20, 2007.

18. Interview with a professional geologist, July 20, 2007.

19. Interview with a biologist, June 12, 2007.

20. Interview with a cave conservationist, July 18, 207.

21. Interview with a park manager, March 12, 2007.

22. Interview with a karst graduate student, August 2, 2007.

23. Interview with a karst researcher, March 24, 2007.

24. Florida Caves: Cave, Cavern, and Sinkhole Diving. http://www.floridacaves.com/ (accessed June 9, 2009).

25. Interview with a recreational caver, March 3, 2007.

26. Florida Cave Survey. http://www.caves.org/survey/fcs/ (accessed June 9, 2009).

27. Interview with a geologist, July 20, 2007.

28. Interview with a recreational caver, June 27, 2007.

29. Kincaid, Todd R. "The Florida Cave Database: A GIS of Underwater Caves for Hydrogeological Characterizations." *Geological Society of America Abstracts with Programs.* 36, no. 2 (2004): 85. http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70793.htm (accessed March 26, 2008).

30. Florida Geological Survey. *Online Cave Database.* http://www.hazlett-kincaid.com/FGS/cave-db/ (accessed May 11, 2008).

31. Interview with a recreational caver, June 26, 2007.

32. Interview with a cave manager, March 15, 2007.

33. Interview with a recreational caver, March 3, 2007.

34. Ibid.

35. Interview with a karst graduate student, August 2, 2007.

36. Interview with a grotto member, August 2, 2007.

37. Interview with a karst researcher, March 24, 2007.

38. Interview with a professional geologist, July 20, 2007.

39. Ibid.

40. Interview with a recreational caver, June 27, 2007.

41. Interview with a county planning official, July 18, 2007.

42. Interview with a recreational caver, March 3, 2007.

43. Office of the Attorney General of Florida. *Government in the Sunshine*. http://myfloridalegal.com/sunshine (accessed May 2, 2008).

Tables and Illustrations

Illustration I: Title: Communities of Practice Process from Koeglreiter et. al., 2006.

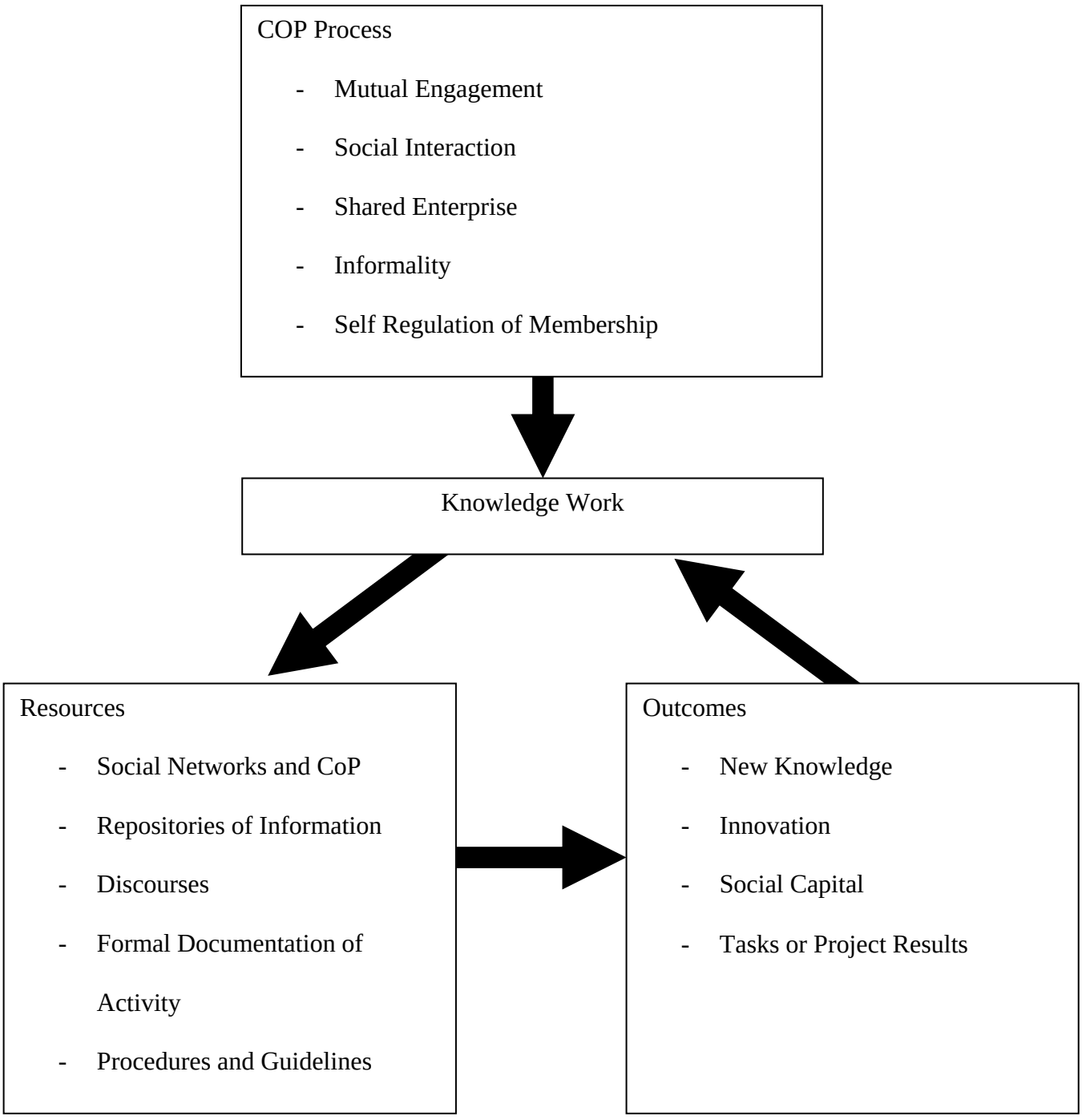

Table I: Title: Characteristics of a Karst Community of Practice

Characteristic*	**Value**
Knowledge domain	Caving, Caves and Karst Science
Set of interested and interconnected participants	Recreational Caving Organizations - Florida Grottos - Florida Cave Survey Karst Researchers - Florida Museum of Natural History - University of Florida - University of South Florida Government Agencies - County Zoning and Planning - Florida Department of Environmental Protection - Water Districts - United States Geological Survey
Opportunity for ongoing processes of sense making, knowledge of sharing and discovery within the domain of interest	Mutual Engagement and Social Interaction - Caving together, - Surveying new caves, - Attending organizational meetings, lectures, - Creating Cave exhibits for schools, museums, - Creating membership newsletters, websites, etc. Self Regulation of Membership - Defining who is a caver

	- Questioning of motives - Questioning regarding who you know - Defining who can gain access to cave information. <u>Shared Expertise</u> - Primarily experience and caving ability - Surveying and mapping ability, - Biological and GeoScience knowledge.
Set of resources related to the domain of interest including methods, tools, theories, etc.	<u>Methods</u> - Proper caving techniques, - Surveying, - Inventorying <u>Knowledge Produced</u> - Cave maps, - Management plans, - Cave/karst databases of - Cave locations, - Biological and geological inventory - Cave history and literature, - Photographs and ephemera. - Publications - Discipline of Speleology <u>Emergent Theories</u> - Role of secrecy as tied to cave conservation

	- Best management practices
Processes by which the community maintains and refreshes its membership	- Caving trips - Classes and educational field trips - Grotto websites - Museum displays - Student groups - Articles or documentaries for general public consumption

* Adapted from Stein, 2005