A Design Theory for Digital Habitats: Building Virtual Communities of Practice

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Abstract

This paper reports on-going research into the design of virtual communities of practice. Using Wenger’s work on communities of practice it develops an Information Systems Design Theory (ISDT) for building digital habitats for communities of practice. The researchers use an analytical approach in applying the design theory ontology of Gregor and Jones to the work of Wenger, White, and Smith together with inductive insights gained from several development case studies. An expository example illustrates a design project case study for a virtual conference.

1. Introduction

Information systems design theory has been a topic of conversation for many years. Recent emphasis on design theory and design science approaches in information systems has provided a more robust framework for thinking about information systems design theories. Walls, Widmeyer and Savy [25] made an elegant case for focusing research on building endogenous design theory for information systems in 1992.

The need for well-developed design theories is fundamental to both the maturation of the discipline and to the success of new developments in the field. The need for development of successful inter-organizational knowledge sharing systems found in global cross-cultural settings enabled by new Web 2.0 technologies sparked our interest in design theory for virtual communities of practice.

Enterprise social networks emerged as a legitimate organizational knowledge sharing tool in 2008 and 2009. These networks, far beyond the informal networks such as FaceBook and MySpace [18], seem to be finding a legitimate role in both private industry and governmental institutions as a platform for intra-organizational knowledge sharing. While many barriers and caveats exist, limiting adoption at this point, recent industry research suggests they will now become accepted and mainstream [16].

Web 2.0 virtual teaming environments are following a similar adoption pattern. Dozens of virtual teaming products exist, and over 100 open source groupware packages are available for implementation [17]. Social software is software that aims to simplify the realization and preservation of networks among people and has become a part of organizational life. Less research has been performed on the uses of such platforms to share knowledge in the form of lessons learned in diverse global settings.

Communities of practice (CoP) have been well researched and promoted as models of both intra and inter-organizational knowledge sharing and creation [27]. Communities of practice are promoted as a valuable approach for organizational learning in multiple environments and organizational settings. With the rise of online learning and the necessity of building community as a valuable part of the learning process, virtual communities of practice have increasingly become a focus of research.

Evolution of new tools has occasioned an explosion of virtual communities of practice. New content management systems, combined with social networking tools, provide a new landscape for the growth and development of “digital habitats” that are an integration of traditional communities of practice made virtual through technology [28]. The interaction between new technologies and what they make possible is transforming the concept of community. Deepening experience with the development of digital communities on the part of practitioners and the continued development of new social technologies requires a design theory to guide successful development and adoption of these systems [20].

Therefore our purpose for this line of research is to develop an information systems design theory (ISDT) for cross-cultural virtual communities of practice. Our research question is: What are the essential elements of an ISDT for virtual communities of practice? We use a deductive analytical approach using the design theory ontology described by Gregor and Jones [9]. The ontology provides an analytical framework used to deduce
theory components from reported work on CoP design from the literature and inductive insights from our own extensive case work over a seven year period in designing digital habitats. The paper finishes with a brief expository description of a systems design project for a virtual conference.

The paper furthers the development of information systems design theory [25] by providing another specific example of an information design theory, further strengthening the endogenous base for theory development in the IS discipline. It also provides support for developers of digital habitats in both communities of practice and in tool builders of digital habit environments.

2. The challenge of designing digital habitats

While much descriptive research on communities of practice has been done [20], the transition from the rich research and constructs developed for understanding CoPs does not translate well in the design of virtual communities of practice. Schwen ad Hara [20] identify through a case study analysis five challenges for the design of online communities of practice. They propose a design approach that suggests analysis of an existing community of practice, a prototyping approach using iterative development followed by evaluation and revision of the system.

Our own experience supports this view both in the types of problems experienced and the difficulty of design and acceptance, especially in situations where communities of practice are emergent in an online-only environment. This complicates the analysis and design work because the design of the environment constitutes the virtual location of the community, but the community itself must be recruited and established.

2.1. Design theory challenges

The development of digital habitats for cross team, cross cultural online communities of practice involves several major research challenges. Schwen and Hara [20] identify five key challenges that are confirmed in our own work:

Prescriptive vs. description distinction. The foundational social theory is not a warrant for designing or nurturing a CoP. This challenge is central to our own published work where we have used the Value Frequency Model as a guide to design. VFM is a foundational descriptive social theory and the translation to prescriptive theory as a guide to design is not straight forward [12].

Development of a design theory addresses this challenge since design theories combine both descriptive and normative theory in a theory of design [16].

Ready-made vs. communities in the making. Situated learning theory [27] has more to offer the “formed” community. Little is known about the early life cycle of CoPs. Therefore the best opportunity for online design is with formed CoPs. We report on both of these situations, although the contribution of our research is primarily in design for communities in the making.

Knowledge of possession vs. knowing in practice. CoPs are rarely centered on declarative knowledge acquisition. Rather, CoPs support knowledge in action. For example online classroom communities are focused more on knowledge acquisition. Recent developments, however, in massive, open, online courses (MOOC) are shifting this paradigm by connecting the classroom to more active situated learning environments [7]. Knowing in practice and involvement in a community of practice is a fundamental focus in this educational innovation.

Mid-level social theory vs. micro learning theory. Situated learning theory is a “middle-level” social theory; mixing learning theory and related pedagogy is either inappropriate or an untested mixing of levels of theory and methodology. Information systems design theory addresses the integration of kernel theories which are primarily descriptive and from different levels of analysis. It also addresses the integration of different levels of analysis and blended approaches to design methodology (process) and results (artifact). An ISDT encompasses both approaches [9].

Motivated members vs. unwilling subjects. The intentions of the community members are often subverted in “designs of” CoP. This is a problem of goal congruence in community-based and collaborative systems. [12].

Beyond the research challenges identified by Schwen and Hara [20], we note an additional critical challenge from our own work:

Identifying and bridging cultural communication gaps. Cross Cultural challenges are not only a result of the different national cultures involved, but also of different organizational and professional cultures. Researchers have been trying to identify how deep culture influences IT adoption [13; 15; 26]. We
assume that there is a possibility to further understand the cultural influence in the perceived value of a change in work practices as proposed in the Briggs et al. value frequency model [4; 19; 22].

2.2. An ontology for an Information Systems Design Theory

Gregor and Jones [9] outline six essential components and two additional components of an information systems design theory that extends early work on information systems theory [8; 25].

Essential components include:

- Purpose and scope
- Constructs
- Principle of form and function
- Artifact mutability
- Testable propositions
- Justificatory knowledge

Additional components include:

- Principles of implementation
- Expository instantiation

We use this ontology as an analytical framework to define the components for an ISDT for community of practice digital habitats.

3. Essential Components of a Design Theory for Digital Habitats

In this section we use the Gregor and Jones ontology as a preliminarily definition of an ISDT for community of practice digital habitats.

3.1. Purpose and scope

“What the system is for.” the set of meta-requirements or goals that specifies the type of artifact to which the theory applies and in conjunction also defines the scope, or boundaries, of the theory. [9]

The purpose of a digital habit is to support a specific community of practice. This class of systems is distinct from other forms of digital community that are primarily based in social forms of interaction such as occurs in social media. Social interaction is a key component of communities of practice; however, in a CoP the learning component is central, and the interaction is more demanding than in strictly social systems [27].

According to Wenger et. al. [28] the purpose of a digital habit is to provide technology support for communities of practice in three dimensions: the knowledge domain, the practice, and the community of learning companions.

Knowledge domain. The knowledge domain is a specific arena of inquiry that is of mutual interest to the community. According to Wenger’s extensive work in this area, the knowledge domain has both an internal and external focus.

The internal domain focus constantly evolves through and is an expression of the growth of the community membership and its interests. This distinguishes communities of practice from other more casual communities such as those found in social media circles where the purpose of the community is other than knowledge acquisition, creation, and sharing.

The external domain is the value of the community to outside community interests which may be related domains, individuals, groups, organizations, or endeavors. This domain is both an input to and receiver of the community’s acquired knowledge. Externality in this case is a porous boundary and outsiders may transition to the internal domain as active members of the community. In turn members of the community may also transition to the external domain.

The digital habitat in this dimension is a mechanism used to evolve a common community identity, negotiate the focus of the internal domain, and connect to the external knowledge domain [28].

This type of organizational form is essentially a network organization with a boundary based in a knowledge domain rather than geography, organizational membership, or other classical forms of organization. From that standpoint it is a boundary crossing form of organization in terms of geography, culture, and profession. Modern telecommunications technology enables and transforms the community as traditional boundaries that defined communities in the past are quickly disappearing. [14]

Practice. The practice is a shared engagement that generates learning relevant to community members. Since the community members are engaged with the knowledge, the knowledge domain is a shared exploration and therefore situated or in the context of engagement.

As a learning community, a CoP learns both from, and with each other; it learns through formal and informal activities, and it learns from sources outside as well as inside the community.
A digital habitat, therefore, enables a sustained mutual engagement, a deepened understanding of each other’s practice, and an expanded set of learning activities which provide access to stories, tools, solutions, and concepts [28].

**Community of learning companions.** This dimension of community is an essential component in CoPs. The mutual support provided by the community is achieved through the commitment of the members. The reciprocity of engagement around shared interests builds trust within the community. Trust is an essential component which binds the community together [14; 27].

This trust enables both diversity and engagement. Productive disagreement and exploration of the domain enable community growth and development. Trust also legitimizes the peripheral participation of members of the group who are not active contributors as well as those who take more active leadership roles both formal and informal, Thus communities are leader-full not leader-less [14; 27].

In this dimension digital habitats must support social connectedness, reduce isolation, foster relevant connections between members, and support the evolution of community roles and extended structures.

### 3.2. Constructs

*The representations of the entities of interest in the theory (Dubin’s “units”) are at the most basic level in any theory. These entities could be physical phenomena or abstract theoretical terms.* [9]

Wenger et. al.[28] define several key constructs in the design of a digital habitat for a CoP.

- Community activities
- Community characteristics
- Community polarities

Together these components provide a basis for the analysis and design of a digital habitat that supports the growth and evolution of the community.

**Community Activities.** These are the activities that connect the internal learning of the community among members and outsiders in the external domain. (See Figure 1.)

Wenger et. al. define seven fundamental activity types: Exchanges, Productive Inquiries, Building shared understanding, Producing assets, Creating standards, Formal access to knowledge, and Visits. These activity types provide a loose classification of interaction patterns within the community. Specific activities in each type form a basis for requirements definition and the development of specific design patterns such as those defined in the collaboration engineering literature.[6]

The virtual team literature also identifies fundamental components that apply to designing digital habitats. Lipnack and Stamps [14] identify four fundamental components to the design of a virtual team. (See Figure 2) Virtual teams commonly exist as part of a larger hierarchical structure within organizations and are boundary crossing in the same way as are communities of practice but are more limited in scope. Teams are focused on specific tasks for a limited time. Still they share the same digital habitat and frequently the digital habitat of a CoP is emergent from the digital habit designed for its virtual teams.
Community characteristics. The base characteristics of a community of practice are a primary component of the design theory.

<table>
<thead>
<tr>
<th>Proposed Community Characteristics</th>
<th>Wenger et. al.</th>
<th>Lipnack &amp; Stamps</th>
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<tbody>
<tr>
<td>Teleological Focus</td>
<td>Constitution</td>
<td>Purpose</td>
</tr>
<tr>
<td>Evolutionary Path</td>
<td>Lifecycle</td>
<td>Time</td>
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<tr>
<td>Technological Orientation</td>
<td>Technology</td>
<td>Links</td>
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<tr>
<td>Sociological Means</td>
<td>Roles</td>
<td>People</td>
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Wenger et. al. [28] define three primary characteristics of the community which serve as the basis of their analysis in designing digital habitats for CoPs.

This compares to the Lipnack and Stamps structure for virtual teams [14]. From this comparison we derive a set of community characteristics that serve as fundamental components for analysis of a community of practice. (See Table 1)

Community polarities. Each community has its own distinctive culture defined as a set of polarities. These describe how communities deal with the basic dilemmas of social relationship. Wenger et. al. [28] describe three polarities:
- Rhythms: togetherness and separation
- Interactions: participation and reification
- Identities: individual and group

These polarities are dilemmas that express the culture of the community. Trompenaars [24] identifies seven basic polarities that can be used to expand the analytical framework. These compare to the basic cultural framework of Hofstede [10]:
1. Time: Sequential vs. synchronic (Expands Wenger’s concept of rhythms)
2. Universalism: rules vs. relationships (relates to Wenger’s Interactions)
3. Communitarianism: Individualism vs. collectivism (The same polarity in Wenger)
4. Neutral vs. emotional (A key source of conflict in communities)
5. Specific vs. diffuse (How separate we keep our private and working lives)
6. Achievement vs. ascription (Do we have to prove ourselves to receive status or is it given to us?)
7. Internal vs. external control (Do we control our environment or are we controlled by it?)

This expanded set of polarities provides a richer basis for analysis and expands Wenger’s work.

3.3. Principle of form and function

The abstract “blueprint” or architecture that describes an IS artifact, either product or method/intervention.[9]

Due to the evolutionary nature of a digital habitat, the principle architecture in this design theory is fundamentally a change process based on the systems development life cycle (SDLC). Specific artifacts are designed, developed, and adopted by the community to meet its requirements. New technology provides new capabilities for communities and expansion of the digital habitat which is highly influenced by adoption and diffusion fundamentals.

We therefore have found the Value Frequency Model [4] (see Figure 3), an important perspective in the analysis and design of digital habitats.

![Value Frequency Model](image)

In the analysis phase, the habitat’s requirements are defined through:
1) Mapping the community characteristics. This provides fundamental insight into the fundamental values of the community (V).
2) Identifying the community activities. This provides fundamental insight into the frequency of use based on activities (F).
3) Inventorifying the current technological footprint. This provides fundamental insight into the current exposure to technology (C).
4) Analyzing the correspondences and gaps between the community’s characteristics, activities and cultural polarities on one hand and the technological footprint on the other. This provides insight into the perceived value of the transition to a new digital habitat. (T)
This provides the designer with a current state of the practice of the community and the barriers to be overcome in creating a willingness to change its work practice, that is, to adopt a new digital habit. In the systems design phase, the barriers to adoption of a new (modified) habitat must be overcome. The design must take into account the resources and constraints of the community in deciding an acquisition strategy. The solution is designed in light of the requirements document with particular attention to the cultural polarities which are a fundamental values perspective that influences adoption.

This is an iterative design process which adjusts polarities of the community profile by matching new technology to community activities through a continuing change management process.

3.4. Artifact mutability

The changes in state of the artifact anticipated in the theory, that is, what degree of artifact change is encompassed by the theory. [9]

The essential form of the theory is that the habitat development is evolutionary. In many ways this is a form of collaborative enterprise architecting with an internal community of practice that pioneers and guides the community in the adoption of new technology in its practice. [2] There is an essential interplay between emerging technology and the adoption and use by the community as new tools are explored, used, adapted, and disseminated through the community.

Wenger, et. al. [28] define a “Technology stewarding” role that is the central driver of the technology adaptation and dissemination within the community. This is an emergent phenomenon within the community and follows the principles of the Value Frequency Model [4]. The essential growth model is that of an internal technical support function that is both aware of community needs and issues and conversant with new technologies. This is a form of collaborative enterprise architecting found in current business practice [2].

3.5. Testable propositions

Truth statements about the design theory. [9]

Testable propositions are largely based on the Value Frequency model [4].

P1. The more the design of a digital habitat is perceived to enhance the fundamental values of the community, the more likely it will be adopted as a change in work practice.

P2. The more the design of a digital habitat is perceived to add value to the most frequent activities of the community, the more likely it will be adopted as a change in work practice.

P3. The more the community is exposed to proposed new technology that is consistent with current technology use, the more likely it will be adopted as a change in work practice.

P4. The more the community perceives the transition to a new digital habitat as a solution or improvement over its current habitat, the more likely it will be adopted as a change in work practice.

3.6. Justificatory knowledge

The underlying knowledge or theory from the natural or social or design sciences that gives a basis and explanation for the design (kernel theories). [9]

The kernel theories central to the development of this design theory are describe previously. These have been introduced and discussed in previous sections.

Wenger’s Situated learning theory [27]. This is central to the understanding of the definition, purpose and scope of a community of practice. Wenger et. al. [28] introduced the concept of “Digital Habitat” and an analytical screen for defining its requirements.

Brigg’s Value-Frequency Model [4]. This is primarily a descriptive theory. The primary innovation here is to use this as a basis for design. There is some justification for this as a basis for designing an interview protocol for discovering collaboration engineering opportunities. [5]

Lipnack and Stamps’ framework for virtual teams [14], provides a helpful micro theory of virtual teams which informs and provides perspective on the work of Wenger et. al. [28].

The work of Bente, Bombosch, and Langade [2] on Collaborative Enterprise Architecture documents the use of a community of practice as a central governance structure for stewarding technology development in organizations which is applicable to communities of practice in more general terms.

4. Implementation considerations and Expository Instantiation

In order to illustrate the proposed information systems design theory for digital habitats, we report a field study action research project to develop a virtual conference system for an international peer to peer
community of practice. This project was initiated in the fall of 2011 and completed in the spring of 2013.

The organizational context of the study was a global NGO, The Institute of Cultural Affairs International (ICAI). ICAI is “a global community of non-profit organizations advancing human development worldwide. The role of ICA International is to facilitate peer-to-peer interchange, learning and mutual support across the network, for greater and deeper impact. ICA International maintains consultative status with UN ECOSOC, UNESCO, UNICEF, WHO & FAO” [23]. ICAI is focused on human development work in more than 40 countries worldwide.

The organization is structured as a network of nationally incorporated non-profits and inter-connected communities of practice. Knowledge domains include such areas as educational innovation, peace activism, community development, ecological awareness, youth engagement, sustainable agriculture, forest management, and HIV/AIDS remediation efforts.

One of the national organizations hosts every four years a global conference on human development. In the fall of 2012 the Institute of Cultural Affairs – Nepal hosted the 8th Global Conference on Human Development in Kathmandu, Nepal [11]. One of the more ambitious goals of the conference was the idea of a virtual conference. Virtual conferences have been hyped, debunked, promoted, pronounced a silly idea and the greatest thing since the development of the internet. [1; 3]

This case study describes from a design theory perspective the design process, lessons learned, and best practice recommendations for future design projects.

4.1. The Design Artifact and Process

Typical features of virtual conferencing, sometimes also called web conferencing, include the following:

- Virtual slideshow presentations
- Live or streaming video of presenters, sessions, etc.
- Meeting recording for viewing by remote participants or archiving
- Whiteboarding for live presentation via a shared whiteboard
- Text chat, forums, and blogging using social media tools
- Electronic meeting systems for online brainstorming, clustering, and decision-making
- Polls and surveys
- Voice over Internet Protocol (VOIP) audio conferencing

Most of these features were designed into the virtual conference system and used at various stages of the conference. The conference design followed the process outlined by the previously detailed theory

Identifying the design requirements for the conference Students from a master’s class in collaboration design at a major mid-western university were divided into eight design teams. The process began with online interviews of the ICAI leadership team and conference designers. A design requirements document that addressed the process and technical requirements for the pre-conference, conference, and post-conference phases was developed. Part of this process utilized a virtual sticky note product called Edistorm (now Stormboard) [21] to identify the user stories for each of the six conference themes.

User stories are planned scenarios for imagined activities of the virtual conference. This process involved the collaboration of the theme leaders and their virtual facilitation partners recruited from an internal community of practice focused on virtual facilitation. The virtual facilitation team was a key to participation in this phase and eventually formed the core of the virtual conference facilitation group, “The Sherpas” as they were-called; who would serve as the “technology stewards” for the conference activity and long term development of a digital habitat for the larger community.

Building and evaluating eight design surrettes. During March of 2012 masters students researched and developed eight different design surrettes based on the surfaced requirements from phase 1. The goal was to develop eight conference platform prototypes using a variety of web conferencing tools and evaluate their ease of use, fit to the requirements, cost etc. The evaluation of the design surrettes was done by two classes from another participating university involving 60 undergraduate students along with approximately 10 ICAI internal facilitators with virtual facilitation experience.

Designing and building the conference prototype. During the spring and early summer of 2012, an international virtual developer team worked to build a working system based on the design work. The base team included a professor of information systems experienced in collaborative systems design located in the Midwestern US, a professional developer (located in Bali, Indonesia) from a Chicago-based web development company, and a full time tech
representative with ICA Nepal in Kathmandu. All team members had extensive experience in both the technical aspects of the development as well as organizational experience. The beta version of the site was released in July and the “Sherpas” began working with the site and testing the features. The input we received from the Sherpas helped refine and test the features on the site. Once the site was fully functional, it was transferred to ICA Nepal’s server for open registration and use of the system by conference attendees. The site is still active and can be visited at http://virtual.ica-nepal.org.

The Sherpa implementation team. One of the primary elements of the pre-conference preparation was the creation of the Sherpa team. The design team realized early on that if the virtual conference was to be successful, the development of a workable technical platform was only a small part of the design solution. Sherpas needed to provide expert guidance and facilitation to conference participants. Building and using a virtual conference was comparable to climbing Mount Everest. This is a journey with many perils for the climbers and without Sherpas to guide and facilitate the climb, most people would not be successful. The Sherpa team was made up of experienced facilitators with a virtual team at the center.

These individuals participated in most of the design process and helped with the testing and implementation of the system. They then worked as virtual facilitators in collaboration with the Conference theme leaders to develop pre-conference sessions, support, and facilitation during the conference and post-conference communities of practice for some of the conference themes.

4.2. What were the lessons learned?

A virtual conference in concert with an in-person conference is a very difficult thing to do. It is comparable to running two conferences at the same time.

A Collaborative design process requires more lead time. The design process involved more than 100 people around the globe in helping to imagine, develop, and implement a virtual conference experience. The development of the Sherpas as guides was an essential component and based on the assumption that adoption of the conference platform would be more likely if there was a base of experience within the community in the designed conference platform. This is an essential component of a successful virtual conference and cannot start too early. Post conference evaluation determined this should have started a year sooner.

While the early stages of planning the virtual conference started a year in advance, there were only a few short months (September and October) with a developed conference virtual platform. Actual system usage required design changes, creating confusion for uses at a critical point during the face-to-face conference. This finding tends to support proposition P1, P2 and P3 where more time with the system prototypes ahead of the conference exposes the community to the technology and allows for a better fit to community values and goals.

Leadership goal congruence supports platform adoption. The conference was composed of six internal communities of practice. The adoption and use of the platform by these separate communities for the virtual conference was inconsistent. Where there was discontinuity between the face-to-face design and the virtual design of the conference, adoption and use of the conference platform was limited or nonexistent.

This finding supports proposition P1 and P4 where the virtual platform was for some internal communities a distraction from the planned face to face activities.

Consistent pre-conference and conference virtual activities led to post conference CoP development. More than half of the conference themes (60%) developed into ongoing communities of practice. These communities had pre-conference presentation sessions, surveys, polls, and forums that were combined effectively with conference activities and discussions. Post-conference these communities continued to meet virtually and continue the work of the conference.

This finding supports proposition P2 and P4 where there was a significant change in work practice as a result of the conference activities.

Access to virtual conference challenges. The electrical and communication infrastructure of Nepal presents its own unique challenges. Rolling blackouts meant that the face-to-face participants did not have access to the conference site during certain hours of the day. This can be planned for, but a global virtual conference depends on the capabilities of infrastructure worldwide as well. In preparation for the conference, it was decided that the conference virtual site would be hosted by ICA-Nepal’s server, which was outsourced to a reliable company in Canada. Unknown to the design team, this server
company also outsourced its physical server from another company somewhere on the east coast of North America. Hurricane Sandy happened on the first day of the conference (evening of October 29th) in Nepal, making the virtual conference platform unavailable.

The other infrastructure challenge at the beginning of the conference was the expense of providing wifi to conference attendees. Last minute budget constraints led to dropping wifi support by the conference host. During the opening conference dinner the technical staff raised funds from participants for a conference wifi connection. Once this was secured and announced to the participants, overwhelming demand crashed the system. Most participants had more than one internet-connected device. An integrated virtual and live conference depends on not only the virtual participants’ access to the conference site but the live participants as well. This finding illuminates an aspect of proposition P4 in that the digital habitat must support the basic expected needs of the community.

**Virtual simultaneity and integration requires a change in presuppositions about conference dynamics.** The conference becomes a 24/7 concept and re-integrating workshop data becomes a constant question. Integrating onsite and offsite processes and product must be carefully planned for. This finding supports proposition P4.

### 5. Discussion: theoretical implications

It would be a mistake to think that the design goal of the virtual conference platform was that it would become a lasting center of collaboration and dialogue within the community. This was not the case; the primary goal was to build capacity within the community for virtual collaboration and networking. In other words - it was the journey that was important not the destination.

The virtual conference platform development served as a catalyst for adoption of new collaborative technologies and practices within the community. The conference represents a single event within the overall life and journey of the community. The community’s goal was to build capacity for virtual collaboration that would facilitate and change work practices within the community in general. The virtual conference development process exposed the core community of technology stewards in the community to a number of possible technologies that were later adopted.

The propositions in the theory must be taken as a whole. Changes in work practice is a cumulative effect based on the net perceived value, the frequency of the activity, the exposure to technology, and the perception that the change provides value to the community.

### 6. Conclusion

Using the Gregor and Jones [9] ontology, we have an initial articulation of an information systems design theory for digital habitats. The instantiation case demonstrates how the theory can be used for design in complex global environments and how specific design efforts should be viewed in the overall context of the evolution of the community rather than the success of any single design event. The value frequency model helps understand the adoption and development of the habitat as the community evolves over time. Specific design efforts and events catalyze adoption and diffusion within the community.

More analysis of further instantiation case studies would help refine the testable propositions. The testable propositions listed above must be taken as a whole, since the willingness to change work practice is functional dependent on the perceived value of the whole.

### 7. References


Value Frequency Model", Group Decision and Negotiation, (20) pp.315-346.


