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Learning to Collaborate in COINs: Insights from a multi-disciplinary global virtual collaboration

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Abstract

This paper presents insights from an interdisciplinary collaborative venture in the virtual environment between four university teams. The venture, which is called the COINs course, was designed to enable students to learn experientially how to use the tools of dynamic social network analysis (DSNA) through a variety of projects. Collaborating across disciplines requires team members to rapidly and clearly communicate and demonstrate the value of key principles, processes, and work practices while negotiating multiple levels of complexity, knowledge cultures, skills, and capabilities. This paper explores these complexities, documents insights gained through experience, and proposes a framework for future GVT collaboration.

Keywords: global virtual teams; complexity; multidisciplinary collaboration; experiential learning; collaborative innovation networks (COINs)

1.0 Introduction

Collaborative online innovation networks, or COINs, "are cyber teams of self-motivated people with a collective vision, enabled by the Web to collaborate in achieving a common goal by sharing ideas, information, and work." (Gluesing, Gloor et al. 2009) Interest in COINs, and in social networks in general, has increased in recent years as their importance as engines of innovation has been documented. Although COINs have always been a part of human history, advances in information and communication technology have accelerated the emergence and growth of these networks far beyond what was possible in the past.

Collaborative *innovation* networks (COINs) are characterized by their composition: highly motivated individuals who share a collective vision (Gloor 2006). While this describes the ideal COIN, one that is spontaneously emerging and self-organizing, not all collaborative ventures fit this description, especially at the outset. Many ventures begin with a group of people who are assigned to a role in a project. These individuals are less likely to be motivated by their passion to pursue that particular project, and rarely share anything in common, much less a

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collective vision relative to the task at hand. In this case reaching a shared understanding on critical issues, such as defining mission and objectives and addressing differences in group members' skills and information technology, unless explicitly addressed, will disrupt or stall progress, and eventually result in members withdrawing from participation. Similar scenarios are played out on a daily basis in organizations of all types and sizes as innovation becomes an imperative, and as more work is organized around global virtual teams (GVTs). This raises critical questions as to when and how to organize for COINs, and how individuals can be coached in ways that increase the effectiveness of COINs.

The purpose of this paper is to attempt to address these questions by presenting perspectives and insights from the COINs (Collaborative Online Innovation Networks) course, an interdisciplinary collaborative venture between multiple university players, students, and faculty during the 2008 fall term. The participants in this course included information systems and computer science faculty and students from the University of Cologne, the University of Helsinki, and design faculty and students from SCAD. The COINs course was designed to provide students with opportunities to learn through experience how to use the tools of automated social network analysis (ASNA) to identify trendsetters ("coolpeople"), and to discover and "farm" cool trends. By working in global virtual teams (GVTs) students would also have opportunities to learn through experience how to communicate in a multicultural, multinational, and multidisciplinary virtual environment.

As would be expected, insights and learning occurred across multiple dimensions. Major findings were highlighted through analysis of four individual and team assessments that were conducted during the course of the class. Correlating team performance with survey data suggested that

- The five survey dimensions predict student assessments of their team performance, with an adjusted R2 of .80, significant at .015.
- Mission and Objectives is the greatest predictor of team performance with a correlation to performance of .88, significant at the .01 level.
- Team Member Characteristics (.572), Team Processes (.573) and Information Technology (.564) are all correlated with Performance at the .05 significance level.
- Team Context (.305) had no significant correlation with Team Performance.

Students were required to rapidly and clearly demonstrate the value of key disciplinary principles, processes, and work practices. At the same time they were learning to understand and integrate their perspectives with the knowledge, skills, and capabilities of team members from very different disciplinary backgrounds in order to successfully complete their projects.

Collaboration in GVTs requires that team members process and manage multiple layers of complexity. This paper explores these layers, documents insights gained through this experience, and proposes a framework for future GVT collaboration.

2.0 The COINs course

The first COINs course was conducted in 2005 and involved computer science and information systems faculty and students from the University of Cologne and the University of Helsinki who worked with research scientist, Peter Gloor, from MIT's Center for Collective Intelligence. It was not until 2008 that design management faculty and students were invited to participate in the COINs course. Up until that time participants were from computer science and information systems, relatively similar fields that shared language, tools, and an understanding of information technology. The inclusion of designers introduced a knowledge culture with very different work processes, tool sets, and language, which resulted in changes to the overall course dynamics and increased the complexity of the interaction.

Students in the COINS course used Condor software, an automated form of social network analysis, to uncover and predict trends in business, collaborative ventures, and in consumer attitudes and behavior. Employing an array of web-based communication tools they engaged in team projects ranging from a study of online betting forums to research on changing attitudes towards animals for a major Swiss retailer. Each team was required to collect data from digital sources that included blogs, wikis, email, and online groups and forums. While preliminary analysis

was conducted using Condor software additional programming was typically required to collect and manipulate data.

Projects are an important component of the COINs course as they form the core around which project teams collaborate. Past projects have covered a broad range of topic areas that included the analysis of Eron email archives that were made available in the public domain (Ye and Niepel 2006), the analysis of communication patterns within the Linux community (Acar, Mathoul et al. 2006) and an analysis of investment trends an online forum (Wundram, Farrag et al. 2008). In each project dynamic social network analysis (DSNA) was used as the basis for discovering patterns and trends. Analysis was conducted using Condor software (formerly called TeC), which required significant investments of time in learning to perform the processes. Most of the projects required additional programming in order to extract data and conduct analysis. A background in information technology and quantitative analysis was not only advantageous, but in some cases critical, to obtaining meaningful results.

2.1 COINs course 2008

In fall 2008 thirty-six students who were enrolled at the three participating universities either self-selected or were assigned to eight project teams. The process for team formation was coordinated through the course website where descriptions of the projects were posted for several weeks before the virtual meeting where teams were actually formed. Students were instructed to consider which of the projects would be most interesting to them. Each project was presented during the virtual meeting that everyone in the course – students and faculty from the University of Cologne, University of Helsinki, and the Savannah College of Art and Design - was required to attend.
The presentation of individual projects is an important feature of the COINs course: it demonstrates a phenomenon referred to as the "waggle dance", a phrase borrowed from bee keeping. Since honeybees are social insects the analogy to human collaborative networks is quite compelling. The waggle dance is performed by honeybees to communicate to their hive-mates the direction and distance they must fly to reach a new food source (Riley, Greggers et al. 2005). In recruiting individuals to join a COIN, the creator or initiator of a project must perform a similar feat by communicating the significance of the project and generating excitement about the prospects of being a part of the discovery. A successful waggle dance results in attracting and recruiting a committed group of individuals to the cause.

Although the intention of COINs faculty was for students to form teams by self-selecting a project based on a successful waggle dance and their personal interest in the topic, the need to diversify the composition of the teams made it necessary to persuade some students to join teams that were not those they preferred. Consequently, a less than ideal dynamic entered the course environment.

2.2 Collaborating in COINs 2008

Due to differences at the three universities between term start dates and duration the global team projects were not launched until late October. By that time students at the participating institutions had been introduced to the fundamental concepts of social network analysis and had received instruction in using the Condor software. They also had the opportunity to apply Condor in visualizing their individual email networks through an exercise called "the virtual mirror". The impact of being able to watch their email networks animated over time was a compelling demonstration of the potential of automated social network analysis using Condor.

The first meeting was virtual using the web-based platform Flash Meeting (FM). Students at each university introduced themselves; those who had access to webcams appeared on screen. For some of the students this was their first experience with virtual meetings. The quality of the connection varied based on where they were located. Flash Meeting was able to accommodate a limited number of users, so that when that number was exceeded, additional participants were not able to join or were bumped off. All students were in the same location at their respective institutions with faculty in attendance. Basic rules about how to use Flash Meeting were worked out in trial and error fashion with some unpleasant experiences, such as when someone started to broadcast and other microphones were active in a room. Despite the technical challenges, the students were excited to be able to participate in a virtual meeting space with counterparts from other parts of the world.

Following the initial virtual meeting final arrangements to team composition were completed. As previously noted, several students were asked to join teams that needed more diverse representation, which they did. At this point the global virtual teaming component of the COINs course began.

The addition of SCAD design management faculty and students in the 2008 COINs course increased the level of complexity by introducing a new set of national cultures, knowledge cultures, geographic locations, and disciplinary training and socialization. The diversity of tools and skill sets was critical in using the condor software, which needed to be applied in analysis of data collected from blogs, message boards, email archives, and other digital sources.

Designers are typically highly skilled in using digital tools, but aside from interaction designers, few are actually trained as programmers. The design management students were very skilled in using a wide variety of digital technology, and especially graphics software (i.e., Adobe, cad systems, and other s/w packages used in design). However, they encountered a steep learning curve in becoming proficient in applying condor in the analysis phase of the projects. This became a significant issue as work on the projects developed and programming know-how was required to extract and analyze data. The disparity in abilities to manipulate the software began to generate tensions in some of the teams, which eventually impacted their performance. In the end all eight GVT teams presented completed projects and submitted papers.

At the end of the course, after having worked together for nearly three months, each student participant was asked to complete the *Global Virtual Team Self-Assessment Survey* [1] in order to measure team performance along five dimensions: the team's mission and objectives, characteristics of the individual team members, characteristics of teaming processes, the use of communication/information technology in the team's work, and characteristics of the team's context(s). Results of the surveys were correlated to the network structure and semantic data gathered through email using *Condor* software.[2] (Gluesing, Riopelle et al. 2009)

Of the five dimensions, Mission and Objectives (.88) was found to be the greatest predictor of team performance. Team Member Characteristics (.572), Team Processes (.573) and Information Technology (.564) were also found to be statistically significant (Gluesing and Riopelle 2009). This suggests that future COINs classes would be advised to allow time at the beginning of the projects not only to allow all teams to discuss and reach consensus as to the mission and objectives of each team, but also to provide coaching during the process of consensus and trust-building.

The graphic depicting the process of collaborating in COINs (Figure 1) was created by two design management students who participated on different project teams in the COINs 2008 course. It provides a visual representation of the overall GVT experience and suggests a model for how team performance and the team experience might be enhanced by making points of conflict explicit and incorporating activities designed to alleviate tensions that are inherent in virtual environments.

2.3 Learning to Collaborate in COINs: The Designers' Perspective

In follow-up reviews the design students identified multiple challenges which they faced in learning to collaborate with their team mates from computer science and information systems. Designers found that team mates had limited knowledge of the skills and capabilities that they possessed as designers. It was generally assumed that tasks involving sketching, rendering, and aesthetics (i.e., power point design and logo creation) would be the primary contribution of the designers. Consequently, one of the first realizations was that they would need to demonstrate the skills and capabilities they did bring. Establishing the value for the "design thinking" and the design process was a struggle since it did not align with the work processes of the computer science and information systems students.

[1] Global Virtual Team Self-Assessment Instrument, © Cultural Connections, Inc.

[2] Students in the COINS course voluntarily participated in an automated form of social network analysis of their email correspondence throughout the course.

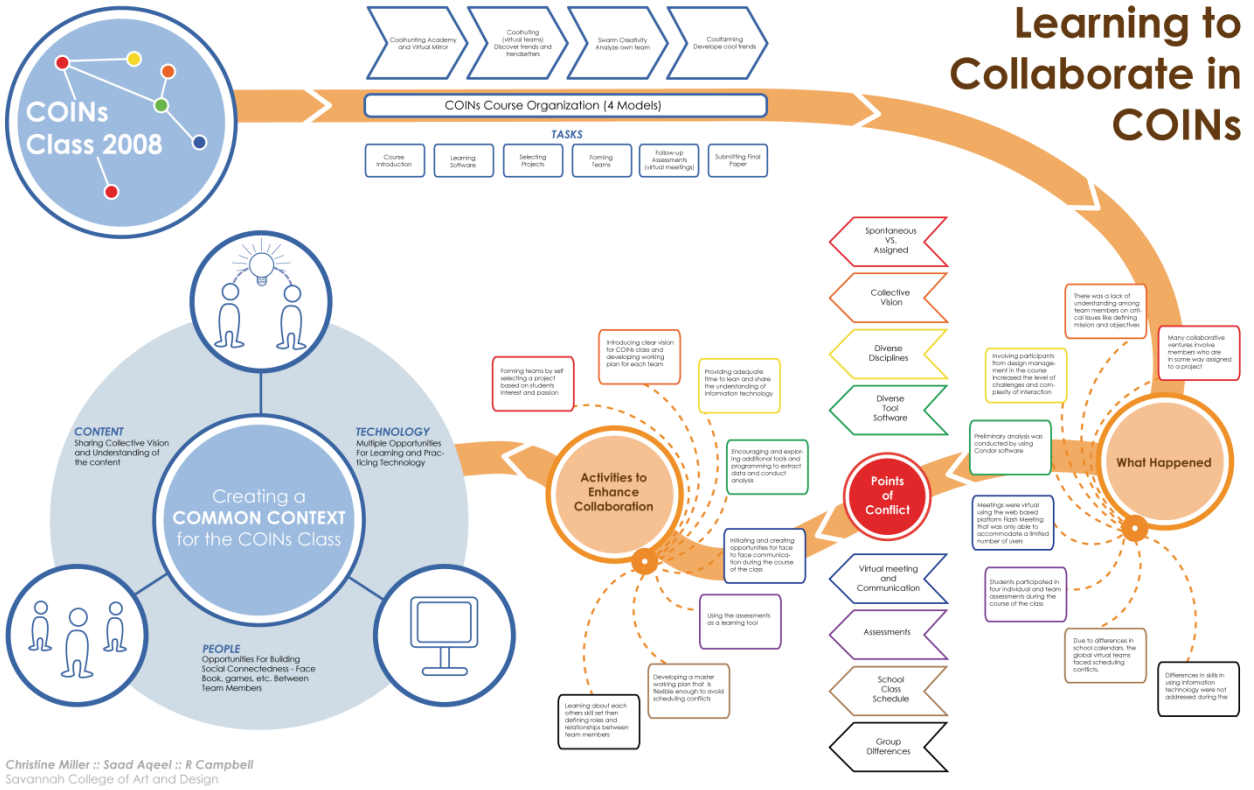

Figure 1 Learning to Collaborate in COINs (Aqeel-Alzrooni and Campbell 2009)

Despite the prevalence of talk about design thinking, there is still relatively little understanding about how the design process works. Design thinking is an approach to problem-solving that assumes that we live in a world of complex systems in which trends and events are perceived as symptoms of underlying system structures (Meadows 2008). Understanding context is critical. Consequently, the initial phases of the design process involve developing a deep familiarity with all aspects of the stated problem. Often this initial inquiry – the discovery phase - of the stated problem reveals unanticipated dimensions that reconfigure the issues in new ways. The divergent nature of the discovery phase can raise tensions in cross-disciplinary teams when other team members are accustomed to processes that move rapidly to identifying solutions.

Developing a shared understanding and appreciation for diverse work practices and processes are difficult in situations where team members are co-located and relatively homogeneous. For cross-disciplinary virtual teams the process can be much more challenging to the point that team performance suffers. Along with work processes and practices, different toolsets can be the source of power. The distribution of power between team members becomes unbalanced when one discipline is closely aligned with tools that are perceived to be essential to achieving a successful outcome. Lack of skill in using those tools can result in marginalizing team members at critical points in the project.

In these instances the design students believed that it was their responsibility to communicate their skills and capabilities as well as the value of their work processes to their non-designer team members. They understood that they would need to articulate the benefits their contributions would make to the successful completion of the project. However, as work on the projects began the technical learning curve for most of the designers was time-intensive, despite the training on using the software that they had received. Consequently, there was little opportunity to frame

the problem in terms of design principles and processes. The fact that they were not familiar with the tools and skills that were considered essential to the successful completion of the project, in many cases playing "catch up" put them at a relative disadvantage in terms of balancing the approach they would take as designers. In some cases this meant settling into the role most often considered what it is that designers do: turning their attention to aesthetics concerns, and at best, visualizing and modelling data. For many of the designers, the potential they perceived at the completion of the project was what they found most exciting.

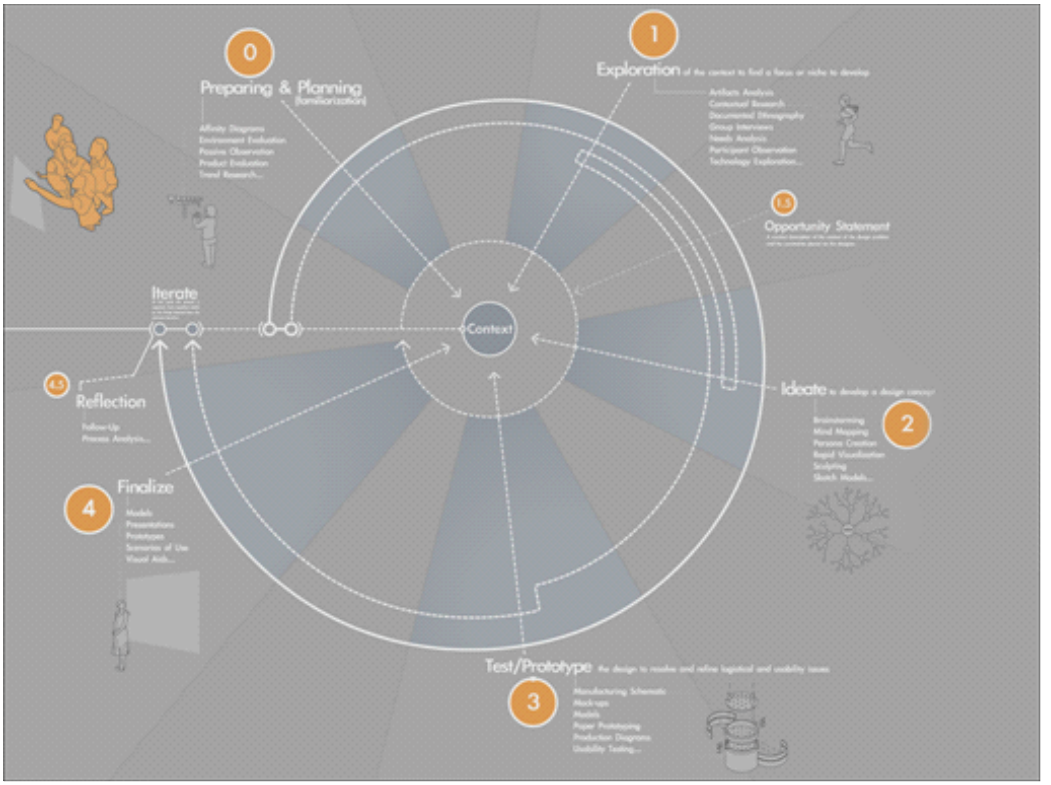

Figure 2 The Design Process (Michael Tseng)

3.0 Moving to the solution: Proposing a framework for Global Virtual COINs

While the experience of participating in cross-disciplinary global virtual team projects was problematic, it was undoubtedly a positive learning experience for all students. From the perspective of the designers the experience for all GVT team members would be enhanced with the addition of several changes to the existing format. Key insights lead us to suggest the following:

- Formal presentation on the representative disciplines at the outset of the course would help in establishing the interdisciplinary nature of the projects: what does each bring to the project?
- Discussion regarding logics should be explicit. These discussions do not need to be formal but should cover issues such as
    - How to handle technical problems
    - What modes of communication are feasible and preferred
    - Contextual issues that can impact the availability of team members, including but not limited to:
        - Time zone differences
        - Language ability
        - Different dates for term beginning and ending, holiday schedules
        - Expectations regarding grades and performance

- Scope the project and establish mission and objectives from a perspective that includes the skills of all disciplines so that one discipline is not in the position of being dominant in either the approach to the problem, perceived value of skill sets, work processes, or tools.
- Allow students to work on the projects they want to work on rather than assigning them to teams. Following this strategy more closely aligns with a naturally occurring COIN and was instituted in the 2009 COINs class.
- Explanation of the role of faculty, their contribution in terms of expertise, and their availability

4.0 Conclusion

Given current trends in business and organizational practice, the value for graduate students from all disciplines of participating in cross-disciplinary global virtual team projects is not only evident in learning outcomes, but is also key to their future success . At SCAD, the COINs course has become a component of the Design Management curriculum and students from other departments are taking the opportunity to experience and learn how to collaborate at a distance by taking the class, despite the additional work load it requires.

Lessons learned through the first course, COINs 2008, have been applied in the course in 2009. Successful collaboration between the four universities is leading to other opportunities for projects and initiatives. In essence, learning to collaborate in COINs has resulted in a community of practice (Wenger 1998) and is spinning off new collaborative innovation networks. The perspective and insights of the design students and faculty are being incorporated into the course format going forward. We anticipate that this will lead to a greater opportunity for learning for all the graduate students who participate in COINs projects, and that this will result in a richer experience, and enhance project outcomes for the client sponsors.

References

Acar, T. C., C. Mathoul, et al. (2006). Analysis and Correlation of Collaborative Communication: Behavior and Geographical Location - The debian Project. COINs course final project reports. Cologne, University of Cologne.

Gloor, P. (2006). Swarm Creativity: Competitive Advantage through Collaborative Innovation Networks. New York, Oxford University Press.

Gluesing, J., P. Gloor, et al. (2009). Collaborative Innovation Networks (COINs) Workshop: A Proposal, Wayne State University.

Gluesing, J. and K. Riopelle (2009). Be A Bee Course 2008-2009 Global Virtual Teams Survey (GVT) – Summary Report. Troy, MI, Wayne State University.

Gluesing, J., K. Riopelle, et al. (2009). Global Virtual Teaming: A Correlation of Survey Data with Network Structure from Email. Collaborative Innovation Networks 2009, Savannah, GA, Elsevier.

Meadows, D. H., Ed. (2008). Thinking in Systems: A Primer. White River Junction, VT, Chelsea Green Publishing.

Riley, J. R., U. Greggers, et al. (2005). "The flight paths of honeybees recruited by the waggle dance." Nature **435**(7039): 205-207.

Wenger, E. (1998). Communities of Practice: Learning, Meaning, and Identity. Cambridge, Cambridge University Press.

Wundram, M., K. Farrag, et al. (2008). Investment Trend Project: The Motley Fool. COINs Course final project reports. Cologne, Germany, University of Cologne**:** 41.

Ye, L. and S. Niepel (2006). SNA-Tool supported methods to uncover criminal networks. COINs Course final project reports. Cologne, Germany, University of Cologne**:** 11.