

# **SPEAKING IN TEAMS: MOTIVATING A PATTERN LANGUAGE FOR COLLABORATION**

**Erik Johnston<sup>1,\*</sup> and Darrin Hicks<sup>2</sup>**

<sup>1</sup>School of Information & Center for the Study of Complex Systems,  
University of Michigan  
Ann Arbor, USA

<sup>2</sup>Department of Human Communication Studies, University of Denver  
Denver, USA

*Preliminary report*

*Received: 2 November, 2004. Accepted: 13 December, 2004.*

## **SUMMARY**

Collaborative work is increasing in frequency and importance in business, academia, and communities. The knowledge behind what makes for a successful collaboration is also increasing but is normally focused on only one aspect of collaboration theory. The understanding of how successful collaborations are built is greatly improved by the creation of a unified framework that organises and transfers knowledge and practices. The framework proposed in this paper is the concept of a pattern language for collaboration. The notion of a pattern language was first detailed in 1979 by Christopher Alexander in his book, *A Timeless Way of Building* [1]. A pattern language consists of a hierarchy of individual patterns that are used to solve problems associated with the parts in the pattern. When developed, researchers can use a pattern language for collaboration as a tool set to evaluate existing collaborations, repair unhealthy collaborations, and build future collaborations. The core concept is that the structure of an environment guides the pattern of events that occurs. A healthy collaboration is more likely to be responsive to the needs of its community and robust enough to overcome unanticipated challenges. The development and evolution of the pattern language is similar to a genetic process in that quality of the overall language emerges from the interaction of individual and complex patterns. The article applies the pattern language to the real world example of twenty eight different collaborations that are part of the Colorado Healthy Communities Initiative to illustrate the application of the pattern language in context. The article closes with recommendations for future development of the language.

## **KEY WORDS**

Colorado Healthy Communities Initiative, collaboration, pattern language, evolutionary development, complexity

## **CLASSIFICATION**

APA: 3020

\*Corresponding author, *η*: [erikwj@umich.edu](mailto:erikwj@umich.edu); (+734) 615 7210; STIET Program, University of Michigan, 2204 SI North 2112, 1075 Beal Ave, Ann Arbor, MI 48109-2112, USA

## **INTRODUCTION**

Collaborations are becoming an increasingly common form of work of greater frequency and greater importance. Low cost communication technologies are accessible to more people. Increased travel and communication has shaped a world that is increasingly interconnected. Business, social, and professional relationships are moving from the hallways to online virtual meeting places. Relationships, professional or social, can be maintained at greater distances and with lower effort. As these changes occur the urgency to understand how to build healthy collaborations builds.

The funding of collaboration research and the knowledge base of collaborations is growing every day to meet this need. Individual aspects of collaborations are already known in great detail. These aspects include technology effects, management methods, group dynamics, information sharing, and more. The challenge is that much of this knowledge exists in isolation. As the different research areas develop they start to overlap suggesting underlying similarities. The similarities can be generalised to concepts that are useful to a great variety of applications. The research and experiences with collaborations has developed sufficiently that a framework for understanding the interrelations between these concepts can begin to be formalised through a unifying structure.

The purpose of this paper is to motivate a “pattern language for collaboration” as a framework for understanding this knowledge. The properties of such a pattern language is modelled off the properties of designing buildings and communities that Christopher Alexander describes in his 1979 classic book, *A Timeless Way of Building* [1]. The characteristics of a pattern can be understood in general as: examining specific contexts that address a specific type of problem and proposing specific solutions. Common ground, distributed work, and models of information are elements of patterns that can be combined together to form the structure of a pattern language. A pattern language consists of a hierarchy of parts that are used to solve problems associated with the patterns.

When developed, the structure of a pattern language provides a network of relationship between patterns that organise, transform, and share knowledge and practices. The knowledge is built through experience and research and provides the motivation for the practices. The practices are actions and methods that build healthy collaborations and repair deficits in existing collaborations [2].

There are precise qualities that are inherent to a healthy collaboration. A healthy collaboration is one that is responsive to the needs of the community it is serving. A healthy collaboration is robust enough to overcome unanticipated difficulties that arise. A healthy collaboration has stakeholders who are willing to risk their own interests for the greater good. A healthy collaboration can also have a significant impact on more than just the intended purpose of the project, frequently building social capital between the stakeholders and strengthening the community [3]. In this paper, we will use the Colorado Healthy Communities Initiative to demonstrate the usefulness of a pattern language for collaboration. [4] The research provides a rich example of a real world application of successful collaboration across various communities.

## **COLORADO HEALTHY COMMUNITIES INITIATIVE**

The Colorado Healthy Communities Initiative (CHCI) started in 1992 with an 8,8 million dollar initiative to empower citizens across the state of Colorado to improve the health of their communities. The CHCI is modelled after the World Health Organization's "Healthy Cities Initiative". Twenty nine communities in Colorado were given planning grants that funded a 15-18 month process to encourage community wide thinking on what health means for a community and to create an action plan to act on this definition. These action plans varied widely depending on the needs of the communities. Examples of actions plans include: building a new medical centre, improving the quality of childcare, and building a region wide transportation program. The twenty eight communities that completed the planning process were then given \$100 000 to carry out their action plan with limited restrictions. Later research conducted at the University of Denver evaluated twenty six of these communities on six performance measures.

1. The project accomplished its specific objectives. The goals and objectives of the original stakeholder group were accomplished. 20 of the 26 CHCI projects reported they had accomplished their objectives.
2. The project achieved more than the original goals formulated by the stakeholders group. 18 of the 26 projects exceeded their original goals. Example: In one community the goal was to create a small medical clinic that would serve a few hundred patients a year. After ten years this clinic was serving over 10 000 visits per year and is now a key component of the health care community in the region serving patients from multiple states.
3. The project had a concrete impact on the root problem it targeted. 19 of the 26 projects impacted the root problem. Example: A separate community had the goal of providing transportation through the mountains from outlying communities to health and social services targeting lower income families. The collaboration led to the creation of the second largest regional bus system that serves four million passengers a year.
4. The project was a catalyst for other projects or efforts. 20 of the 26 projects led to other efforts. Example: In a very poor urban community the initial success stakeholders experienced in building a new senior centre has led to the establishment of a community-wide food bank.
5. The project helped change the way the community works together on public issues. Example: One project has a vision of creating a connections group that coordinated the efforts of different agencies to promote community collaborations. Since its inception the agency has fostered highly successful collaboratives on tobacco awareness, children's literacy and preservation efforts of the regions water supply.
6. The project developed new leaders and increased the engagement of community members. 21 of the 26 projects increased the "social capital" of their community. Example: One community developed an innovative leadership development program for the indigenous populations living in their region. This program had been modelled in several other communities across the United States.

The overall project was successful by nearly any standard. What are still unknown are the common factors that lead to the success of the collaboration in these communities. We first proposed applying the concept of a pattern language to collaborations as a method of describing the qualities of collaboration. The fitness of these qualities can

help predict what makes some collaborations successful while other collaborations with nearly identical processes fail.

## **APPLICATIONS OF A PATTERN LANGUAGE FOR COLLABORATION**

The framework is a pattern language that can be used as a tool set to evaluate existing collaborations, repair unhealthy collaborations, and build future collaborations.

As an evaluation tool, a shared pattern language can diagnose where problems exist and predict the expected outcome given the conditions of a current collaboration. The benefit of describing a collaboration using the patterns of the language is the identification of an essential missing factor and a subsequent recommendation of a method to remedy the problem. A trivial example of this point is two people with a shared language of cars discussing why the car will not start. The explanation that the gas tank is empty clearly identifies and communicates the problem. These two people do not have to explore the condition of the tires or discuss how the gas will propel the car forward using internal combustion because sharing the language underlying the concepts is enough to organise and share the knowledge of the situation.

A pattern language also provides the framework and tools necessary to repair collaborations with problems. A shared language facilitates the ability to identify problems that inhibit the potential of collaboration. A shared language leads to the transferring of knowledge on how collaborations operate while also providing natural recommendations for mediation strategies of problems until they can be repaired. After the repair the pattern language is applied again to assess the new state of the collaboration in an ongoing evolutionary process.

A pattern language also provides the architectural blueprint for building future collaborations. When stakeholders in any collaboration have a shared language, they are better able to coordinate a shared vision and solve problems that unexpectedly arise. For example, the CHCI collaborations were required to have a 15-18 month planning period before they could start. The first step in this process was to create a community definition of health. The planning process identified the capacities necessary to create novel solutions to increasingly complex social, economic, and public health problems. During this time the collaboratories constructed a shared language. After the initial construction of the collaboration, the language is continually used to assess performance, identify emerging problems, recommend remedies, and again, allow the process to naturally evolve.

## **EVOLUTION OF A PATTERN LANGUAGE**

The evolution of a pattern language and the evolution of an individual process are similar to genetic evolution. The pattern language is composed of many parts and these parts can be configured in countless complex structures. As architects of collaborations start to build multiple collaborations, they learn how one configuration of patterns might work better than a different configuration of patterns in any given context. When they encounter a similar context again they will be more likely to go with the one they know as more viable. Outside of context there is no perfect collaboration. Collaboration is only as successful as its ability to adapt to its environment. Stronger patterns survived through use and weaker patterns are used less frequently. The development of a fully functional pattern language occurs through the growth of many such competitions over time.

The University of Michigan has built a preliminary version of a collaboration pattern language with its Science of Collaborations (SOC) Wizard. The project has studied over 100 scientific laboratories and has observed qualities across collaborations that are highly suggestive of a successful collaboration. The SOC Wizard is a tool that describes collaboration patterns including: collaboration readiness, common ground, technology readiness, and distributed work. For each pattern there is a series of questions that determine if the collaboration will be successful for that pattern. When a question finds a deficiency, the tool both identifies the problem and recommends a remedy for success. As this tool and the pattern language formalises, the ability to predict, diagnose, and build successful collaborations improves. The goal is to build stronger collaborations by designing information models that promote quality, healthy cooperation.

Each pattern, because it is part of the larger whole, can help both itself and other patterns to emerge as successful. The interaction of the parts can lead to patterns that co-evolve together as complex combinations of patterns start to form. When conditions change, either gradually or suddenly, the patterns and combinations of patterns that best adapt to the local circumstances will be the ones that survive through use. The interactions of isolated or complex individual patterns are the building blocks for the language [5].

## **COLLABORATION PATTERN EXAMPLE: COMMUNICATION CHANNELS**

The current research will apply the one pattern from the pattern language to a real world situation that is rich in data. Evaluating the language against collaborations with known processes and results provides the necessary feedback to develop the patterns of the language, observe how these patterns interact in practice, and witness the results across situations where various patterns and pattern groups are included or omitted [6]. We will apply an example of an individual pattern to a problem encountered by one of the laboratories of CHCI to show how this pattern can isolate the problem, provide the means of mediating the problem, and recommend a solution. This will demonstrate how the structure of an environment guides the pattern of events.

### **CONTEXT**

A healthy environment for collaboration naturally leads to more successful collaborations by creating an open and credible process. An interesting finding from the research in Colorado is the observation in practice of the fair process effect. If stakeholders perceive the process as unfair, as treating them with insufficient respect and dignity, they will either abandon collaboratives, or worse will remain and find ways to manipulate the process to garner more resources at the expense of others. They will not, however, see their actions as unethical, but as the natural outcome of the process itself. The result is a vicious circle of selfishness, an eventual loss of legitimacy and the collapse of the deliberative process. On the other hand, we have found that when stakeholders perceive the process as fair they will act cooperatively even when they receive less than what they hoped for. And they will take others' needs and desires into consideration in forming their own convictions. The result is a virtuous circle where the initial emotional, physical and spiritual energy invested into the collaborative fosters greater commitment to the process and stakeholders continue to re-dedicate themselves and their resources to implementing and sustaining joint initiatives.

## **PROBLEM**

While only three of the original 29 projects were not successfully implemented, each encountered obstacles to collaboration. The most common obstacle, as reported by 69 % of the stakeholders, was engaging committed people in sufficient numbers to overcome vested interests and negative community perceptions about the project. Three of the projects failed to engage sufficient commitment to implement their projects. And the ability to foster commitment explained the varying degrees of success among the initiatives as measured along the six performance measures. The only significant difference found between those communities in terms of their ability foster commitment was the stakeholders' ratings of their processes fairness. In those communities where stakeholders perceived the process as less fair success dropped considerably. Described from a game theoretic perspective, each stakeholder has the ability to either cooperate or defect. In this situation cooperation was risking individual resources for the greater good and defecting was not investing resources or protecting ones own interests first. In a situation where one stakeholder defects, the other stakeholders need to know of this defection to appropriately react and punish the behaviour. In the unsuccessful CHCI projects, stakeholders cited a lack of feedback resulting in an equal response from the other stakeholders regardless of if they cooperated or defected. This uniform response provides no incentive to cooperate when cooperation has a cost. Stakeholders also complained of being uninformed of the actions of the other stakeholders and thus were unable to know if others were cooperating or defecting. When negative feedback is sent it deters future defections and also sends a signal to others that defection has direct consequences [7]. Similarly, when a stakeholder makes a sacrifice to the greater good, the feedback should also be immediate and positive.

## **MEDIATION**

The economic theory of trembling-hand perfect equilibrium (THPE) provides a strategy for negotiating contexts with noisy communication channels until high quality communication channels can be constructed. The main idea behind THPE is that stakeholders who are cooperating might be perceived by other stakeholders as having defected (or *vice versa*). When such mistakes are understood to be possible, THPE remains the optimal solution for all stakeholders because is more robust at overcoming mistakes caused by noisy or incomplete communication cannels. The cost of THPE is that the strategy is not an optimum solution, but given the noisy communication channels, it is overall the most stable means of negotiating with the other stakeholders and in the long term provides the most favourable results.

## **SOLUTION**

Improve the communication channels with better technology. Create a community web space that can be accessed by all stakeholders and provides a shared record of events and participation. Standardise the delivery and feedback expectation for actions that require responses. Processes supported by technology are more robust to failures at either level. Technology integrated with a high quality process provides for clear communication channels that transmit a stakeholder's actual intent.

## **FUTURE WORK**

This article is being written at the beginning of this line of research, is forward thinking, and reasonably optimistic by nature. The formalism of the pattern language is a naturally evolving process that will continue to develop. As the framework is

explored, future work can be conceptualised either through extending on the understanding of one pattern in the language, exploring relations between existing patterns or combinations of patterns, or adding a new pattern altogether. A thorough understanding of the language will be able to describe the role of collaboration concepts that are as diverse as:

- social capital
- diffusion of innovation
- communication channels
- information needs
- fair process effects
- communities of practice
- media richness
- network externalities
- resource scarcity
- technology effects
- collaboration readiness
- cultures of helping
- trust
- critical mass
- imperfect information
- reputations
- data sharing
- remote users
- power dynamics
- in/group out/group effects, etc.

The quality of the language is a direct result of the quality of the individual patterns. It is the network of connections between patterns that is responsible for creating the nature of the language. As the individual patterns develop through high quality research, the overall structure of the language will continue to be useful as a framework to organise and share knowledge and practices of collaborations.

## **ACKNOWLEDGMENTS**

We would like to acknowledge the following people for their help in the continued research into this area: Carl Larson, Gary Olson, Judy Olson, Ning Nan, the Science of Collaboration team, and the Collaboratory for Research on Electronic Work (CREW).

E. J. would also like to thank Josip Stepanić for his continuing encouragement for collaboration with the Complex Systems group in Croatia, and Miran Božičević for inviting him to speak in Zagreb as part of the Caternetics Speaker Series in the summer of 2004.

## **REFERENCES**

- [1] Alexander, C.: *A Timeless Way of Building*.  
Oxford University Press, New York, 1979,

- [2] Alexander, C.; Ishikawa, S. and Silverstein, M.: *A Pattern Language: Towns, Buildings, Construction*. Oxford University Press, New York, 1977,
- [3] Putnam, R.: *Bowling Alone*. Journal of Democracy 6(1), 65-78, 1995,
- [4] Larson, C.; Christian, A.; Olson, L; Hicks, D. and Sweeney, K.: *Colorado Healthy Communities Initiative: Ten Years Later*. Colorado Trusts, Denver 2002,
- [5] Dennett, D.C.: *Darwin's Dangerous Idea*. Simon and Schuster, New York, 1996,
- [6] Axelrod, R.: *Theoretical Foundation of Partnerships for Economic Development*. World Bank Conference on Evaluation and Development – The Partnership Dimension, July 23-24, Washington, D.C., 2001,
- [7] Axelrod, R.: *The Evolution of Cooperation*. Basic Books, New York, 1984,  
<http://www.personal.umich.edu/~axe/research/Partnerships.pdf>.

---

## **RAZGOVOR U GRUPAMA: MOTIVACIJA RAZVOJA OBRASCA JEZIKA**

Erik Johnston<sup>1</sup> i Darrin Hicks<sup>2</sup>

<sup>1</sup>Škola za informacije i Centar za proučavanje kompleksnih sustava, Sveučilište u Michiganu  
Ann Arbor, SAD

<sup>2</sup>Odjel za proučavanje ljudske komunikacije, Sveučilište u Denveru  
Denver, SAD

### **SAŽETAK**

Učestalost i značajnost suradnje raste u poslovanju, znanosti i zajednici. Znanje o preduvjetima uspješne komunikacije također raste, ali je uobičajeno koncentrirano na pojedini vid teorije suradnje. Razumijevanje izgrađivanja uspješne suradnje znatno se povećava stvaranjem jedinstvenog okvira ta organiziranje i prijenos znanja i vještina. Okvir predložen u ovom članku je koncept jezika obrazaca za suradnju. Pojam jezika obrazaca prvi je razradio 1979. godine Christopher Alexander u svojoj knjizi *A Timeless Way of Building*. Jezik obrazaca je hijerarhija pojedinačnih obrazaca upotrijebljenih za razrješavanje problema povezanih s dijelovima obrazaca. Razvijeni jezik obrazaca za suradnju istraživači mogu koristiti kao alat za izvrjednjavanje postojećih, poboljšavanje nezdravih i izgradnju budućih suradnji. Suština pristupa je da struktura okoline oblikuje obrasce događaja. Zdrava suradnja vjerojatnije će biti odgovorna prema potrebama zajednice i dovoljno robustna da nađe izazove suradnji. Razvoj i evolucija jezika obrazaca slični genetskom procesu jer odlike jezika u cjelini izrastaju iz međudjelovanja pojedinačnih i kompleksnijih obrazaca. U članku se primjenjuje jezik obrazaca na primjer 28 različitih kolaboracija koje su dio Inicijative zdravih zajednica u Coloradu radi ilustriranja njegove primjenjivosti u kontekstu. Članak završava smjernicama daljnjeg razvoja jezika obrazaca.

### **KLJUČNE RIJEČI**

inicijativa zdravih zajednica u Coloradu, suradnja, jezik obrazaca, evolucijski razvoj, kompleksnost