

# Putting It All Together: Pattern Languages for Interaction Design<sup>1</sup>

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## THE TOPIC: PATTERN LANGUAGES FOR INTERACTION DESIGN

### The Challenge: Complexity and Diversity

Interaction design is becoming an increasingly complex and diverse activity. It is becoming more complex in that communications and computational technology is being integrated into more devices and environments as it becomes cheaper and smaller. This, in combination with advances in sensing and effector technologies, provides a new arena in which interaction designers can solve (and create!) new problems. Even as the space of design possibilities increases, workplace studies are making us increasingly aware of the complexity of the socio-technical systems within which we are working to integrate our new technologies. How are we to manage this complexity?

Interaction design is becoming more diverse in that a wider range of people are becoming involved in it. Within CHI, it is well accepted that anthropologists, psychologists and visual designers, as well as computer scientists, have roles to play in systems design. As computing systems shrink in size, industrial and product designers need to work hand in hand with systems designers. The advent of virtual spaces create roles for architects and interior designers. The commercialization of video and multimedia technologies create roles for musicians, film producers, et al. While the multidisciplinary nature of interaction design brings much richness, it is also challenging because no common perspective, set of practices, or theoretical orientation can be assumed.

Another factor driving the diversification of interaction design is customization. As systems become increasingly customizable due to technologies like component software, more and more design -- in the sense of front end creation, application programming, and software configuration -- is being done in-house. Sometimes this means that traditional MIS departments are playing a role; sometimes it means that external consultants are involved; sometimes it means that end users themselves participate. In many cases, these participants lack the time, resources, or inclination to engage in research on the needs and practices of their users. And, in many cases, these participants lack formal training in design, and hence any common perspective.

### A Possible Solution: Pattern Languages

So, we have a rapidly expanding game: more players and more technology projected onto workplaces which we are learning more and more about. This increasing complexity and diversity can be source of richness, or of chaos. If CHI is, indeed, looking to the future, we need to explore ways of dealing with the increasing complexity and diversity of the interaction design field. In this workshop we would like to explore one possible way of putting it all together. Our model is the work of Christopher Alexander and his colleagues who over the last few decades have looked at what works and what doesn't work in architecture and urban design. The basic approach is to closely examine particular cases, attempt to identify recurring patterns and integrate them into a language of relatively concrete patterns. Their work is codified in the book *A Pattern Language* [1]: each pattern is described; examples are given; empirical data supporting the pattern are referenced; and the relationship to other patterns are defined. The way of using the patterns, that is, the process of design, is described in a companion volume, *The Timeless Way of Building* [2].

Let's take a brief look at Alexander's Pattern Language. The language consists of a network of over 250 patterns. The patterns cover a wide range of scale, ranging from a pattern for the distribution of towns and cities to patterns for walls and room sizes. The patterns are loosely connected across levels: any given pattern typically points to smaller scale patterns which can support it, and larger scale level patterns in which it may participate. For example, a pattern called Identifiable Neighborhood (aimed, obviously enough, at creating neighborhoods with their own particular, sense of place) will involve a number of lower level patterns, possibilities including Street Cafe, Individually Owned Shops, Corner Grocery, Beer Hall, and so on. At the same time, Identifiable Neighborhood participates in larger scale patterns that specify characteristics of communities.

Now let's look at a few examples of individual patterns, though these short summaries do not give the full flavor of the careful analysis and data that are contained in the full patterns. "Eccentric Neighborhood Centers" points out that neighborhood centers should be off-center; that is, closer to downtown because people will tend to go toward the city center rather than away from it. "Beer

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<sup>1</sup> This proposal has been slightly modified with the permission of the authors to conform to the format adopted for CHI 2001.

Gardens" points out that community pubs should have activity around the edges and large tables in the middle. This encourages people to cross through the center and sit at the tables. By contrast, many bars have very small tables, and it becomes uncomfortable for a stranger to "casually" approach another because the space is too intimate. Thus, the opportunity for the pub to serve as a cohesive force is diminished. "Gradient of Privacy" says that there should be a gradual gradient from public to private space in a house; e.g., from porches that look on the street life to entry ways to public rooms to family rooms to the bedroom.

These patterns focus on the interactions between the physical form of the built environment, and the way in which its form inhibits or facilitates various sorts of personal and social behavior within it. This emphasis on the overlap between the physical and behavioral worlds brings to mind the Gibsonian concept of affordances, although what is going on here is much subtler: whereas saying that certain properties of the environment afford certain actions simply means that it makes them possible (most tables and chairs afford being stood on by a person), the Alexandrian emphasis is on characteristics of the environment which facilitate or inhibit (the presence of a table and chairs can facilitate people working together or sharing food).

### **Goal of the Workshop: Towards an Interaction Pattern Language**

While these patterns describe basic ways that space should be organized in order to have a positive impact on human feelings and behavior, we believe there is a possibility to create something analogous for processes of human interaction. As representations, Pattern Languages have very interesting properties:

- they are based on concrete prototypes drawn from the domain in which design is being done
- they work at multiple levels -- community, group, individual-- and they endeavor to tie the levels together
- they endeavor to bridge the gap between the physical and social worlds
- they seem to be amenable to gradual, piecemeal development

We believe that these properties might enable Pattern Languages to serve as a *lingua franca* for the diverse community of interaction designers. (It should be noted that there is considerable interest in Pattern Languages as a vehicles for object-oriented software design reflected both books (e.g., [3, 4, 5]), and in mailing list activity (see the Patterns home page at <http://st-www.cs.uiuc.edu/users/patterns/>) -- however, as yet, there has been little attention given to pattern languages for interaction design.)

Among the issues the workshop will take on are:

- Should there be one Interaction Pattern Language, or many? For example, one might imagine a single "Pattern Language of Human Interaction" that would

include patterns at various levels including those that deal with the organization of whole societies, organizations to perform extended work (companies, churches, universities), departments, teams, and individuals.

- In contrast to the Alexandrian Pattern Language, which deals with space, interaction pattern languages need to deal with time, sequence, and roles. How is that to be managed?
- How might Pattern Languages be applied in actual use? What design methods lend themselves to Pattern Language development?

The scope of such an undertaking is huge; we certainly would not expect that a two-day workshop would produce a complete pattern language! However, we do believe that we could explore a number of the issues that need to be addressed in such an undertaking.

### **FORMAT OF THE WORKSHOP**

#### **Participant Solicitation and Selection**

We will solicit the CHI community through all the usual mechanisms including e-mail and personal contacts, especially at several upcoming meetings. In addition, we would like to get one or more people who have worked directly with Christopher Alexander to come. We will be looking for participants who are willing to give this enterprise a serious, constructive try; we are not interested in a two-day debate, absent any evidence, on whether or not this is a good idea. We are looking for participants with lots of experience in some aspect of designing interactive systems. Other things being equal, we will attempt to construct a list of approximately 12 attendees with a large diversity of experiences. We also expect people to have read enough of Christopher Alexander's work to understand the basic approach and to have developed at least one or two trial patterns prior to the workshop (see preparation). We will select people then, on the basis of the quality of their proposed patterns; the extent (and diversity) of their backgrounds in design; and their familiarity with the basic concepts of *A Pattern Language*.

#### **Method of Interaction**

Initially, we will ask each participant to briefly describe their proposed pattern(s). (Limit ten minutes per person initially). The focus here will be on understanding what the patterns are. Secondly, using the K-J method (bottom-up group clustering), we will break into smaller groups. For example, it *may* be that a natural clustering occurs around the "level" of interaction.

After a brief discussion and modeling of the processes, we will expect people to interact in smaller groups via Dialogue and Skilled Discussion [6]. Dialogue is a controlled process for allowing group intelligence to emerge. From Dialogue, we expect new patterns to emerge for consideration. Skilled Discussion is a way of

determining whether particular proposed patterns should be part of a pattern language.

At the end of the formal session, we will re-convene for a read-out of the groups' proposed patterns. We will also allow time for a general discussion of how to evaluate our output and how to continue the work in a distributed fashion.

#### **Schedule for the Workshop**

Day One, Morning (3 hours): Preliminary introductions; logistics; agenda; presentations by participants (about 10 minutes, depending upon number); clustering exercise.

Day One, Afternoon (3 hours): Short explanation and modeling for Dialogue and Skilled Discussion. Most of the afternoon will be spent in smaller group exercises to build more patterns (depending on the results of the clustering). At the end of the afternoon, the entire group will reconvene to take stock and discuss possible dinner plans.

Day Two, Morning (3 hours): Meet in small groups to further develop patterns and prepare draft explanations/materials for poster and presentation to the larger group.

Day Two, Afternoon (3 hours): Read-outs of new proposed patterns. Large group discussion and revision.

#### **Pre-workshop Activities**

As should be clear, we would like people to be familiar with Alexander's A Pattern Language, to reflect on their own design experience and come up with several proposed patterns and be prepared to explain these to the group. We would also like people to do a small amount of reading on Dialogue and Skilled Discussion, though there will be time to explain these processes during the workshop itself.

#### **Plan for Dissemination**

The first order of business will be to write up the results of the workshop in a SIGCHI Bulletin paper and thereby to solicit more suggested patterns from the community (assuming that our evaluation is that this is a viable method). An archival Web site that can be linked to through the CHI 2001 Web site will also be prepared by the organizers to support networking among participants.

#### **Fees**

Fees will be waived for Thomas Erickson and John Thomas.

#### **Technical Requirements**

No extraordinary technical support will be required beyond the default equipment available with the room.

## **ORGANIZERS' BACKGROUNDS**

Thomas Erickson is a research scientist at Apple Research Laboratories, in the Discourse Architecture Laboratory. His responsibilities at Apple include designing interfaces for future technologies and applications, and developing scenarios and strategies for future products. Among his current research interests are understanding what makes real world environments rich and inviting places (or impoverished and forbidding places), and applying that understanding to the design of human-computer interfaces, intelligent devices, and to physical environments with embedded computational technology. He has published a variety of papers describing particular design research projects, and discussing design process. While he has participated in a number of workshops (although not at CHI), he has not organized a workshop before.

John Thomas is an Executive Director for NYNEX Science and Technology with responsibilities for speech technology, applications, and platforms as well as human computer interaction, network testing labs, and software productivity aids. He has published numerous articles in such areas as speech technology, query languages, human problem solving and creativity, and human computer interaction. Currently, he is focusing his own work on Organizational Learning. He has worked in HCI research and design for 23 years, primarily at IBM and NYNEX. He was on the workshop committee for CHI '89, workshop chair for CHI '90, general co-chair for CHI '91 and has co-lead workshops at CHI '92 and CHI '93 as well as participating in numerous other CHI workshops. He has also led numerous workshops in under the auspices of the Institute for Rational Emotive Therapy in New York City.

## **REFERENCES**

1. Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I., & Angel, S. *A Pattern Language*. New York: Oxford University Press, 1977.
2. Alexander, C. *A Timeless Way of Building*. New York: Oxford University Press, 1979.
3. Coplien, J. O., and Schmidt, D. C. (eds.) *Pattern Languages of Program Design*. Reading, Mass: Addison-Wesley, 1995.
4. Gabriel, R. P. *Patterns of Software: Tales from the Software Community*. New York: Oxford University Press, 1996.
5. Gamma, E., Helm, R., Johnson, R., and Vlissides, J. *Design Patterns: Elements of Reusable Object-Oriented Software*. Reading, Mass: Addison-Wesley, 1995.
6. Issacs, William N. The Process and Potential of Dialogue in Social Change. *Educational Technology*, Jan./Feb., 20-30, 1996.

## **250 WORD ABSTRACT FOR THE CALL**

The effort to design computing systems is being undertaken by an increasingly broad community of designers, who share little in the way of a core discipline, practice, or theoretical basis. At the same time, the difficulty of design is increasing, as new technologies come to market, and as computing systems become more closely entwined with the workplace. This workshop explores the use of Pattern Languages -- an approach drawn from architecture and urban design-- in interaction design. Pattern Languages focus on the interaction between the physical and social worlds, and represent those interactions as a lattice of concrete prototypes, or patterns. We believe that Pattern Languages offer the potential for functioning as a *lingua franca* among the multiple disciplines involved in design, as well as between domain experts (i.e. end users) and designers.

The workshop will explore ways of applying Pattern Language to interaction design problems. Participants will come to the workshop with examples of patterns, and we will work together to understand the patterns, and the issues they raise. Participants are expected to be familiar with Christopher Alexander's *A Pattern Language*. We will select people for the workshop on the basis of the quality of their proposed patterns; the extent (and diversity) of their backgrounds in design; and their familiarity with the basic concepts of *A Pattern Language*.

Send position papers to John Thomas,  
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## **The Challenge: Complexity and Diversity**

Interaction design is becoming an increasingly complex and diverse activity. It is becoming more complex because existing technologies are becoming smaller and cheaper and thus more ubiquitous, even as new sensing and effector technologies are entering the scene. This complexity is exacerbated by the task of integrating technologies into workplaces which we are recognizing as filled with customs and practices which we disrupt at our peril. Simultaneously, interaction design is becoming more diverse. Within CHI, it is well accepted that anthropologists, psychologists and visual designers, as well as computer scientists, have roles to play in systems design. And as new technologies and application domains appear on the scene, the need for disciplines such as, industrial and product design, architecture and interior designers, and music and film becomes evident. Another factor driving the diversification of interaction design is customization. As systems become increasingly customizable more design is being done in-house. This may be done by MIS departments, outside consultants, or the end users themselves. In many of these cases, these participants lack the time, resources, training, or inclination to engage research on the needs and practices of their users.

## **A Possible Solution: Pattern Language**

So, we have a rapidly expanding game: more players (lacking a common background), and more technology, projected onto workplaces which we are learning more and more about. This increasing complexity and diversity can be source of richness, or of chaos. If CHI is, indeed, looking to the future, we need to explore ways of dealing with the increasing complexity and diversity of the interaction design field.

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Alexander's Pattern Language consists of a network of over 250 patterns. The patterns cover a wide range of scales; each pattern typically points to smaller scale patterns which can support it, and larger scale level patterns in which it may participate. These patterns focus on the interactions between the physical form of the built environment, and the way in which its form inhibits or facilitates various sorts of personal and social behavior within it.

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## **Further Reading**

1. Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I., & Angel, S. *A Pattern Language*. New York: Oxford University Press, 1977.
2. Alexander, C. *A Timeless Way of Building*. New York: Oxford University Press, 1979.