

Pattern Language 3.0 and Fundamental Behavioral Properties

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In this paper, I present frontiers of pattern languages based on my studies over the past 10 years. First, an overview of the history of pattern languages and the perspectives of categorizing existing pattern languages is presented. In this categorization, pattern language for human actions are in their third generation—thus the name “Pattern Language 3.0.” This paper introduces Learning Patterns, Collaboration Patterns, Presentation Patterns, Change Making Patterns, Survival Language, and Words for a Journey as examples of Pattern Language 3.0. The paper also illustrates methodologies of pattern mining, pattern writing, and pattern illustrating. Then, workshops using pattern languages and tools for accessing pattern languages are described. Finally, I propose Fundamental Behavioral Properties as an extension of the theory presented in Christopher Alexander’s book, *The Nature of Order*. I hope that this articulation of the results of my studies will stimulate others to develop future innovations for a creative society.

Pattern language 3.0; human action, dialog; workshop; behavioral properties

1. INTRODUCTION

Over the past 10 years, working with my students, I have created more than 20 pattern languages on various topics to describe human actions, consisting of more than 600 patterns in total. By creating these new pattern languages, we have studied and developed methodology to create pattern languages and to use them. Furthermore, we have made theoretical advances related to pattern languages. This paper presents results from such studies and practices: a conception of generations of pattern languages; examples of pattern languages for human actions; and methodologies of pattern mining, pattern writing, and pattern illustrating. There are also descriptions for how workshops contribute to the successful use of pattern languages, tools for utilizing pattern languages, and fundamental behavioral properties of pattern languages for human actions.

2. GENERATIONS OF PATTERN LANGUAGES

Pattern languages can uncover design knowledge that exists in particular areas of a profession. Design knowledge refers to both the intelligence to notice problems and the clue to solve them. In other words, pattern languages describe expertise in problem solving under certain conditions and in particular contexts.

The originator of pattern language was the architect, Christopher Alexander who proposed it to develop design knowledge of building and town (Alexander, 1979). His intention was to have people who lived in a community get involved in the process of designing their own towns and houses. In the late 1970s, he wrote a book with his colleagues that contained 253 patterns on practical architectural design (Alexander et al., 1977). Ten years after the book was published, Alexander's idea of pattern language was adopted in the field of software design (Beck & Cunningham, 1987; Gamma, et al., 1995). Since the 1990s, an increasing number of fields have adopted the methods of pattern language (Coplien & Harrison, 2004; Manns & Rising, 2005; Manns & Rising, 2015; Hoover & Oshineye, 2009; Pedagogical Patterns Editorial Board, 2012).

On the basis of this background, I have been creating pattern languages in a new area of knowledge concerning human actions such as learning, presentation, collaboration, education, business, social innovation, policy-making, and even beauty in daily life.

Through these experiences, I have thought a fundamental question "What are pattern languages?" In considering this question, I have organized and refined my views on pattern languages. Human actions appear to differ vastly from architecture and software; neverthe-

less, they need to be designed with tacit design knowledge, which still consists in a context, a problem, and a solution. In that sense, without losing the essence of design knowledge, pattern languages are continuing to evolve, which has brought us to the Pattern Language 3.0 stage, distinguishing it from previous stages: Pattern Language 1.0 and Pattern Language 2.0 (Iba, 2011; Iba, 2012b). Figure 1 and Figure 2 illustrate the evolution and difference of these generations as they relate to the object of design, the act of design, and the design purpose.

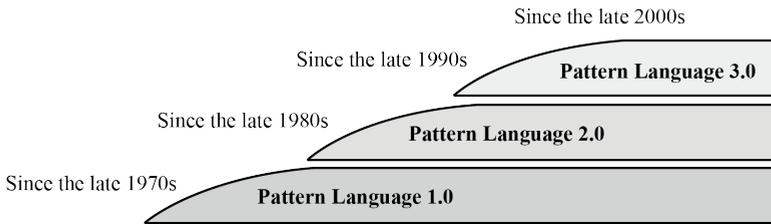


Figure 1: Three Generations of Pattern Languages

	Object of Design	The Act of Designing	Purpose
Pattern Language 3.0	<p>Forms of Human Action (Innovation, Education, Learning, Presentation, Collaboration)</p>	<p>Design Act is Embedded in Actions over Time</p> <p>a series of action</p>	<p>Connecting People who have Different Experiences</p>
Pattern Language 2.0	<p>Non-Physical Forms (Software, Interface, Organization)</p>	<p>Design Act is Iterated over Time</p> <p>release release</p>	<p>Bridging the Gap between Expert and Non-Expert Designers</p>
Pattern Language 1.0	<p>Physical Forms (Architecture)</p>	<p>Design Act is Basically Carried out in a Period</p> <p>completion</p>	<p>Bridging the Gap between Designers and Users</p>

Figure 2: Comparison of Pattern Language Generations

2.1. Object of Design

A pattern language is a collection of inter-related facets that describe aspects of the expertise that is the foundation of design knowledge. The areas of expertise for which pattern languages have been used have changed over time. Initially, the primary object of using pattern language was to describe the design of architecture. Next, it was applied to non-material objects, software programs. Today, in Pattern Language 3.0, the evolution continues as it addresses human actions. An entirely new and unique feature of using 3.0 to create pattern languages is that users develop a type of meta-cognition as they are constantly reflecting on themselves whilst developing their designs.

Examples of the Pattern Language 3.0 areas of human actions being addressed today include: education (Pedagogical Patterns Editorial Board, 2012; Iba et al, 2011; Shibuya et al., 2013), innovation (Manns & Rising, 2005; Manns & Rising, 2015), learning (Hoover & Oshineye, 2009, Iba & Iba Lab, 2014a; Harashima, et al., 2014), collaboration (Iba & Iba Lab, 2014b), presentation (Iba & Iba Lab, 2014c), change making (Shimomukai, et al., 2015), disaster prevention (Furukawazono, et al. 2015), beauty in everyday life (Arao, et al., 2012), living well with dementia (Iba & Okada, 2015), living with continuous self-fulfillments (Nakada, et al., 2013; Kamada, et al., 2014), living in the age of a global society (Matsuzuka, et al., 2013), cultural design (Kadotani, et al., 2013, 2014), academic research (Kobayashi, et al., 2008), project promotion (Naruse, et al., 2008), cooking (Isaku & Iba, 2014; Isaku & Iba, 2015), and policy design (Iba & Takenaka, 2013).

In addition, Pattern Language 3.0 actually includes patterns for creating new pattern languages. These specialized patterns are referred to as “meta-patterns,” because they present the fundamental skills to develop new pattern languages. Meta-patterns include: pattern mining (Iba & Isaku, 2012; Iba & Yoder, 2014; Akado, et al., 2015), pattern writing (Meszaros & Doble, 1997; Harrison, 2006), pattern illustrating (Harasawa, et al., 2015), shepherding (Harrison, 2006), writers’ workshops (Coplien, 1999), and designing workshops to use patterns (Iba, 2012a).

2.2. The Act of Designing

As pattern languages have evolved, not only has the object of design changed, but the meaning of the design has changed as well.

In Pattern Language 1.0, architectural designing was basically a once-off activity in the process of creating a town or a house. After it had been built, it could rarely be undone. Pattern Language 2.0 updated the design system to accommodate software code to make it easier to identify problems, understand how to fix the problem and rewrite the corrected code to be re-released as a better version of the product. For this reason, Pattern Languages 2.0 are useful for repetitive design.

In 3.0, a new aspect has evolved based on the fact that, in practice, human actions undergo continuous change, as people find better ways to do things. Unlike architecture, with its concrete start and end, or software that requires iterative design to turn out new versions of the software, 3.0 pattern languages for human actions must address nonstop change and it is difficult to recognize a clear beginning or end of a certain phase of an activity. This new level of complexity can be explained by the observation that the difference between designing and practicing a human action is hardly distinguishable. We practice to design and design to practice, creating an endless design process.

2.3. Purpose

In Pattern Language 1.0, Alexander developed pattern languages to serve as a lingua franca to bridge the gap between professional designers and community members. With the shift to the information age, Pattern Language 2.0 was primarily developed to fill technical gaps between experts and less experienced professionals. Software designers who wished to improve their skills read the patterns to acquire design knowledge from more experienced programmers. In this case, both sides became designers and the patterns existed merely to reduce the distance between them. The 3.0 evolution of pattern languages now makes it possible to connect all kinds of people (actor) with all kinds of different experiences. 3.0 patterns help illuminate the less noticeable parts of a person's experience, so the person can reconsider the experience to talk about and share these with others. Stated simply, Pattern Language 3.0 becomes a medium for narrative and conversations between people regardless of the amount of experience or skill a person has. In addition, a person need not understand the concept of pattern languages or background knowledge about the design knowledge written in it to use the pattern to its fullest advantage.

3. Examples of Pattern Languages for Human Actions

This section focuses on some major examples of 3.0 pattern languages for human actions we created: Learning Patterns, Collaboration Patterns, Presentation Patterns, Change Making Patterns, Survival Language, and Words for a Journey (Figure 3).

3.1. Learning Patterns

Learning Patterns consists of 40 patterns (Iba et al., 2009; Iba & Miyake, 2010; Iba & Sakamoto, 2011; Iba & Iba Lab, 2014a) to enhance creative learning by providing an opportunity for learners to reflect on their learning styles, to discover or rediscover good habits, and to obtain new insights into how they can become a better learner.

3.2. Collaboration Patterns

Collaboration Patterns are 34 patterns that describe practical knowledge for performing collaborative interactions (Iba and Isaku, 2013; Iba & Iba Lab, 2014b), whereby teamwork creates new values that could change the world by producing an emergent robustness that cannot be attributed to any one member of the team, but comes with the process of enhancing one another.

3.3. Presentation Patterns

Presentation Patterns are 34 patterns that describe practical knowledge for designing presentations (Iba et al. 2012; Iba & Iba Lab, 2014c; Iba & Isaku, 2014) A Creative Presentation is an imagination provoking presentation inviting the audience to discover new findings. Although we use the word “presentation,” this set can be applied to all kinds of presenting such as general public speaking, performance of music, drama, or dance.

3.4. Change Making Patterns

Change Making Patterns describe the secrets for facilitating social change (Shimomukai & Iba, 2012; Shimomukai et al., 2012, 2015; Nakamura & Iba, 2015a, 2015b). The 31 distinctive patterns show how social entrepreneurs identify social issues and create or implement solutions to overcome these issues. This set of tacit knowledge is disclosed for you to not only learn how social entrepreneurship is executed in difficult situations but also start your own change making project.

3.5. Survival Language

Survival Language is a pattern language to support survival when a catastrophic earthquake occurs (Furukawazono, et al., 2013a, 2013b, 2015). There are 20 patterns to teach people to develop practices, including: *Designing for Preparation [for an earthquake]*, *Designing for Emergency Action [in the event of an earthquake]*, and *Designing for Life After an Earthquake*. These patterns were formulated based on the lessons Japan has learned from its experience of numerous earthquakes.

3.6. Words for a Journey

Words for a Journey are 40 patterns to assist people living with dementia (Iba & Okada, 2015; Iba, et al., 2015a, 2015c) and those who care for them to improve quality of life for all involved, and to reduce the negative impressions people may have of the disease. This pattern language was developed from a collection of wisdom and stories from people living in this situation and extracts its essence to be shared widely.

<p>Learning Patterns</p> 	<p>Core Creative Learning Opportunity for Learning Learning by Creating Open Learning</p>	<p>Opportunity Jump In Copycat Learner Effective Asking Output-Driven Learning Daily Use of Foreign Language Playful Learning Tornado of Learning Chain of Excitement Quantity brings Quality Skill Embodiment Language Shower Tangible Growth</p>	<p>Creation Thinking in Action Prototyping Field Diving A Bug's-Eye & Bird's-Eye View Hidden Connections Triangular Dig Passion for Exploration Brain Switch Fruit Farming Attractive Expressions The First-Draft-Halfway-Point Acceleration to the Next</p>	<p>Openness Community of Learning Serendipitous Encounters Good Rivals Talking Thinker Learning by Teaching Firm Determinations Questioning Mind The Right Way Brave Changes Frontier Finder Self-Producer Be Extreme!</p>
<p>Collaboration Patterns</p> 	<p>Core Creative Collaboration Mission for the Future Innovative Ways Create a Legend</p>	<p>Good Team Growth Spiral Sympathetic Union Response Rally Feeling of Togetherness Part to Contribute Return of Growth Spontaneous Commitments Loose Connections Vulnerability Disclosure Words of Thanks</p>	<p>Creation Process Emergence Vigor Loaf of Time Collaborative Field Activity Footprints Chaotic Path to Breakthrough Ideas Taking Shape Inside Innovator Roadmap to the Goal Improvised Roles Spadework for Creativity</p>	<p>Going Beyond Power to Change the World Quality Line Creative Clashes Generative Destruction Beyond Expectations Project Followers Strategic Developments Context of the World Endurance to Continue Creating Polishing Senses</p>
<p>Presentation Patterns</p> 	<p>Core Creative Presentation Main Message Touching Gift Image of Success</p>	<p>Sharing Storytelling Exploration of Words Visual Power Dramatic Modulation Unexpected Evolution Doors of Mystery Beautiful Clarity Perfect Portion Cherry on Top</p>	<p>Inspiring Mind Bridge Reality Sharing Participation Driver Quality in Details Expression Coordinator Discomfort Removing Significant Void Activation Switch Take-Home Gift</p>	<p>Performing Stage Building Reminders of Success Construction of Confidence Presentership Best Effort Personality for You Invitation to the World Improvised Presentation Reflecting Forwards</p>
<p>Change Making Patterns</p> 	<p>Mindset Know Yourself Yes, and Energy Checkup Microvision Trust Your Instinct Idol Imitation Juice Work and Life</p>	<p>Mission Defining Frontiership Detective Eyes Market Research 3WH Leverage Point</p>	<p>Preparation Field Diving Quick Actions Training for Innovation Change Construction Sustainable System Root Rediscovery Roadmap to the North Star</p>	<p>Implementation Success Prototyping Invite Aliens Excitement Delivery Trusteam Stage Setting Pile of Efforts Obsession with Everything</p>
<p>Survival Language</p> 	<p>The Core Pattern Survival Action Gift</p>	<p>Designing Preparation Safe Sleep Zone Storage Area Door Space Reverse L-Shape Lock Biting Lock Roots of TV Extrastock Daily Use of Reserves Crowbar</p>	<p>Designing Emergency Action Life over Furniture Evacuation Before Fire-Fighting Armadillo Pose Cover and Lock</p>	<p>Designing Life After Quake Kick Signal Evacuation Initiator Repetition of Better Decision Vinyl Lavatory Breaker Off Contact by Any Means</p>
<p>Words for a Journey</p> 	<p>Core A New Journey</p>	<p>Words for Those Living with Dementia The First Step Departure Announcement Travel Plan Fellow Travelers Can-Do List Daily Chore Self-Reflecting Room Favorite Place Voice of Experience Turning the Tide Live in the Moment Self-Intro Album Own Way of Expressing Gift of Words</p>	<p>Words for Caring Families Going Together Team Leader Family Expert The Three Consultants Disclosing Chat Chance to Shine Preparation for the Dream Make it Funny Usual Talk The Seen World Personal Time Emison Switch Casual Counseling Special Day Generational Mix The Amusement Committee Hint of Feelings</p>	<p>Words for Everyone Job-Specific Contributions On-the-Spot Helper Encouraging Supporter Personal Connections Mix-Up Event Inventing Jobs Delivering the Voice Warm Design</p>

Figure 3: Pattern Names of Learning Patterns, Collaboration Patterns, Presentation Patterns, Change Making Patterns, Survival Language, and Words for a Journey

4. Methodology of Pattern Mining

Despite the method of pattern language has been applied to various domains, little has been discussed about how to create pattern languages and its methodology is yet to be developed. To start the process of developing a new pattern language, it is important to “mine the seeds” of the patterns from examples of best experiences or practices. Pattern mining is shorthand for discovering thought patterns embodied in our minds or in the activities associated with the target. The term pattern mining is taken from a metaphor of geological *mining* (Gabriel, 1996; DeLano, 1998).

In the pattern mining, first, miners explore their experiences, observations, episodes, or documented past work related to the subject at hand. Through this exploration, they look for and identify hidden knowledge used for the target. This knowledge may include associated rules, methods, tips, or customs. Next, the miner finds critical connections among these related items so that prospective pattern begins to form a meaningful whole. In what follows, I will show three types of pattern mining methods based on our experiences in creating pattern languages: Collaborative Introspection, Mining Interview, and Mining Workshop.

4.1. Collaborative Introspection

Collaborative introspection is usually done by two or more people so that multiple points of view are engaged to avoid patterns becoming skewed, to reflect only the values of a single person. In the process, group members first go through an element mining session together (Figure 4). They write rules, methods, tips, or customs they consider important about the subject onto a sticky note, talk about it briefly to the group, and then place the note on a large sheet of craft paper. The members simultaneously write their notes and each take turns talking about them until no one has any more ideas to share. After collecting their ideas, they organize these by compiling similar ideas and dividing them into groups, and finally the groups are potential seeds of patterns.



Figure 4: Collaborative Introspection (Left: Presentation Patterns; Right: Collaboration Patterns)

Using this method, we created the following pattern languages: the Learning Patterns (Iba & Iba Lab, 2014a), the Collaboration Patterns (Iba & Iba Lab, 2014b), Presentation Patterns (Iba & Iba Lab, 2014c), the Generative Beauty Patterns (Arao, et al., 2012), the Creative Co-Cooking Patterns (Isaku & Iba, 2015), and several meta-patterns. Iba & Isaku (2012) presents the patterns for collaborative introspection and clustering ideas into the seeds of patterns in holistic way. And, Iba, et al. (2010) shows the process of creating the Learning Patterns; Sakamoto & Iba (2011) shows the case of the Presentation Patterns.

4.2. Mining Interviews

If you are motivated to create a pattern language for an area in which you have little or no experience, it is necessary to conduct interviews with experienced people to collect key information needed to write the patterns (Figure 5). During an interview, it is important to ask key questions that relate to the *Solution*, *Problem*, and *Context*. According to the *Keys Worth Sharing* (Iba & Yoder, 2014), a good way to begin an interview is to first ask what the interviewees really want to share with colleagues and newcomers. This question usually elicits responses that include core ideas about possible solutions; most people enjoy sharing this information. Then, ask what will happen if you don't practice the important points in order to conduct *Problem Digging*. For example, you can ask what drove you to choose this solution? This will help to obtain information about the problem that the pattern solves. Thereafter, ask when or where the problem occurs, in order to conduct *Context Catching*.

The interviewer should take notes during the interview process by either writing them down in their sticky notes, notebook or on a whiteboard. After collecting the ideas by such an interviews, they go on to organizing them by compiling similar ideas and dividing them into groups.



Figure 5: Mining Interview (Left: Words for a Journey; Right: Pedagogical Patterns for Creative Learning)

With using this method, we created the following pattern languages: Words for a Journey (Iba & Okada, 2015), the Change Making Patterns (Shimomukai et al., 2015), Survival Language (Furukawazono et al., 2015), Personal Culture Patterns (Nakada et al., 2013), Global Life Patterns (Matsuzuka et al., 2013), Policy Language (Iba & Takenaka, 2013), and Pedagogical Patterns for Creative Learning (Iba, et al., 2011; Shibuya, et al, 2013). See also Oi et al. (2015) for the method of presenting patterns related to their original interview transcriptions.

4.3. Mining Workshop

Another approach is to conduct pattern mining workshops where the seeds of patterns are collected from dialog among the participants. Interestingly, different goals for participants and organizers can be set for such a workshop (Akado, et al., 2015). Mining pattern seeds would not be a motivation for people from outside the pattern language community. Therefore, it is a good idea to design the workshop as an opportunity to get some practical tips and solutions directly from the workshop, even though one goal of the organizers could be collecting information about problems and solutions for making pattern seeds (Figure 6).

In a pattern mining workshop, ideas about both solutions and problems are mined. It does not matter with which one starts, just so long as both are clarified during the workshop. If someone starts with a solution, ask the person what the problem is. The special type of facilitator, which we call 'generator,' tries to discover what that person sees as a suitable solution or asks other participants for suggestions. To easily maintain separation between the sticky notes for comments on Problems and comments for Solutions, it is highly recommended to use two different colors of sticky notes.



Figure 6: Mining Workshop (Generative Beauty Workshop)

We used this method to collect additional pattern seeds for the Generative Beauty Patterns. Based on this experience, Akado et al. (2015) presents five patterns for designing pattern mining workshops. Hong et al. (2015) used this type of mining workshop to understand cultural similarities and differences on beauty in daily life in Japan, Korea, and the United States.

5. Methodology of Pattern Writing

After any of the mining methods pattern seeds are obtained. Next what we need to do is to write them down into a pattern format. Although there are various pattern formats, I usually follow this format: Pattern Name, Introduction, Pattern Illustration, Context, Problem, Forces, Solution, Actions, and Consequence.

The Pattern Name gives the pattern a short memorable name for easy reference that accurately describes the pattern. The introduction provides an entry gate to the patterns, and Illustrations make it easy to imagine a living image of the pattern. These three elements actually provide a summary of the pattern.

The rest of the elements provide more details about the patterns. For example, Context informs when the pattern should be used. Problem is the undesired consequence that is likely to occur in the context under discussion. Forces are unavoidable laws about the aspects of human nature that make the Problem difficult to overcome. A Solution is one way to resolve the problem, and Actions provide some concrete activities. Finally, Consequences describe how things can change when this pattern is applied to the situation.

Even with a simple format of a pattern, we take a different, more complicated order to write the contents of the pattern. This process tends to confuse many beginners in pattern writing. I have emphasized the order of pattern writing in university classes and workshops for pattern writing because I realized that, for some people, it is necessary to have a tool for showing basic order to follow in pattern writing.

On the backdrop, I designed the Pattern Writing Sheet (Iba, 2014a). It provides not only the space to write the contents of a pattern but also instructions on how to proceed thinking about them (Figure 7). This sheet is available online under the Creative Commons license, and I have used it for several workshops (Figure 8).

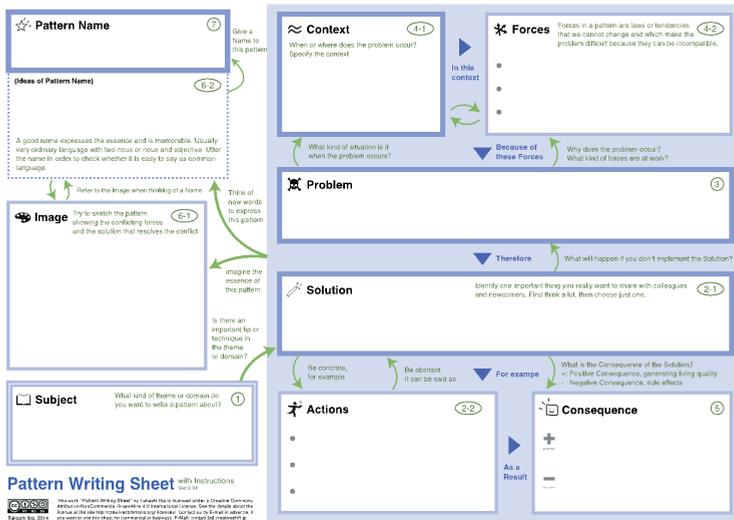


Figure 7: Pattern Writing Sheet

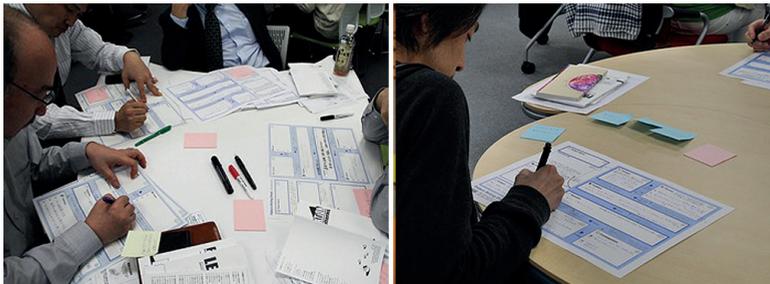


Figure 8: A workshop for business people to write a pattern related to their work using a Pattern Writing Sheet

6. METHODOLOGY OF PATTERN ILLUSTRATING

The most eye-catching part of our patterns is pattern illustration. In my mind, pattern illustrations are not just interesting side drawings, but essential expressions of a pattern, especially in Pattern Language 3.0 for human actions. Pattern Illustrations should meet the following three requirements:

1. It should express the essence of the pattern.

2. It should include character(s) that express human movements and feelings through body language and facial expressions.
3. It should be an iconic representation of the pattern that does not connect multiple scenes with arrows.

Pattern illustrations are carefully designed. We start by understanding the essence of the pattern, draw rough sketches, and revised them several times, much like revising a sentence to get it just right. For example, to get the 34 pattern illustrations for the Presentation Patterns, we drew more than 500 illustrations.

The preference is for simple characters rather than realistic, detailed characters (Figure 9). Manabu-kun is the character for the Learning Patterns (Iba & Iba Lab, 2014a), the Collaboration Patterns (Iba & Iba Lab, 2014b), the Presentation Patterns (Iba & Iba Lab, 2014c), the Survival Language (Furukawazono, et al., 2015), and the Pedagogical Patterns for Creative Learning (Iba, et al., 2011). “Manabu” means “learn” in Japanese, which is why we used it to name the drawing pattern illustrations for Learning Patterns, which was our first pattern language with pattern illustrations. However, there are other characters in other pattern languages that we have created; some examples are shown in Figure 9.

Many writers in our pattern community are interested in pattern illustrating, but they say that it is difficult and want to know where to start and how to proceed through the design process. We have studied pattern illustrating (Harasawa, et al. 2012, 2014), and published two guides about it; one is a picture book (Figure 10) showing the process of pattern illustrating very simplistically (Harasawa, et al., 2015), and the other is comprised of the 28 actual patterns in Pattern Illustrating Patterns (Iba & Iba Lab, 2015; Miyazaki, et al., 2015).

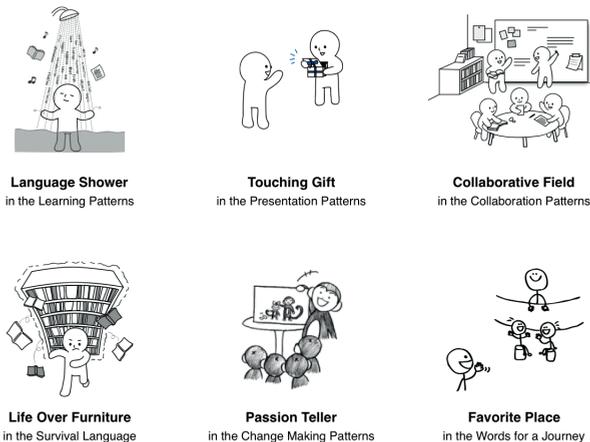


Figure 9: Examples of Pattern Illustration

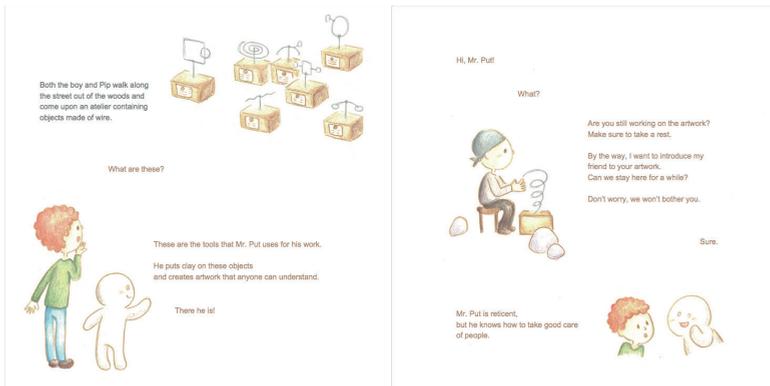


Figure 10: Picture book: *A Tale of Pattern Illustrating* (Harasawa et al., 2015)

7. Workshops using Patterns Languages

Third generation pattern languages for human actions are used not only for self-study by reading patterns, but also as media for narrative and dialog. For different purposes, I invented some specific types of workshops: the creative dialog workshop, a collaborative improvement workshop, and an idea generation workshop.

7.1. Creative dialog workshop

An implementation of pattern languages as media for creative dialog is an organized workshop (Iba, 2012b, 2014c) that provides participants an opportunity to reflect on their experiences, talk about them with others, and make a plan for future actions using the pattern language (Figure 11).

In this workshop, first, participants are asked to recall their experiences in terms of the provided pattern language. They are asked to choose five patterns they wish to master in the near future. Then, participants are free to mingle and to find and talk with other participants. When they find someone who has experienced a pattern they want to master, they listen to the other participant's story.

Dialog workshops using the Learning Patterns (Iba & Iba Lab, 2014a) have been held at the Faculty of Policy Management and Faculty of Environment and Information Studies, Keio University, since 2011. All freshmen at the two faculties, approximately 900 students, have participated in these workshops and talked about their experiences of learning in light of the patterns. About 4,500 students have participated in the workshops over the past five

years. Iba (2014c) presents feedback from workshop participants of the dialog workshop using the Learning Patterns. Based on the results, we realized the following merits of dialog workshops using a pattern language.

First, participants can talk to people to whom they have never talked before. By setting a rule that participants must talk only to people they do not know, the workshop becomes an extraordinary and interesting event and is still feasible even if participants are shy and do not like talking to new people. This is because the atmosphere and rules of the workshop make it more comfortable for people to talk. Moreover, the workshop is fun and interesting and the participants even make new friends, although the theme is learning.

Second, to actualize the patterns they want to implement, the participants gain ideas about specific actions they can take and also learn that the same pattern can have various applications. In this workshop, participants are often motivated by other people's attitudes and experiences, of learning in the case of Learning Patterns, and by seeing the diversity of the experiences of others. Through the workshop, the participants gain a broader viewpoint of the world and themselves to help them share and solve problems they are facing.

Third, the workshops not only allow participants to know something unique about others, but also to discover new aspects in themselves by using the pattern language to talk about themselves. In the dialogs, they also sometimes discover they have experience with a pattern that they did not realize they had experienced. Some participants are already using the pattern names as part of their vocabulary and making emphatic comments about what the dialog workshop actualizes in them.

Thus, dialog workshops facilitate not just simple conversation and trading information, but become places for creative dialog. Iba (2012a) presents a pattern language for designing thus type of workshop and Iba (2014a) introduced the method of pattern language as media for mining, analyzing, and visualizing experiences.





Figure 11: Dialog workshop using a pattern language (Up: Learning Patterns at Keio University; Down: Learning Patterns at the University of North Carolina at Asheville)

7.2. Collaborative improvement workshop

A pattern language can be used to improve design based on a diagnosis of current status. Christopher Alexander calls this function “a process of diagnosis and local repair”(Alexander et al., 1975). Likewise, we can use pattern languages for human actions by diagnosing the current status and finding ways to repair it.

I sometimes hold workshops where participants improve their presentation skills using the Presentation Patterns. First, they give their own short presentation, maybe three minutes, very short. Then, they discuss how they could improve the presentations by giving constructive comments using the Presentation Pattern Cards, which will be discussed later in this paper.

Interestingly, in previous workshops, I have witnessed that younger less-experienced participants can still impart useful advice to comparatively experienced participants, possibly because the participants do not need to think of the advice from scratch based on their experience, but rather can choose patterns and apply them to the presentation during discussion. We have held the workshop for collaborative improvement using the Presentation Patterns (Iba & Iba Lab, 2014c) for graduate students (Figure 12) and my collaborator has had success with a similar workshop at an elementary school.



Figure 12: Creative Improvement Workshop (Presentation Patterns)

7.3. Idea generation workshop

Patterns are usually used to support direct design for the target. In 3.0, this means designing human actions. Recently, however, we utilized patterns as seeds for designing products and services to help people in the situations described by the patterns (Figure 13).

There are two kinds of pattern language use: designing products and services to support conducting actions to solve a problem and designing products and services to change conditions so that the problem does not occur in the first place. The idea generation workshop can be conducted as solution-driven, problem-driven, or a mix of both.

During idea generation using a pattern language, patterns take on several roles: seeds for abductive reasoning, constraints on the scope of ideas, and needs for the emerging ideas. Since patterns provide ideal direction of solutions, people can think out new ideas based using the patterns as clues. These patterns are also constraints on divergent thinking, but the level of abstraction of patterns provides a good level of ambiguity. Moreover, ideas based on solutions of the patterns always have reasons why the idea is important, because every pattern is written as a pair: problem and solution.

We held idea generation workshops using “*Words for a Journey*” patterns for college students (Figure 14). In the workshop, participants invented new ideas for products and services for people with dementia and their families, using Words for a Journey Cards, which are shown in the next section. Few had previous knowledge about dementia, but they were able to learn enough from the pattern language to conceptualize new tools for positive support.

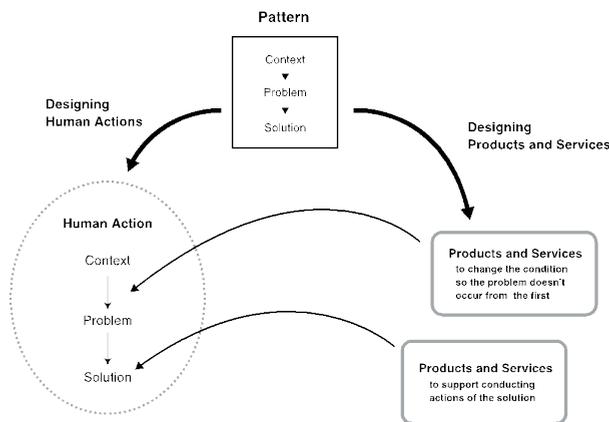


Figure 13: Designing products and services to indirectly support actions with a pattern



Figure 14: Idea Generation workshop (Words for a Journey)

8. Tools for utilizing Pattern Languages

Since Alexander invented the method of pattern language, patterns are now shared in books, papers, and on web pages. These are good for studying the practical knowledge from domain experts. However, these sources are not suitable when pattern languages are used as media for dialog between more than two people.

Accordingly, we created several new tools for using pattern languages, such as pattern cards, pattern stickers, and a web system for sharing quality.

8.1. Pattern cards

The crucial problem of providing pattern languages as books, papers, and web pages is that these are less flexible. It is simply impossible to manipulate patterns in books, papers, or web pages to stimulate thinking or communication. So, I created several pattern cards, which are small-size thick paper cards with a summary of the patterns printed on them. These pattern cards are easy for people to manipulate as they think and communicate about an issue. Figure 15 shows the layout of one of the Presentation Pattern Cards and Figure 16 shows one of the Words for A Journey Cards.

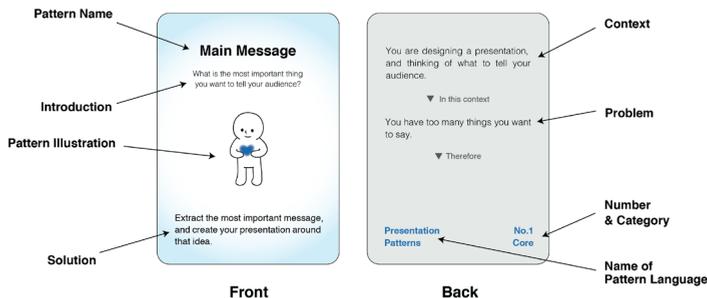


Figure 15: Front and Back of a Pattern Card (Presentation Pattern Cards)

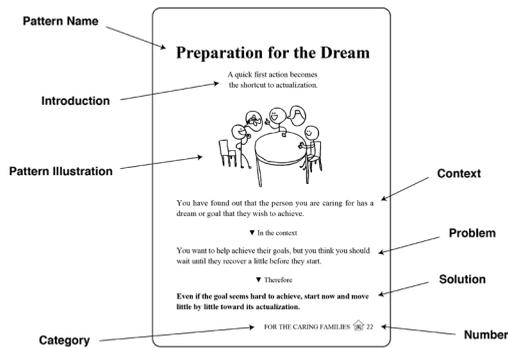


Figure 16: Pattern Card (Words for a Journey Cards)

Although pattern cards can be used in various ways, I recommend the following ways:

1. Diagnosing Yourself: Diagnose yourself by grouping the cards according to whether you have prior experience with each pattern.
2. Drawing Future Visions: Use the Pattern Cards to develop your plan of activity.
3. Improving Your Learning: Use the Pattern Cards to improve your actions.
4. Reflecting on Your Activity: After an activity is finished, the Pattern Cards can be used for reflection on your experience.
5. Case Studies: Use the Pattern Cards as tools for case studies of activities.
6. Dialogs: Use the Pattern Cards to share past experiences of activities.
7. Interviews: With the Pattern Cards, you can interview others to hear stories about the patterns that you want to use in the future.

The upper pictures in Figure 17 illustrate using the Presentation Pattern Cards for (5) case studies in a high school. After becoming familiar with patterns through (6) Dialogs, participants watched a TED talk (www.ted.com) and analyzed the presentation using the Presentation Patterns. They examined all 34 patterns and categorized them into three groups: Practicing, Partially Practicing, and Not Practicing. These categories indicated whether the presenter was practicing any of the patterns or not. Then, they discussed why the presentation was attractive based on the patterns grouped in the Practicing or Partially Practicing groups. Lower pictures of Figure 17 show the same workshop, but for training of high-school teachers.

I have created the following pattern cards so far: Learning Pattern Cards, Collaboration Pattern Cards, Presentation Pattern Cards, Survival Language Cards, and Words for a Journey Cards. These cards can be used for thinking alone or for workshops. Additionally, we have a prototype of a card game of patterns (Okazaki et al., 2011).



Figure 17: Workshop with Pattern Cards (Presentation Pattern Cards)

8.2. Pattern stickers

Although workshops using pattern languages are great and pattern cards are good tools for workshops and daily use, it is difficult to always use them in daily life. How can we make pattern languages something that comes to mind easily in daily life?

One way is to create stickers with the pattern name and pattern illustration and put them on any flat surface, such as the cover of laptop computer, tablet PC, schedule book, cosmetic case, or wall. The stickers can remind you of the patterns whenever you look at them during the day. The sticker not only sticks itself to the flat plane but also can stick the corresponding pattern about life in the mind of the individual.

I have designed pattern stickers for the Learning Patterns, the Collaboration Patterns, and the Presentation Patterns (Figure 18). These stickers were given to participants at the PLoP2013 (20th Conference on Pattern Languages of Programs) conference and at ORF2013 (Open Research Forum 2013). Figure 19 shows some of use cases of the participants who received stickers.



Figure 18: Pattern Stickers



Figure 19: Making use of Pattern Stickers

In the near future, I want to create 3D objects that present patterns in the real world using digital fabrication machines such as 3D printers and laser cutters. The research and practice of creating new pattern objects that fit naturally into surroundings while being reminders of patterns are one of several new frontiers.

8.3. Web system for sharing quality

In pattern language workshops, participants exchange their vivid experiences related to the patterns that are being examined. Through the dialog, participants can feel the aliveness of experiences related to the patterns. However, there are few opportunities for workshops, and it is not possible for a reader of a pattern paper or book to communicate with others as they read.

We realized that a new system for sharing personal experiences and feelings of aliveness is the key to dissemination and real application of pattern languages. Therefore, we designed a system that supports people in grasping and sharing the aliveness of personal experiences through a pattern language, and named it the “Feeling of Life System” (FoL) (Iba et al, 2014).

This system lets people express themselves using photos and stories, sharing the aliveness of personal experiences as they relate to each pattern. The system can store the aliveness and continue to share it. Photos show the scenes or objects that invoke the aliveness, or the feelings or objects that express personal feelings. These types of stories tell about real life. The system attempts to personalize a pattern language that is initially universal by using the system users’ own photos and stories. As Alexander said, “A language gives you back your confidence in what seemed once like trivial things” (Alexander 1979, p. 545), and to “express life” with different patterns repeatedly helps people realize their aliveness.

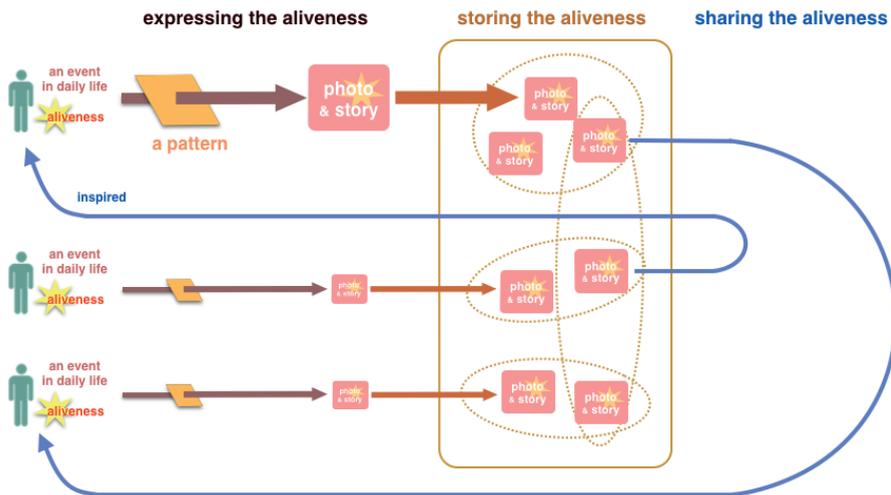


Figure 20: An Overview of the Feeling of Life System (FoL)

The FoL system has three functions: expressing, storing, and sharing. While these three functions are basically different, they impact and give power to each other, so the system can be called cyclic. System users will get *piecemeal growth* by expressing and storing, or being inspired by others and, then expressing new feelings or actions (Figure 20). We also demonstrated the system, “The 4th Place,” as an example of the FoL system, which uses the Generative Beauty Patterns, a pattern language for one to live lively and beautifully each day (Figure 21).

Note that a more functional system to keep using a pattern language, the Pattern Diagnostic System was developed by Isaku et al. (2013).



Figure 21: "The 4th Place" system for the Generative Beauty Patterns as the first prototype of the FoL system

9. Fundamental behavioral properties

Christopher Alexander outlined the core properties of the hidden qualities of buildings in his book, *The Nature of Order*. He pointed out that a living whole consists of "centers," which are parts that make up the whole, and that the whole becomes lively when the centers synergistically intensify each other (Alexander, 2002a). He organized how centers intensify each other into 15 geometrical properties, known simply as the „fifteen properties“ in *The Nature of Order*: 1. LEVELS OF SCALE, 2. STRONG CENTERS, 3. BOUNDARIES, 4. ALTERNATING REPETITION, 5. POSITIVE SPACE, 6. GOOD SHAPE, 7. LOCAL SYMMETRIES, 8. DEEP INTER-LOCK AND AMBIGUITY, 9. CONTRAST, 10. GRADIENTS, 11. ROUGHNESS, 12. ECHOES, 13. THE VOID, 14. SIMPLICITY AND INNER CALM, and 15. NOT-SEPARATENESS (See Figure 22, an illustration of the geometrical properties, which I presented in Iba & Sakai (2014)).

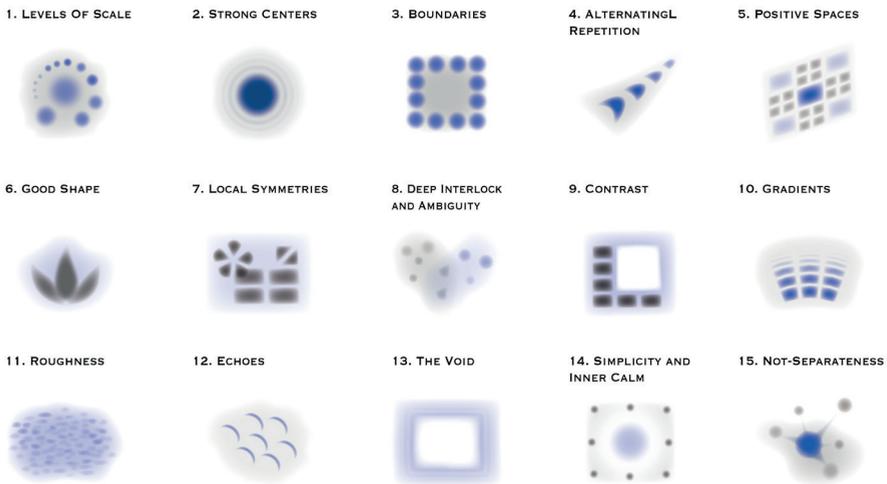


Figure 22: Fifteen Fundamental Geometrical Properties

Recently, there has been a movement challenging the application of these geometrical properties as things other than architectural, e.g. workshop on the Pursuit of Pattern Languages for Societal Change (PURPLSOC) and even within the software community. However, Alexander's properties focused primarily on geometrical, physical objects, such as buildings and items found in nature. Thus, it is still unknown whether they can be applied to things that are hard to perceive, such as human actions or society.

Based on the background, we have identified and defined fundamental behavioral properties within the wholeness of lively human activities; similar to the way in which Alexander defined the 15 properties based on his theory of wholeness and centers (Iba et al., 2015b, 2015d; Harashima, et al, 2015). In order to find these properties, we analyzed human action patterns that we had created in the past. In *The Nature of Order*, Book 2, Alexander says that a pattern language is an essential way to define generic centers (Alexander, 2002b). The implication is that it is possible to capture centers by investigating pattern languages. Based on his idea, we could capture the centers in human activities from the patterns and discover the properties based on their commonalities.

Thus, the basic strategies would be to investigate pattern languages of human action in order to find out the mechanisms that create the liveliness behind each pattern; verify the universality necessary for the properties of the mechanism by checking if they can describe liveliness in other patterns; and finally, express how the discovered properties generate the

mechanism for liveliness by illustration and description while thinking about the relationship between the properties.

Through the investigation process, we discovered these 24 fundamental behavioral properties: 1. BOOTSTRAP, 2. SOURCE, 3. SPREADING, 4. ATTRACTION, 5. INVOLVING, 6. TOGETHERNESS, 7. BUILDING UP, 8. ORGANIC GROWTH, 9. REFLECTING, 10. ACCOMPANY, 11. ENHANCEMENT, 12. EMPATHY, 13. SELECTION, 14. SIMPLIFICATION, 15. CONSISTENCY, 16. LOOSENESS, 17. FLEXIBILITY, 18. ABUNDANCE, 19. ENDEAVOR, 20. CONNECTING, 21. POSITIONING, 22. DIFFERENTIATING, 23. OVERLAPPING, and 24. CONTINUOUS RELATION (See Figure 23, an illustration of the behavioral properties (Iba et al., 2015d)).

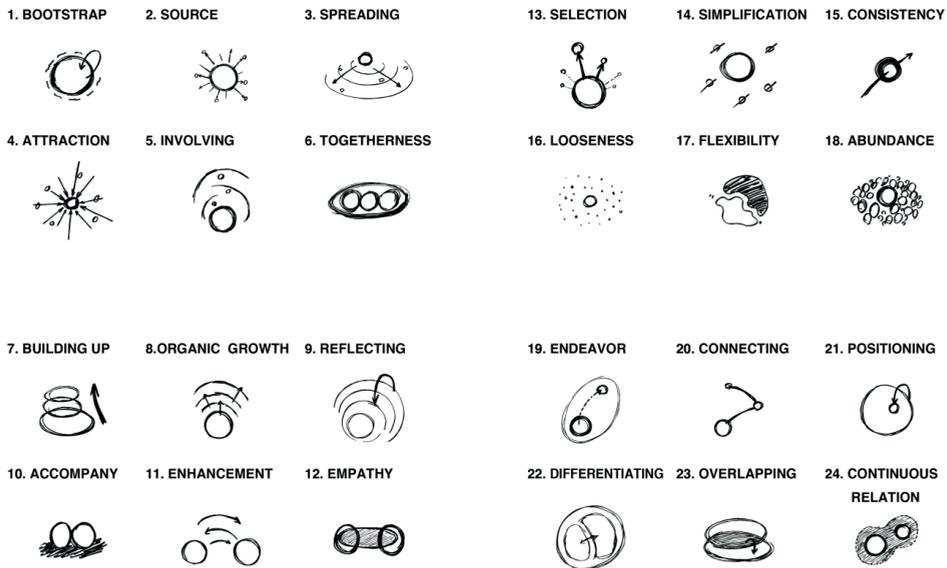


Figure 23: The 24 Fundamental Behavioral Properties

The 24 behavioral properties can be used mainly for three purposes: pattern mining, pattern writing, and designing. First, these properties can be used to indicate patterns from experiences or episodes shared at pattern mining interviews or workshops. As behavioral properties describe the properties of lively human activities, understanding them makes it possible to estimate how actions from the experiences or episodes imbue each activity with life.

Second, properties are also useful for accurate verbalization of how the pattern contributes to make the activity lively. Behavioral properties are the properties of how centers inten-

sify each other to create the liveliness of human activities. Therefore, it helps the writer to capture the centers in the description of a pattern and to understand how those centers intensify each other to create the liveliness of that activity so that the writer can improve the description.

Third, other than for patterns, properties can also be used for designing. Even if there are only a small number of patterns already written in a certain domain, there should be plenty of lively human behaviors that have not yet been converted into patterns. It is possible to recognize the wholeness by identifying the centers of behavior and how those centers intensify each other.

Geometrical properties and behavioral properties are not just properties that appear in architecture, nature, or in human activity but two viewpoints may can be used for capturing lively phenomena in general. We anticipate that these properties can support people to experience aliveness and wholeness of phenomena.

10. Conclusion

Thirty years ago, Christopher Alexander said, “The house is no longer an ‘object’ which is manufactured, but a thing of love, which is nurtured, made, grown, and personal” (Alexander, 1985) and therefore “families would design their own houses” (Alexander, 1985). Similarly, our life is “a thing of love, which is nurtured, made, grown, and personal” and, therefore we would design our own lives. It is my hope that the studies presented in this paper will stimulate people to work for future innovation in pattern language methodologies.

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PURSUIT OF PATTERN LANGUAGES FOR SOCIETAL CHANGE

Designing Lively Scenarios
in Various Fields

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This book focuses on the pattern approach established by the Austrian-born Christopher Alexander - architect, mathematician and philosopher, and collects selected papers on work presented at, or related to the *PURPLSOC* World Conference held at Danube University Krems, July 3 – 5, 2015. *PURPLSOC* is the acronym for "*In Pursuit of Pattern Languages for Societal Change*", a series of (roughly) biennial conferences on patterns in and with disparate fields such as architecture, design, media, arts, IT, management, pedagogy, social activism, social innovation and diverse grassroots movements.

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