From a Pattern Language to a Field of Centers and Beyond

Patterns and Centers, Innovation, Improvisation, and Creativity

Hajo Neis

Illustration 1: University of Oregon in Portland Downtown Urban Campus

The Campus is located in downtown Portland in adapted old warehouse buildings, and was first designed in the Oregon pattern language method with the principles of patterns and user participation. The White Stag building facilities are open since 2009.

INTRODUCTION

What we call now the ›overall pattern language approach‹ in architecture, urban design, and planning has grown from its original principle of ›pattern and pattern language‹ into a large and solid body of theory and professional work. Today, pattern theory and practice includes a large number of principles, methods, techniques and practical project applications in which patterns themselves play a specific part within this larger body of knowledge. Not only has the pattern language approach grown in its original area of architecture, but it has also (though less triumphantly than silently) expanded into a large number of other disciplines and fields, in particular computer and software science, education, biology, community psychology, and numerous practical fields. Nevertheless, we first have to acknowledge that the pattern approach originally started with a single principle almost 50 years ago, the principle of pattern and pattern language that gave the name to this school of thought and practical professional project work.

In this article we want to trace some of the theoretical and practical development of the pattern method and its realization in practical projects. We want to explore how challenges and opportunities resulted in the adaptation of the pattern language method into various forms of pattern project formats and formulations including ›pattern language‹ and ›project language.‹ We want to look at various forms of innovations and techniques that deal with theoretical improvements as well as the necessities of adaptation for practical cases and projects. Finally, we want to understand how the principle of pattern and pattern language was modified and adapted for theoretical and practical project reasons, slowly developing into a sizable body of knowledge and practical application, supplemented with new principles that were added to make the principle of patterns work better in a complex context and real applications. Here, in particular, we want to explore the principle of ›Formation of Field of Centers‹ that helped to give geometrical structure to the more functional structure of patterns.

Before the principle of Formation of Field of Centers is introduced, the context of this article has to be understood within the larger framework and perspective of patterns and pattern languages, particularly how it relates to the theme of this publication: *Innovation and Improvisation for Organization and Social Systems.* From my perspective as an architect, urban designer, and also part of the original pattern group (second generation) within architecture, I will show some of the development of patterns and pattern languages within the field of architecture and then make connections to other disciplines and the wider context of pattern language use and application with regard to innovation, improvisation and creativity. Finally, we will start to explore new ground in theoretical and practical issues, such as the investigation of ›Types of Production that Can Generate Living and Beautiful Environments‹ and the construction processes for the 93 %. We will also look at innovative interdisciplinary models for urban design and planning projects.

LIFE AS THE ESSENCE AND STARTING POINT

Let me first briefly talk about the essential notion and umbrella of pattern theory, which makes patterns meaningful and shows how patterns are connected in a pattern language, like blood connects different parts of the body, and ultimately connects aspects of different disciplines in a social system-like fashion. The notion of life can be considered the essential philosophical starting point and category, and life is also the central practical focus of work with the intent of making the notion of life an integral part of a scientific method. The central idea here is the understanding of a gradual quality of life. This quality of life, or as Alexander originally called it, ›quality without a name,‹ can be attributed to all systems and structures, including biological as well as non-biological systems. And while this is at first unusual, it is scientifically not as strange as one may think. And for a practicing architect and builder this notion indeed helps very practically to do good work with building structures, material, space and functional life.

Speaking from today's multidisciplinary perspective, we can say that the overall pattern language approach has reached a point where we can describe it as a general theory and a practice of development (design and building) that has become relevant for many disciplines, organizations and social systems. The main target of this thinking is the improvement of life, human development and improvement of the environment in which we live. And while it has always been a central task of philosophy to explain the good life, the pattern language school of thought may offer a new way of dealing with and thinking about the world today that opens up new ways at looking at and solving problems in a practical fashion, starting with an advanced understanding of life defined in gradual steps of quality of life.
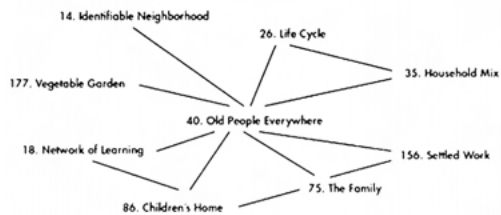
Illustration 2: OLD PEOPLE EVERYWHERE »Old People need old people, but they also need the young, and young people need contact with the old.« From APL p.216. (pattern 40)

The key central category and practical starting point of this endeavor is the notion of a pattern. Here, we are not interested in just any kind of pattern but specifically, those kinds of patterns that support life. We are interested in patterns that have the capacity to solve practical problems or what can also be called problem-solution patterns.

Patterns as Atoms of the Environment[1]

The idea of a pattern in this specific understanding is first based on the observation of repetition of particular building elements, such as TATAMI FLOOR in the Japanese House, or ENTRANCE DOOR, COURTYARD, OLD PEOPLE EVERYWHERE, and PEDESTIAN STREET, elements which form substantial knowledge of a building culture or culture in general when we include other kinds of patterns such as BIRTHDAY, COMMUNAL EATING, MARKET, BANKING, MEDICATION, SUNBATH, and HOLIDAYS. Looking at specific contemporary or traditional cultures and finding archetypal solutions to fundamental problems is a good start to begin to understand the notion of patterns. Hundreds of these patterns may define the building knowledge of a given culture and thousands may define close to the overall cultural knowledge of a given culture.

But repetition alone is not enough to define a pattern. More specifically, a pattern in this approach is a general planning or design principle, a rule which addresses a clear problem which may occur repeatedly in the environment, states the range of contexts in which this problem will occur, and gives the general features required by buildings or plans which solve this problem. Patterns in this understanding can be defined as a method to solve recurring problems:

Pattern = Problem – Discussion – Solution

- *Problem:* For example, a problem that occurs repeatedly in the United States and elsewhere is that of ENTRANCE TRANSITION. In the book *A Pattern Language,* a problem with entrances has been formulated in the form of a hypothesis: *Buildings and especially houses, with a graceful transition between the street and the inside are more tranquil than those which open directly off the street.*
- *Discussion:* Then the range of contexts in which this problem will occur is discussed based on evidence, i.e., in residences or other cases that thrive on a sense of seclusion such as churches, public libraries, or a clinic. After this investigation a general solution based on empirical and/or analytical evidence is proposed to solve this problem. In the case of entrance transition the proposed general solution is as follows:
- *Solution:* Make a transition space. Bring the path which connects street and entrance through this transitional space, and mark it with a change of light, a change of sound, a change of direction, a change of surface, a change of level, perhaps by gateways which make a change of enclosure, and above all with a change of view.

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1 | Understanding patterns as atoms of the environment was expressed in an earlier publication by Chris Alexander and Barry Poyner, »The Atoms of Environmental Structure,« Ministry of Public Building and Works, 1st edition, 1967.

Illustration 3: ENTRANCE TRANSITION (APL pattern 112) The example of a good solution to the problem of entrance transition is taken from Obidos in Portugal (Photo: Sara Ishikawa)

Based on this brief description of a solution-pattern, we can see that a pattern is formulated in such a way that its correctness or incorrectness can be supported by evidence. In this way, the formulation of a pattern follows scientific procedure. Yet, a pattern is, first of all, oriented towards practical application. It can be discussed in public, and according to the outcome of the discussion, it can be adopted or not, by a planning board for example, which may be responsible for the community building design guidelines. In that sense we may say that a ›problem-solution-pattern‹ is an empirically or analytically grounded imperative, which states the precondition for the solution of an environmental or building problem, or any other problem in society that can be approached in this way.

The underlying theory for patterns and the pattern language design approach has been laid out in a book by C. Alexander titled *The Timeless Way of Building*. (Alexander, 1979) Here we find that the format of a single pattern is much more elaborate than the threefold division of problem-discussion-solution, and this for a good reason. Since we want to arrive at a Pattern Language as a system of patterns, the format needs a structure that actually connects these various patterns in a meaningful and understandable way. It begins with the title of the pattern

and a photo, which introduce you to the topic and also illustrate a solution to the problem. Then there is a short definition of the problem, an extensive discussion of the problem with possible solutions, followed by a formulation of the proposed problem solution and a diagram to illustrate the solution. Furthermore, patterns have stars attached to the title to indicate the validity or quality of a pattern itself: Two stars are the highest validity such as in LOOPED LOCAL ROADS, and one star or no stars indicate lower universality.

What is important for our discussion here is the notion of Pattern Language as a network. Here, each pattern has a section at the beginning and a segment at the end that make direct references to other patterns. The section at the beginning of a pattern refers to patterns connected at a higher level of hierarchy and references at the end refer to patterns at a lower level. The pattern ENTRANCE TRANSITION (112) for example is connected at a higher level to the pattern MAIN ENTRANCE (110) and at a lower level to the pattern ENTRANCE ROOM (130). In this way we get a network of patterns that are all connected, and we can enter the network at any level and let the connections lead us to other patterns and clusters of patterns. It is these connections in a network that transform patterns into pattern languages. And while this system was developed before any personal computers were in place more than 40 years ago, *avant la lettre*, it is a system that is ideal for computer application, and was in fact later adopted and used by many other disciplines including computer science after it started in the field of architecture (see Illustration 4).

A Pattern Language or APL – the Book

The book *A Pattern Language,* written by Alexander, Ishikawa, Silverstein, and others (Alexander et al., 1977), is a collection of 253 patterns that range in scale from large regions to cities and towns to construction details.[2] Here, the traditional use and idea of patterns has been transformed into a modern mathematical system, which can be used by designers and builders today. A pattern can be defined as a generic solution to an environmental context problem, derived from functional arguments. And a pattern language can be defined as a coherent set of generic solutions which can be used in various combinations – quite language like – by architects, craftsmen, users and clients for creating their own particular spaces and environments. Patterns can also be considered archetypal solutions to environmental problems, examples of good environments, which can be applied repeatedly for similar contexts or used and adapted to local conditions and

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2 | The book APL is also one of the most well-known and recognized books of architecture with more than 200,000 copies sold just in the US alone. It has been translated in various languages, including Japanese, German, Chinese, Spanish.
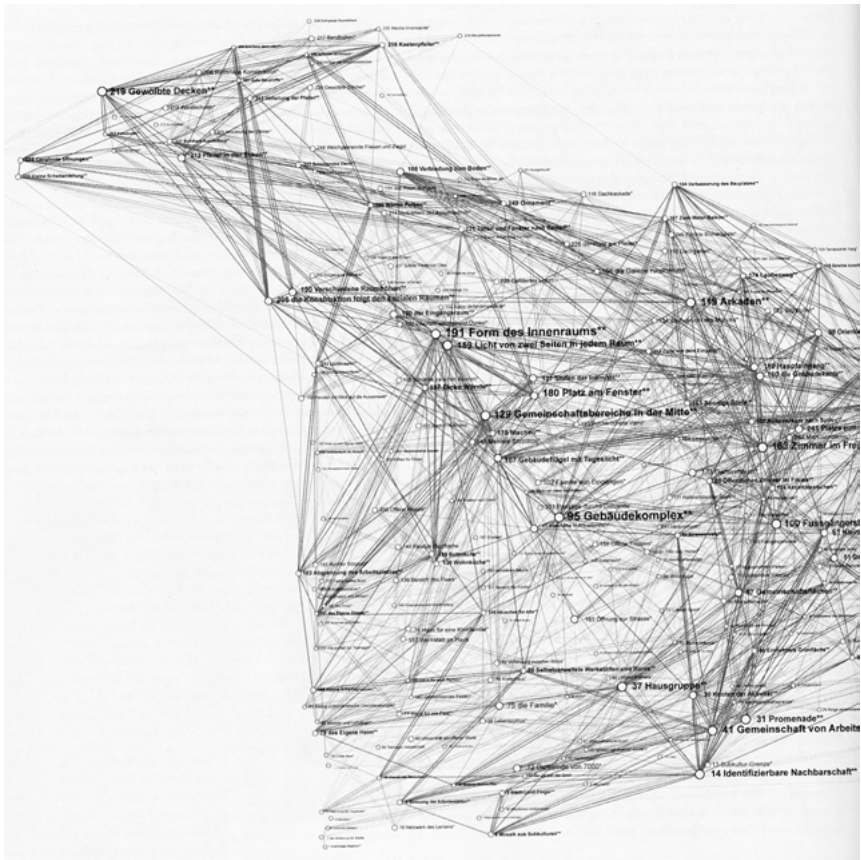
Illustration 4: Graphic Representation of A Pattern Language (APL)
Stefan Tietke and his students have used the software »GraphViz« in order to show the
hidden connections of all 253 patterns from APL. Arch+ 189. October 2008, pp. 18-19

specific communities. *A Pattern Language* provides a general reference and point of departure for creating pattern languages for various types of projects in different locations. The principle of patterns and pattern languages is therefore closely connected to the principle of user participation, because it provides the users an organized procedure to help make sense out of otherwise complex situations such as planning, design, and decision-making processes. In most of the projects that I have applied pattern languages, the principle of user participation also was part of the process of starting and guiding a project.

These archetypal patterns cover four or more major levels of scale of the built environment: Regions and cities, urban areas and neighborhoods, buildings and spaces, construction, engineering and materials. The importance of using a Pattern Language is that it combines all of the different visions and needs of the people involved into a common language that everyone can understand. As dif-

ferent agents such as users, architects, builders, and planners continue to work on individual aspects of the project, they can work within this framework of a common language so that the resulting physical spaces, buildings, apartments, gardens, streets, and gateways will all have the intended structure and a familial resemblance. The simplest form of applying a pattern language to a given design project – for example a residence – is to select a set of patterns and use these solution-patterns as archetypal starting points for a design and building process.

Project Pattern Language: The Oregon Experiment

A ›Project Pattern Language‹ can be defined as a pattern language applied to a particular project. While various projects at different scales have been developed with a pattern project language as a starting point, the example which is of interest here is the language developed for the University of Oregon in Eugene, reported in the book *The Oregon Experiment*. (Alexander, Silverstein, et al. 1975) It shows the first modifications and alterations of pattern formulation and presentation. After almost 40 years this book still serves as the basis of the Main Campus Plan at the University of Oregon. (Campus Plan, 2005) It was this book that prompted the invitation to work in Japan on the design and construction of the Eishin High School and College Campus.

The book describes the formation of the Oregon campus master plan, based on various principles including the principle of pattern language. The full list of main principles is enumerated in the table of contents as chapters: 1) Organic Order, 2) Participation, 3) Piecemeal Growth, 4) Patterns, 5) Diagnosis, and 6) Coordination. As a starting point the architects, users, and campus planners identified and selected 37 broad patterns from the book *A Pattern Language* that were appropriate for solving problems in the campus at the time including: LOCAL TRANSPORT AREA, NETWORK OF LEARNING, IDENTIFIABLE NEIGBORHOOD, FOUR STOREY LIMIT, ACCESS TO WATER, MINI BUSES, PROMENADE, and so on. These 37 patterns were rather general and did not take into account some of the important specifics of a university and the local situation. And this is of course very typical. Patterns from the book APL are solutions that had been developed as examples of good patterns. It was never intended that they would cover all possible cases, which might run in the tens of thousands in any building culture. Each new project requires work on a new set of patterns appropriate for that particular project alone. It is therefore critical that pattern development takes place in each project as innovation and creative work in an otherwise rather complex situation.

Consequently the planners together with the users derived another 18 patterns specifically for this university project. The first six of these specific patterns were the following: UNIVERSITY POPULATION, OPEN UNIVERSITY, HOUSING STUDENT DISTRIBUTION, UNIVERSITY SHAPE AND DIAMETER, UNIVERSITY STREETS, LIVING LEARNING CYCLE, as *pars pro toto*.

When these two sets of patterns are interwoven, we get a single list and discussion of 55 patterns, which form the basis for the Campus plan that is still in use today and updated every 5 years. It is these 55 patterns that also form what we call a ›Project Pattern Language‹ (sometimes also Pattern Project Language). The detailed list and explanations of these patterns as proposed solutions can be read in *The Oregon Experiment,* pages 101-143. In terms of pattern presentations, we find a first modification or simplification in which patterns are not represented in their full form but in the much shorter problem-solution form.

Illustration 5: University of Oregon Campus in Eugene, Oregon (Air-photo)
The Oregon University continuously is applying the principles of patterns and user
participation since 1974 in planning and design of their Campus

The most important lesson in this section is to understand that each project is different and unique in its own way and therefore needs its own Project Pattern Language as an important aspect of innovation, originality, and creativity within a larger complex system of functionality and harmony. New patterns are being developed in various projects all the time. The latest set of new project patterns was developed for the new UO University Campus in Portland, Oregon, where an urban block of three 4-6 story buildings was remodeled for the purpose of providing a new urban Campus to the University of Oregon about two hours' car drive from Eugene.[3] (see Illustration 1)

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3 | Neis, Hajo, Theodoropoulos, Christine, Thallon, Rob. »New Facilities and Expansion of the University of Oregon Department of Architecture,« in City Campus: Proceedings of the 2007 Fall ACSA Central Fall Conference, pp.1/22-1/33. Riverside Architectural Press, University of Waterloo 2007.

Project Language – Eishin Campus in Japan

A ›Project Language‹ forms the next step in the evolution of design and building languages for particular projects. As mentioned earlier, we want to understand how challenges and opportunities resulted in adaptations of the pattern language method into various forms of pattern project formats and formulations, such as the format of a ›project language.‹ The idea and development of what we call a project language is defined first by the way one works with users and second, by the form of the language or the way the language is presented. Working with users assumes a rather fluid relationship in which those users are encouraged to present all their specific proposals, ideas, dreams and wishes for a particular project. Since these ideas, proposals, visions and wishes more often than not take the form of individual projects, or are expressed as such, the result may or may not be a pattern in the formal sense (or it might take a lot of time to formulate simple ideas into elaborate problem-solution-pattern format). Still, even a Project Language may contain quite a few patterns in their solution or hypothesis form. The task of the architect or planner then is to start to create a coherent product or project program out of these various (sometimes conflicting) projects, proposed by various users. The outcome of this work is a story, a narrative that tries to capture and describe all the various individual projects in one coherent form.

A Project Language distills and describes the essence and character that a specific building or urban planning project will have, and defines its connection to the town or landscape and to each of its individual occupants. The particular character of the project is presented in the Project Language as a carefully structured sequence of statements, which arise from observation and interviews with users and other interested participants. The key aspect of a Project Language is that it describes the particular nature, essential components, and relationships a project and all of its elements will have, yet at the same time maintaining a childlike openness and ambiguity as to the exact form of the project and its elements. Thus, the Project Language defines the framework within which the exact form will arise directly from work on the site and in the process of building. The language is also presented in a sequential fashion, and with descriptive headings. Just by reading the headings (or first sentences) in a sequence one should be able to build up a picture of the important features of the overall project.

The concept of a project language emerged, developed, and was first applied in a larger project for the design of the Eishin College and High School Campus in Japan. The Eishin project language is recorded in a document of about 100 pages describing a whole new campus as if it were already existing. It consists of 8 chapters, each one dealing with a different aspect. One (non-illustrated) version of this Project Language can be found in the book *The Battle for the Life and Beauty of the Earth* (Alexander, Neis, Alexander Moore, 2012) whereby one can start to actually find an understanding of this form of language formulation and presentation and, in our case, appreciate the practical differences in format from a ›pattern project language‹.
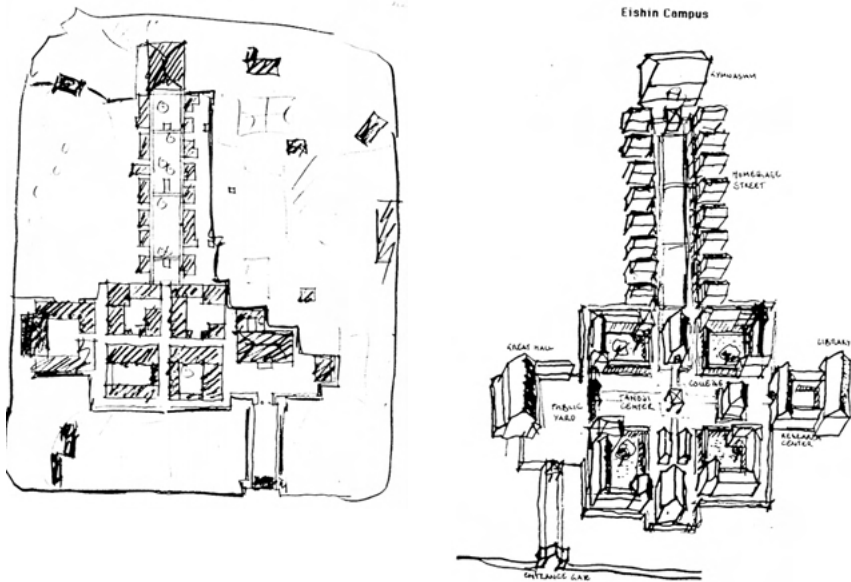
Illustration 6: Two Diagrams of Eishin Pattern Language Representation Diagram
Diagram a) shows a graphical representation of the Pattern Project Language for the
Eishin Campus with ›Inner and Outer Precinct‹ in plan for an ideal site.
Diagram b) shows the inner precinct with an interpretation of possible buildings

Other projects, in which I have applied the format of a ›Project Language,‹ include the Christian Music Village in Nagano Prefecture/Japan. The project language describes the overall structure of the village in the mountains of Fujimi and was partially built. The formation of a project language for the Saida Project in Lebanon was published as »Weaving in Life.« And the project language for the Wertheimer Tor Project in the Castle Town of Breuberg/Germany is presented in a short solution version and a longer format version. Each of these project languages is formulated in a sequential fashion and sometimes in a short and long version, so that one can understand these projects quickly and/or in more detail.[4]

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4 | The Christian Music Village in Nagano Japan is captured in a poetic project language. Published as an HNA Working Paper with numerous illustrations of building designs and completed buildings. HNA 1997. The formation of the Project Language for the Saida Project in Lebanon for the Prince of Wales Urban Design Task Force (UDTF) 1997 was published in ›The Lebanon Project‹, Prince of Wales Institute of Architecture, 1998, pp. 70-80. Hajo Neis ›Weaving in Life: The Formation of a Project Language for Zoutini‹. A full Project Language for the Project is also available as a HNA Working Paper: ›New Memory for the Old City of Sidon‹ 1998. The Wertheimer Tor Project in Breuberg, Odenwald, is documented in a summary version and in a richly illustrated long version (HNA documents). Also see: Hajo Neis. ›Planning

From a Pattern Language to a Project Language:
Innovation, Improvisation and Creativity

Modifications and adaptations of pattern language formats to particular contexts as well as changes into new formats came mostly out of very practical considerations and necessities, as well as opportunities in real project situations. But there are also theoretical issues that have to do with innovation, improvisation, complexity, creativity and appropriateness of response.

Projects should be dealt with at the appropriate level of the context, principle selection and formulation, especially when working with users. For particular contexts it is indeed refreshing that not everything is called a pattern nor every little idea, issue or dream handled as a pattern. (It is also not quite appropriate when the world is carved up into millions of patterns.) Quite often it seems to be appropriate to initiate a process that is different from the formulation of a pattern or pattern language. This might be a narrative or project language, a story, even a poem. There should be a loose variety of approaches, giving flexibility, permitting improvisation, innovation, joy and creativity. New forms are being tested in various contexts, notably sequential formulations are being tested that can be combined more directly with architectural and urban design processes. All of these various approaches still have at their heart the improvement of life and the problem solving intention of design patterns.

Pattern and pattern language discussion and development is going on continuously in a variety of different groups and different locations around the world, either strictly in the rigorous format of patterns, or in more loosely organized project languages for particular projects, even in specialized formats and applications. A recent effort has been started to develop an innovative repository for space patterns and pattern languages by members of the Building Process Alliance Group (BPA) and other related groups, in a format similar to the Wikipedia organization. In fact one of the pioneers of the wiki, Ward Cunningham, explained in one of our conferences in Portland how the idea of a wiki is based on the idea and format of a pattern.[5] Another recent development addresses the idea of anti-patterns. These so called anti-patterns were first simply ›rejects‹ in the original pattern language development because they created more problems than they solved, including the

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Designing and Building Three villages‹. ACSA Regional Meeting. Designing in the Democratic City. Hampton University, Virginia, October 1996. Published in Conference Proceedings. And: Hajo Neis and Susan Ingham. ›Planning and Designing for Making Urban Villages‹. International Making Cities Livable Conference, IMCL, Carmel, California, March 1996.

5 | Fall 2009 International PUARL Symposium 2009. *Current Challenges for Patterns, Pattern Languages &Sustainability. Published by PUARL Press. 2010.* Michael Mehaffy and Nikos Salingaros have also taken up this topic in an article called »The Pattern Technology of Christopher Alexander.« Friday, October 2011. www.metropolismag.com/pov/20111007/the-pattern-technology-of-christopher-alexander.

›madhouse balcony‹ that Chris Alexander sometimes talks about. More recently people have started to develop anti-anti-patterns intended to avoid all kinds of existing wrong solutions to problems.[6] People are also working on different kinds of pattern language formats. Card decks have become popular ways for communicating and working with patterns, so that users can more easily access them and use them in a playful fashion.[7]
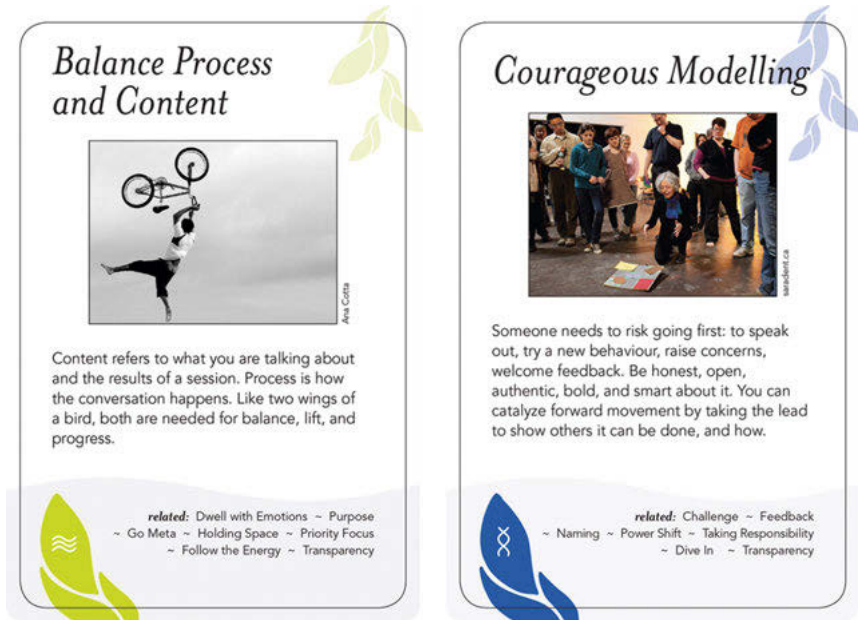
Illustration 7: 91 Cards' Deck: A Pattern Language for Bringing Life to Meetings and other Gatherings (by Group Works, 2012)

The strongest quality of any Pattern or Pattern Language in its formal problem solving articulation seems to be the fact that it is a system based primarily on functional considerations. Most people can easily understand how a pattern works, and how various patterns work together, and how they solve problems in architecture and in many other fields. It is for that reason that patterns and pattern

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6 | Doug Schuler is working on a project that he calls quite dramatically: How to Destroy the World and Make Life a Living Hell for Most People in the Process: A How-To Guide also known as A Diabolical (Anti-)Pattern Language. Evergreen College, Spring 2013.

7 | Tree Bressen and Group Works have developed a pattern language deck in solution form with instructive illustrations: Group Works: A Pattern Language for Bringing Life to Meetings and Other Gatherings. The deck was published in 2012 by Group Works and can be bought as a deck or downloaded for free: www.groupworksdeck.org. Doug Shuler is finishing a deck of pattern cards as part of his project and book ›Liberating Voices‹.

languages have been so successful in many disciplines, a result of their universal applicability to almost any problem with a problem-context-solution situation. It is the universal format of patterns that is of interest here, and which seems to have the potential to tackle and solve complex problems in interdisciplinary ways, especially for the ever-more complex problems that we are faced with today. We will come back to the issue of interdisciplinary use of patterns and pattern languages in complex problem-solving at the end.

However, the fact that we are dealing here primarily with functional arguments and logical organization can also be considered to be a weak point of the principle of patterns, at least for architects, and certainly for people who primarily work with space, geometry, material, and color. For architects, a pattern language can (but does not have to) form the starting point of a building project or design. Even with a pattern language or project language as a programmatic starting point of design, for the architect the building still needs to be designed as a physical and spatial entity, and for the builder the building still needs to be build physically according to spatial and physical ideas, plans and instructions. Many people, especially pattern language enthusiasts, scholars, and supporters seem to think that the main work of a design is the formulation of a pattern language, as if it is at least 50 % or more of a project. In reality, work on a pattern language may be 5-10 % of any building project's design work. This means that 90 % of the work is related to other aspects and principles of a building design and construction process. Here, it means first of all that you have to understand space and geometry as a major category for creating a successful building project.

PATTERNS, CENTERS, AND FIELDS OF CENTERS

Space and geometry are such essential features in any architecture, that we may as well consider these at least as important as functional elements such as patterns. It is Chris Alexander's second large achievement in this overall pattern language theory and school of thought to bring space and geometry into this theory and practice with a new and innovative perspective. The first important element is the understanding of space as a life-giving feature. The second important innovation is the formulation of 15 properties of space and geometry, and the third critical element is the combination of these two features in to what is called a field of centers.

Space as a basis of life is an age-old idea that appears in religion as well as in philosophy. What is new in the theory on space and spatial quality is that it is considered part of the modern scientific world and subject to the scientific method. Life occurs and starts in space because of a life-giving potential and opportunity that exists in space, similar to gravity that exists (equally invisible) in large bodies of material. Centers are essential in this theory, specifically the geometrical relationships of centers. A center emerges in space and supports other emerging

centers to create more life. Space is not a lifeless container, but it is an active entity that together with centers forms the foundation of life.

Centers are observable everywhere in nature and also with man-made objects. They are pervasive all around and take on different forms. Over a long period of studies, Alexander found 15 kinds of geometrical centers that can be identified by their different kinds of qualities depending on their position in space and their configuration in a whole. These fifteen centers or geometric properties of life are the following:

1. Levels of Scale
2. Strong Center
3. Boundaries
4. Alternating Repetition
5. Positive Space
6. Good Shape or Form
7. Local Symmetries
8. Deep Interlock
9. Contrast
10. Gradients
11. Roughness
12. Echoes – Family Resemblance
13. The Void
14. Inner Calm/Simplicity
15. Connectedness – Not Separateness

The notion of centers and field of centers was first tested in a larger project at the San Francisco waterfront in a general formulation without the fifteen properties of living space, published in *A New Theory of Urban Design* (Alexander, Neis, Anninou, King, 1987). The full human geometry or fifteen geometric properties are fully discussed in *The Nature of Order (*Alexander, 2003). Here also the relation of centers to patterns is discussed in a way that centers can also be understood as patterns and patterns can also be understood as centers. Sometimes, specific geometrical centers can be connected with very specific patterns such as the geometric property *DEEP INTERLOCK* can be found in the pattern COUNTRY CITY FINGERS, the geometric property *BOUNDARIES* can be found in the pattern ARCADES, and the property *GRADIENTS* can be identified with the pattern ENTRANCE TRANSITION.

The principle of centers and fields of centers has been applied in numerous projects. Excellent examples have been carried out in their purely geometric form in the following projects: 1) The façade of the Sakura Tsutsumi Building in Japan exhibits beautifully the properties of *UNIFYING CONTRAST* and *ALTERNAT-ING REPETITION* with its alternating diamond shaped exterior concrete elements. 2) The property of *GRADIENTS* is well shown in the overall volumetric structure of the Emoto Apartment Building in downtown Tokyo. 3) The property

of *VOID* exists peacefully in the lake at the center of the Eishin Campus in Japan. 4) The property *GOOD SHAPE* is marvelously embedded in the windows and window frames of the West Dean Visitor Center in West Sussex, England. 5) The property of POSITIVE SPACE can be strongly felt in the Vineyard Farmer's Market in Fresno, California, with its wonderful heavy wooden trellis structure. 6) The properties of *BOUNDARIES* and *DEEP INTERLOCK* can be strongly felt in the courtyard arcade of the Julian Inn Shelter for the Homeless in San Jose, California 7) The property of *FAMILY RESEMBLANCE* or ECHOES is a major feature of the Agate Student Housing Project in Eugene, Oregon. 8) And finally, the Eishin Campus in Japan is probably the best example of a large urban built project with *FIELD OF CENTERS* qualities.[8] (see illustration 7)

7.a. Sakura Tsutsumi Building

7.b. Emoto Apartment Building

7.c. Eishin Campus Lake

7.d. West Dean Visitor Center

7.e. Vineyard Farmer's Market

7.g. Agate Student Housing
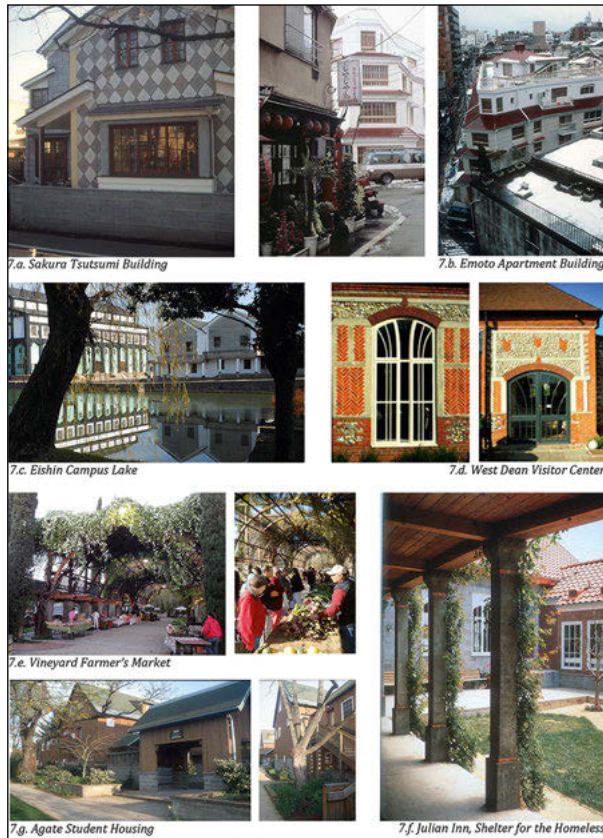
7.f. Julian Inn, Shelter for the Homeless

Illustration 8: Expression of geometrical Properties as designed and built in Projects

8 | The Sakura Tsutsumi Building by HNA is published in: Howard Davis. The Culture of Building. New York: Oxford University Press, 1999. The Emoto Apartment Building by CES is published in: Nikei Architecture. »Maison de Louran: Good Reaction to the Landscape and Urban Space – It succeeds to Interweave with Delicate Shape. 6-13-1988.

How to work with the two essential principles of centers, patterns and pattern languages, and fields of centers individually or both together in an integrated fashion in project formulation, design, construction and development, is an ongoing process of theoretical explorations of creative thinking, practical application, improvisation and experimentation in a creative process. One such exploration was the development of a new Form Language, in which centers and patterns, as well as urban and architectural context concerns were all combined and connected in a way that created a form language for a particular urban project design. Form Language principles were researched and developed by Chris Alexander, the author of this article, and students from the University of California in Berkeley in a way that was very specific for a local project on Telegraph Avenue in Berkeley and, at the same time, was general enough so that most of these principles could very well apply to other urban projects in different urban locations. Thirteen principles were identified such as for example ›positive space‹ and ›building volumes are formed by positive space‹ or ›structure and building construction is real.‹ A key point here is to understand that form languages differ considerably from New Urbanism form-based codes in the way that for each urban project the principles applied are to be a dynamic part of the actual development, design and construction of a project but are not fixed beforehand in regulations and finished design form. At the ›Formensprachen Symposium‹ in Dresden, Germany, in 2001 the results of the form language work were presented and later published in the German Architecture Theory Journal ›Wolkenkuckucksheim‹.[9] Form Language exploration has continued at the University of Oregon with a Form Language for downtown Portland as well as other explorations and ongoing coursework at the UO.

Here we want to summarize some basic points regarding the understanding of these concepts and principles of the overall pattern language approach, and we also want to explore possible research investigations and project applications in various contexts including interdisciplinary arrangements.

SUMMARY: INNOVATION, IMPROVISATION AND CREATIVITY IN THE PATTERN LANGUAGE APPROACH – SOLVING COMPLEX PROBLEMS WITH PATTERNS AND CENTERS

First of all it is important to acknowledge that the Pattern Language Approach itself is an important and innovative theory and method that helps us to understand and organize the world in a new and helpful way, but it also helps us find new

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9 | Hajo Neis. ›Versuche einer neuen Formsprache in der Architektur‹. Howard Davis. ›Architektonische Fakten bei der Suche nach einer Sprache‹. In: Wolkenkuckucksheim. Thema Formsprachen. 6.Jg., Heft 2 (Januar 2012). www.tu-cottbus.de/theoriederarchitektur/Wolke/deu/Themen/themen012.htm.

ways of solving problems and complex problems in architecture, urban design and planning as well as many other fields and disciplines.

In particular the principle of patterns lays out a way of tackling problems so that we can try to find solutions in a problem-discussion-solution format. Furthermore these patterns are formulated as archetypal patterns, which means they are understood as general solutions that can find endless forms of specific solutions and applications according to context and interpretation in many creative ways.

Many patterns together can form pattern languages for particularly large and difficult problems or complex situations. Numerous patterns together as a pattern language can also be understood as forming the knowledge of a particular building culture or even a specific spatial culture as a whole. Some people critically look at pattern languages mostly from the perspective of knowledge and information management, but at the same time, they miss the more important point that it is a collective knowledge based on qualitatively good solutions to environmental and building problems.

Patterns and pattern languages were first invented and applied in the combined fields of architecture, urban design and planning for project program formulation and project design. Patterns and pattern languages are one particular kind of principle that can be applied in combination with other relevant principles to develop an architecture, building or planning project. For example, combining the principle of pattern and pattern language with the principle of user participation, the principle of organic order, and the principle of piecemeal growth, will create a project in which process is becoming relevant (because of the inclusion of piecemeal growth).

Experience in real world projects in architecture and urban design had an impact in modifying and even changing a pattern language into what is called a project language. In a project language, patterns are not the only defining elements any more, but all kinds of specific ideas, dreams, vision, may make up a coherent language for a particular project. Narratives, stories and poems could serve as starting points for a project and can serve as starting points of innovation, improvisation and creativity.

Patterns and pattern languages are determined by functional arguments and functional considerations. For an architect function is not quite enough to design a building, and pattern languages do not replace design, but they are part of the design process. A building project still needs to be designed at a minimum in spatial and geometrical terms. Consequently, a complimentary principle was developed that deals with space and geometry to help the design of buildings and spaces. This principle is called centers and fields of centers, or action oriented it is called ›formation of centers and fields of centers‹ to help to create more life in space and in buildings.

Space is not an empty container but contains the beginning of life in forms of centers that support each other to create more centers and more life. Centers are expressed in fifteen different geometrical building blocks that together create

fields of centers in endless variation. Centers and fields of centers are key innovations in the overall Pattern Language approach that make the theory much richer as a body of knowledge, and make the practice of designing and building quite a bit more specific, artistic, playful and fun.

By now numerous projects have been designed and built with the principles of centers and patterns, pattern languages and fields of centers combined. The Eishin Campus in Japan is a prime example, and the Emoto Apartment Building, also in Japan is another example. The Agate Student Family Housing project at the University of Oregon is another built example, so is the Visitor Center in West-Sussex, England, as well as the Market in Fresno, or the Sakura Tsutsumi Building in Tokyo, are works by CES or HNA.[10] At a planning and larger urban design level, one earlier project by CES stands out: Gusasare New Town in Venezuela was planned as a new mining town in the jungle close to the Colombian border. The principles of patterns and centers were used here in an innovative dynamic growth pattern system, clearly demonstrating how the city can grow over time in a combination of certainty and uncertainty or organized improvisation. More recently two projects by PUARL for the City of Tigard in Oregon explicitly include the principle of patterns and implicitly also include the principle of centers for a town center and an urban corridor.[11] By now we can count numerous examples of architecture and urban projects by many of the architects who use the pattern language approach in their work. Some also work explicitly and successfully with the geometric principle of field of centers.

The individual application, but more so the combination of these two major principles of centers and patterns, are now seen as key principles in trying to create buildings and environments with life, or at least with the beginnings of life according to pattern language theory and practice. And while there are a number of other relevant principles for a building or urban design project to succeed, here we want to specifically emphasize connections to other disciplines and interdisciplinary work in a research and creative project that has little to do with architecture but with social organization and at the same time employing the pattern principle.

It was certainly fun and exciting to be involved in the interdisciplinary MICC research project (as a Verbundpartner) during my research year 2010 in Germany,

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10 | CES stands for Center For Environmental Structure. It is the main organization of the pattern/center approach to architecture urban design and planning, with Chris Alexander as its president. HNA stands for Hajo Neis Atelier, which is my own architecture office. Recently I gave a lecture at Meiji University in Tokyo featuring works of both companies in Japan »CES and HNA in Japan.« Meiji University December, 2012.

11 | 1) New Town Guasare Project in Venezuela, published in The Nature of Order by Chris Alexander. 2a) TIGARD HW99W CORRIDOR: Pacific Highway to a Sustainable Future. PUARL Research Report 2010. (Hajo Neis, PI) 2b) TIGARD DOWNTOWN FUTURE VISION: A Visual Refinement of the TDIP. PUARL Research Report, 2009. (Hajo Neis, Managing PI) puarl. uoregon.edu.

a project that has little to do with architecture and urban design, but a lot with patterns and pattern languages (and a little with centers). The project exhibited the rich variety of applications of the principle of patterns and pattern language for Music, Innovation and Corporate Culture (MICC)[12]. But what was even more impressive for me was the recognition of the large potential that is implicit in this principle. With so many disciplines already using the principle of patterns in different forms as a problem solving method, there seems to be a huge potential for trying to connect these various disciplines for solving relevant problems that might not so easily be solvable otherwise. This could be done by being part of a larger pattern language project within one's own discipline while working together with other disciplines; it could also be accomplished by expanding and extending outside one's own discipline with a project in another discipline.

Outlook: The City of ›The Dalles‹ Sustainable Urban Downtown Project

Two key questions in the pattern language school of thought, research, and practical application, always are: 1) What are relevant open questions and next steps to pursue in theory and research of patterns and centers; and 2) What are practical issues and projects that we want to pursue in order to solve more problems and make the world a better place?

With regard to 1), there are always a number of questions and issues that need attention on a theoretical level, such as the question of ›Types of Production that will generate Living and Beautiful Environments.‹ More socially oriented, we can ask the question how to formulate and provide these kinds of production for the 93 % of people in the world who do not have access to organized construction of this kind. But here we want to end with 2) a rather more practical project question that takes up some of the issues that we were trying to elucidate in this article: How can we start a project within our own discipline and field of architecture, and expand, extend, and include relevant issues and ideas from other disciplines and make them relate within the method of patterns and centers to our field of architecture and urban design?

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12 | Music_Innovation_Corporate Culture MICC is a research project by Professor Dr. Wolfgang Stark und Professor Christopher Dell at the University of Duisburg-Essen, based on a research grant in the research cluster on ›Innovation Strategies Beyond Traditional Management,‹ funded by the German Government and the European Science Foundation. »In a quest to disclose the secrets of innovative cultures, our methodological approach aims to identify the patterns of innovative cultures in organizations and communities by using musical thinking and the patterns of improvisation.« (Dell 2002)

*Illustration 9: Urban Design Axonometric of the Downtown of the City of Tigard
(Developed and designed by Portland Urban Architecture Research Laboratory PUARL,
2009)*

What we imagine is an urban project, specifically an urban design and develop-
ment project that includes smaller architecture projects within it that possess nu-
merous concerns and issues that are not only architectural and urban spatio-phys-
ical but could cover a range of other relevant topics such as ecology, economy,
equality etc. Such a project seems to be shaping up for the City of The Dalles
on the mighty Columbia River, which acts as the border between the states of
Washington and Oregon in the northwestern United States.[13] The problem here
is one of re-urbanization, or, how to rejuvenate the Old Town Center in a way that
it becomes attractive again for living, working, and simply enjoying life there. For

13 | We are currently preparing for the project ›Sustainable Downtown Growth in The Dal-
les‹ at the Portland Urban Architecture Research Laboratory PUARL in an interdisciplinary
approach that uses patterns and centers as key categories for the project.

this project, we obviously would work with the principles of pattern and pattern language as well as the principle of centers and fields of centers with regard to the urban and architectural approach. Possibly, the format of the Form Language may also be applicable here. Further, we imagine that we could go across disciplines in a way that architects would work not only with clients, users, and technical consultants but would work with an appropriate range of disciplines, all applying the pattern language approach in a way that all disciplines can actually connect their patterns in a larger interdisciplinary pattern language.

In this way we are testing a theoretical issue, that is, if and how much we actually could work together with different disciplines applying one main integrated method as a central core to which all different disciplines relate and contribute. At the same time we are trying to work together on a very practical urban design and development project in an interdisciplinary way, trying to solve urban design and other urban problems of an individual city in a creative way.

If this combined interdisciplinary problem-solving method could actually be applied successfully, we might approach larger problems with this method and start to tackle more complex and major urban problems in the world with the vital intention to support and enhance life.

Illustration 10: The City of The Dalles at the Magnificent Columbia River in Oregon, USA

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LIST OF ILLUSTRATIONS

Illustration 1: University of Oregon in Portland Downtown Urban Campus
The Campus is located in downtown Portland in adapted old warehouse buildings, was first designed in the Oregon pattern language method with the principles of patterns and user participation. The White Stag facilities are open since 2009.

Illustration 2: OLD PEOPLE EVERYWHERE »Old People need old people, but they also need the young, and young people need contact with the old.« From APL p.216. (pattern 40) and connections to the patterns forming a particular pattern language or web of life.

Illustration 3: ENTRANCE TRANSITION (APL pattern 112) The example of a good solution to the problem of entrance transition is taken from Obidos in Portugal (Photo: Sara Ishikawa).

Illustration 4: Graphic Representation of A Pattern Language (APL)
Stefan Tietke and his students have used the software »GraphViz« in order to show the hidden connections of all 253 patterns from APL. Arch+ 189. October 2008, pp. 18-19.

Illustration 5: University of Oregon Campus in Eugene, Oregon (Air-photo)
The Oregon University continuously is applying the principles of patterns and user participation since 1974 in planning and design of the Campus.

Illustration 6: Two Diagrams of Eishin Pattern Language Representation
Diagram a) shows a graphical representation of the Pattern Project Language for the Eishin Campus with ›Inner and Outer Precinct‹ in plan for an ideal site.
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Illustration 7: 91 Cards' Deck: A Pattern Language for Bringing Life to Meetings and other Gatherings (by Group Works, 2012).

Illustration 8: Expression of geometric Properties as designed and built in Projects.

Illustration 9: Urban Design Axonometric of the Downtown of the City of Tigard (Developed and designed by Portland Urban Architecture Research Laboratory PUARL, 2009).

Illustration 10: The City of The Dalles at the Magnificent Columbia River in Oregon, USA.