

Patterns We Live By: Pattern App as a Platform to Familiarize Pattern Languages

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In this paper, we propose a platform called Pattern App, an app which manages a personal pattern set from multiple pattern languages while learning about other users' selections and experiences. Our goal is to facilitate the exchange of pattern usage, making it easier to display, manage and share patterns and their information, providing people the opportunity to 'Live by the pattern languages'. Currently the implemented functions are (1) Pattern Library for viewing patterns from four pattern languages, (2) To-Practice Pattern List for selecting patterns to incorporate into yourself, or the members of your project, to create a pattern list from several languages, (3) Pattern Concierge for introducing patterns based on answers to questions Manabu, the Iba Lab character, will ask the user. Users of this app reported in their feedback that this platform helped them get familiarized with the pattern languages. We will continue to improve and increase the functions for making pattern languages familiar to more people in order to strengthen people's interest in patterns, and ultimately to strengthen the impact of the platform.

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1. INTRODUCTION

A pattern language is a method for describing and sharing practical knowledge for problem solving. It also functions as a common vocabulary that can be shared among a group of individuals in collaborative activities (Iba, 2013). Although first created in the field of architecture in 1977 by Christopher Alexander (Alexander et al., 1977), the method has been adapted to a range of fields including software design (Beck and Cunningham, 1987), education (Pedagogical Patterns Editorial Board, 2012), welfare (Iba and Okada, 2015), and social change (Shimomukai et al., 2015).

Alexander who proposed the method of pattern language says, "*A language is a living language only when each person in society, or in the town, has his own vision of this language*" (Alexander, 1979, p.337). In other words, it is necessary to publish these pattern languages so that these languages can be understood by many people.

Pattern languages are generally published as reading materials, such as papers, cards, webpages, and books---most of which have been published in the form of books or booklets. In the software community, patterns are shared as academic papers and submitted to conferences which includes PLoPs held all over the world. Patterns have also been shared via the Internet in places such as the Ward Cunningham's Portland Pattern Repository (Inventado, 2017)¹, which contains the first ever wiki web pages for software design patterns. Christian Kohls introduces supportive tools to help readers practice the patterns in Creative Thinking Patterns for the readers to utilize both online and offline (Kohls, 2015). More recently, 'Pattern Objects' (Iba et al., 2016) have been introduced as a way to make patterns visible in everyday life by putting patterns into the environment.

It is also necessary for pattern languages to be personalized, as Alexander says, "*It is not enough to merely duplicate a pattern from a book in order for each human being to keep in mind the pattern language as an expression of their daily life attitude ... [a] living language must constantly be re-created in each person's mind*"

¹ <http://c2.com/ppr/index.html>

(Alexander, 1979, p.337-338). Therefore, various methods have been created to make the pattern languages more personal.

One way is to design opportunities to interact with patterns collaboratively. In recent years, dialogue workshops (Iba, 2014) and pattern concierge (Mori et al., 2016a) have been introduced as tools for using pattern languages in collaborative settings with pattern cards such as Iba Lab's 'Presentation Patterns Cards' and 'Group Works'². Another setting includes games such as, the 'Learning Patterns Card Game' which helps user become familiar with Learning Patterns, a pattern language for creative learning (Okazaki et al., 2011), and the 'Fearless Journey'³ game, which allows users to learn about patterns on introducing new ideas within organizations (Manns and Rising, 2005).

Not only the pattern languages themselves, but also the online ways of sharing your personalized use of the pattern languages is increasing. For example, there is a Facebook group called "Let's Use Words for Journey"⁴ to share how people utilized the pattern language, "Words for Journey" (Iba et al., 2015) for living well with dementia.

We at Iba Laboratory have developed a system to manage and share patterns by the users themselves. The 4th Place is a system that allows users to express their liveliness by sharing and storing patterns with their photos and stories (Iba et al., 2014a). The system is designed to express the *Quality Without A Name* (QWAN), which Christopher Alexander proposed in his book *The Timeless Way of Building*, "*There is a central quality which is the root criterion of life and spirit in a man, a town, a building, or a wilderness. This quality is objective and precise, but it cannot be named*" (Alexander, 1979, p.19). The developers of the system dealt with Generative Beauty Patterns, a pattern language for living lively and beautiful (Arao et al., 2012) to express, store and share the aliveness of the users' experiences related to each pattern.

The goal of these examples above is to be in touch with patterns. To add to and expand on these methods, in this paper, we propose the Pattern App, a smartphone-based platform that allows users to become closer with patterns. Our goal is to facilitate the exchange of pattern usage, making it easier to display, manage and share patterns and their information.

2. PATTERNS WE LIVE BY: A PLATFORM TO FAMILIARIZE PATTERN LANGUAGES

Based on the concept of "Patterns We Live By", we propose a platform, Pattern App⁵ to enable people to get in touch with patterns on a daily basis and exchange patterns-related information with other users. Specifically, we developed a platform to manage and update one user's personal pattern set from multiple languages, while learning about other users' choices and experiences of patterns.

As presented in Figure 1, both the individuals and members of a project can use this platform. It has three main strengths: (1) publicity, (2) sharing, (3) managing. The users can publish a pattern language, view the patterns published, share the experiences on the patterns, and manage their own pattern lists. For example, a scenario can be like this: A user views a pattern language which other user have published in the platform, and finds a pattern that he wants to practice in his daily life. He put the pattern in his To-Practice Pattern List to motivate and remind himself. However, he couldn't come up with an idea of how to practice the pattern. So he looked other users' experiences up to draw on them. He left comments on what went well and what didn't so that other users can also learn from his experiences. This is a series of a user's scenario. If the user shares the To-Practice Pattern List to the members of a project, he can see which patterns the other members put in the list, and see the comments they left within the list.

² Group Works: a pattern language for bringing life to meetings and other gatherings. <https://groupworksdeck.org>

³ Fearless Journey: A GAME THAT GETS YOUR TEAM UNSTUCK. <http://fearlessjourney.info>

⁴ Let's Use Words for Journey: <https://www.facebook.com/groups/244243222597370/>

⁵ It is open to public at the site: <https://patternapp.net>

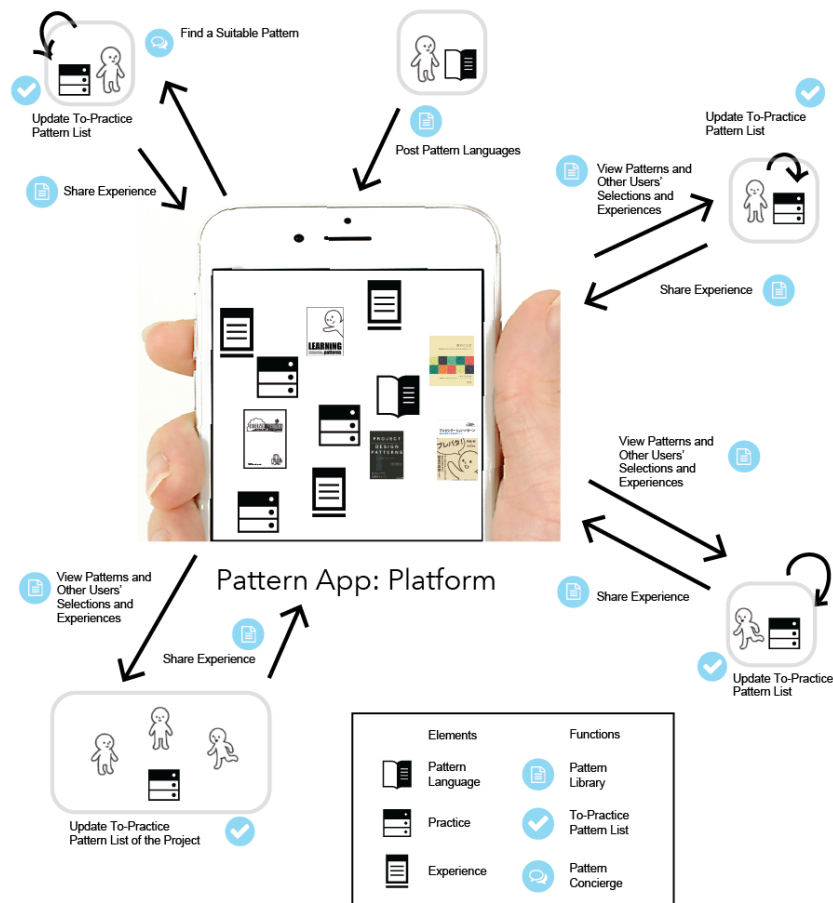


Figure 1: Pattern App as the Platform

Each strengths will be explained below.

2.1 Publicity

First of all, as mentioned in section 1, it is necessary to publish these pattern languages so that these languages can be understood by many people. Alexander says, *"The full presentation of patterns, the criticism and debate concerning patterns, evidence concerning the validity and testing of patterns, may be collected in archives in various libraries, offices, universities, and other centers."* (Alexander, 1971, p.120) In addition to just exposing the patterns themselves, in order to play the role of the platform, it must also function as a place for criticism and open discussion on each pattern. People should be able to view published information on other users' comments and experiences.

How are we going to realize this? Alexander said, individual patterns may be published through normal channels (Alexander, 1971). At that time, in 1971, channels meant the recording rooms of various libraries, offices, universities, research laboratories, centers, etc. Now in this age, there is a medium called the Internet, a channel that can be accessed ubiquitously with one hand. Publishing to the Internet, people can feel the pattern language more close.

2.2 Sharing within a project

A pattern language is a tool to help share the knowledge within an organization to foster a culture where people help each other. Adam Grant, an organizational psychologist says, *"Organizations that people help each*

other, share knowledge and care for each other are better with all measurable indicators: profitability, customer satisfaction, employee retention rate, even for operating cost reductions” (Grant, 2013)

Alexander also says, “We begin with that part of the language which defines a town or community. These patterns can never be “designed” or “built” in one fell swoop --- but patient piecemeal growth, designed in such a way that every individual act is always helping to create or generate these larger global patterns, will, slowly and surely, over the years, make a community that has these global patterns in it.” (Alexander, 1977, xix). Since the patterns become the common vocabulary, they can be used to have common recognition in collaboration with other members (Iba, 2013). We envision this feature for project teams working on something together with members, sharing the patterns and experiences on them for a better collaboration.

In order to achieve this on a daily basis, it is ideal for users to be able to access at anytime from anywhere while updating the situations about the patterns and leaving comments on them. This way, the members of the project can share the information more often, updating it at all times, without the necessity for preparing workshops. It is possible for them to use these two methods, the platform and the workshops differently as the situation demands. Figure 2 visualizes Pattern App when used by individuals, and figure 3 visualizes the image when a project shares the ‘Project Pattern List’ among the project members to make sure what patterns are important to them and to share the situations and comments on such patterns.

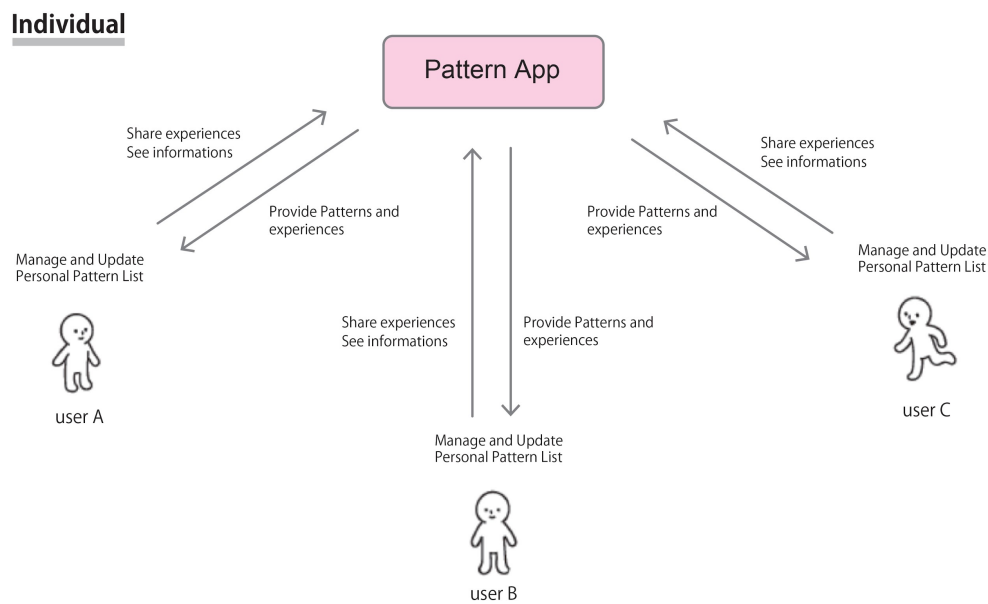


Figure 2: Usage of Pattern App for individuals

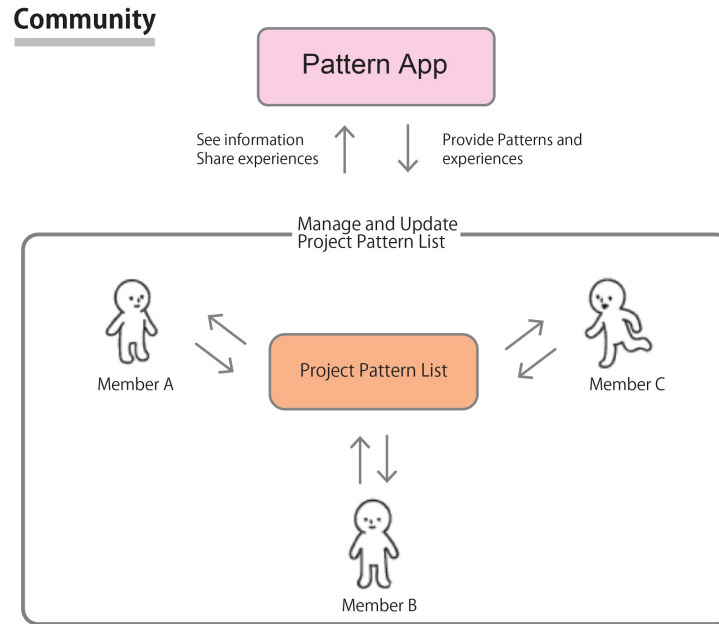


Figure 3: Usage of Pattern App within community

2.3 Managing and updating according to the context

The context of users and projects always change. There is the time for progress, the time for reconsideration, the time for anxiety while the deadline approaches, the time for reflection on the future, time is not static. It is inevitable that the necessary patterns will also change according to such changes in context.

In the platform, by considering the combinations and overlaps of patterns in multiple pattern languages, the users can think about what they need to succeed in their area (Iba, 2013). This is one way to personalize the pattern languages, supporting people to have their own versions of languages as the expression of their attitudes to lives.

Also, after mastering a pattern in enough instances, a user may not require further practice. *“Of course, the pattern languages in each mind are evolving all the time, as each person’s experience grows.”* (Alexander, 1979) As you can see, it is advantageous to manage your personal pattern set, updating it according to the context.

3. PATTERN APP AS A PLATFORM: THE THREE FUNCTIONS

In this section, we introduce the three functions which are currently implemented: Pattern Library, which enables the Pattern App to become a platform to view patterns at any time; Pattern List, a list which can add the necessary patterns; and Pattern Concierge, to propose suitable patterns according to the user's context. The work is in progress as we are implementing more functions discussed in the section Future Works. Next, each function will be explained together with the actual screen.

3.1 Pattern Library

The Pattern Library is a function that allows you to view patterns at anytime. At present, we published four basic patterns languages: Learning Patterns (Iba et al., 2014b), Collaboration Patterns (Iba et al., 2014c), Presentation Patterns (Iba et al., 2014e), and Project Design Patterns (Mori et al., 2016b). It is possible to “like” a pattern by attaching the heart icon to the pattern (Figure 4).

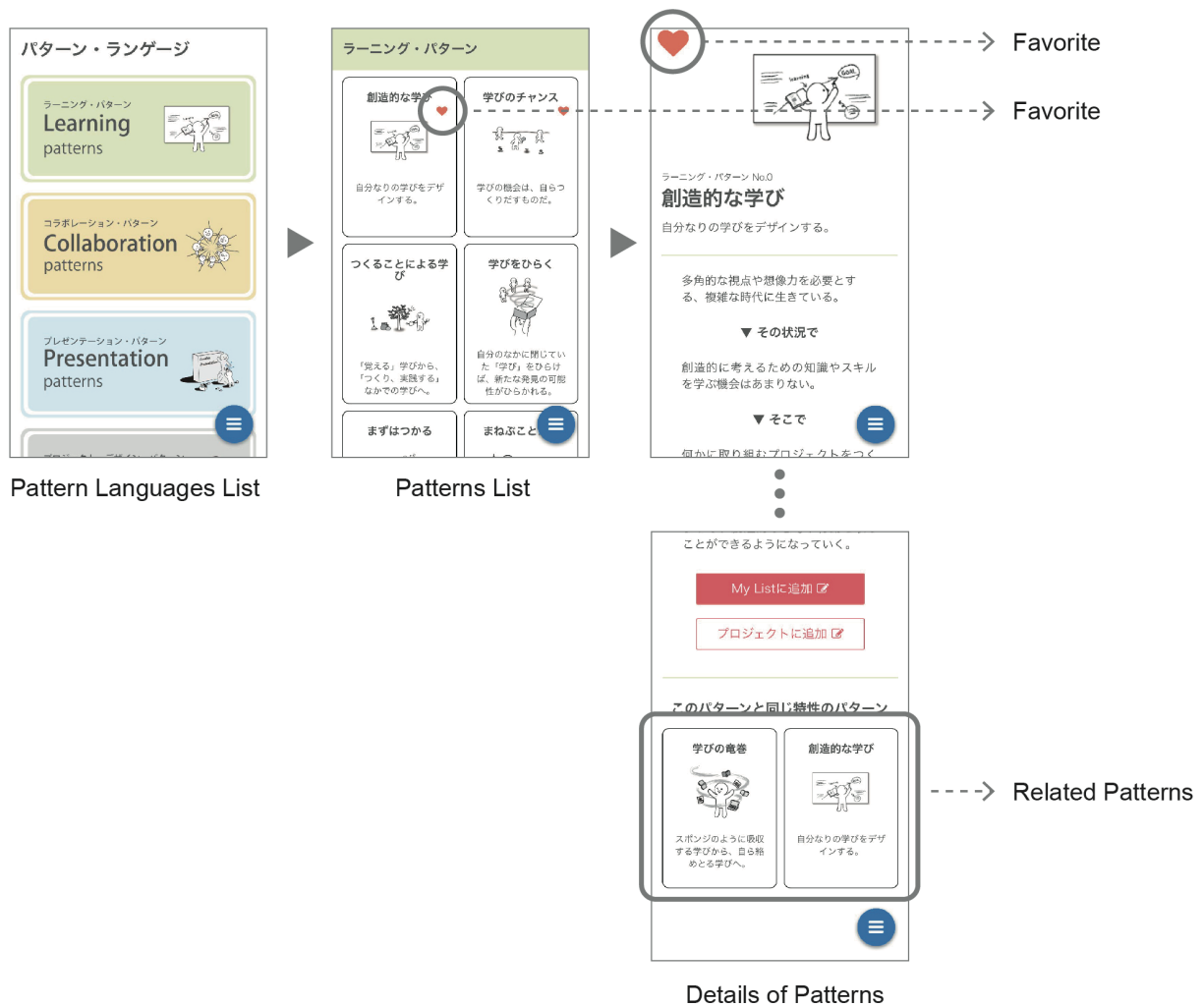
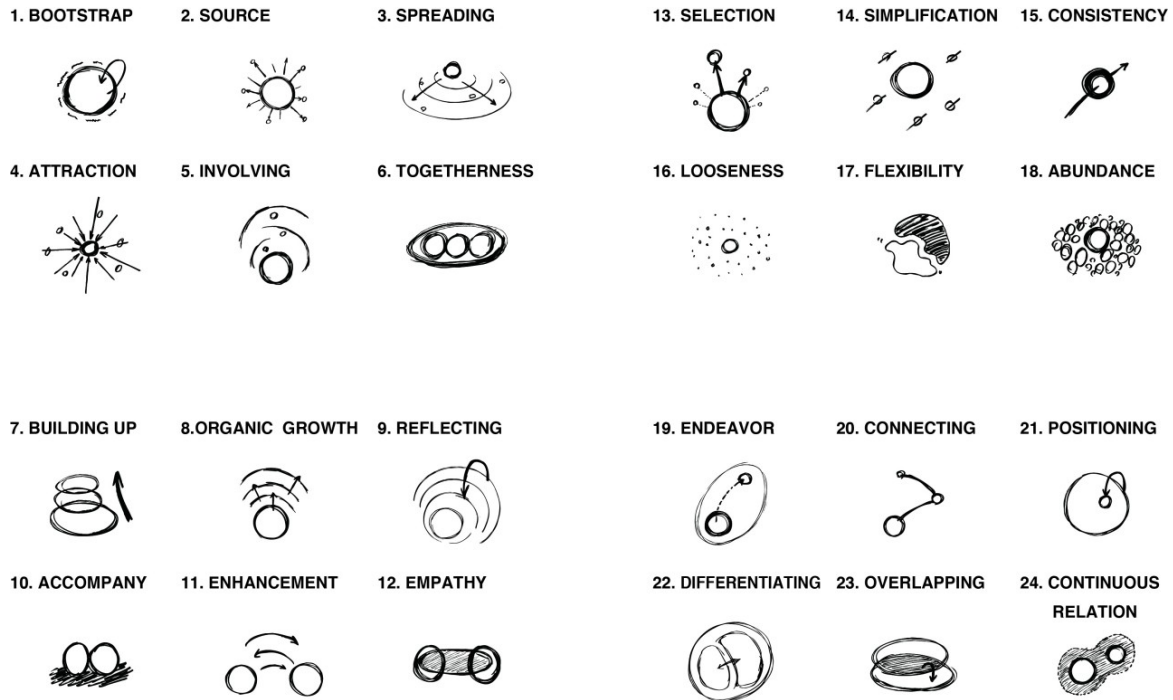


Figure 4: Screens of Pattern Library: Pattern Language List (left); Patterns List (middle); Detail of Pattern (right)

Related patterns are shown with each pattern, so that other patterns which have similar qualities can be found from the pattern the user is looking at (Figure 4). For these suggestions, all patterns of the four pattern languages were classified according to 'The Fundamental Behavioral Properties' (Iba, 2015)(Figure 5). Behavioral Properties present the quality of pattern languages, which is the application of 'The Fifteen Fundamental Properties of Wholeness' (Alexander, 2002), with Pattern Language 3.0. Pattern Language 3.0 is the domain of pattern languages of practical behavior, such as education, learning, and collaboration (Iba, 2011). By displaying patterns with the same properties as related patterns, users can find the quality they are looking for in other patterns.

In the booklets and cards of each pattern language, related patterns are also listed, but these media only show the patterns within that language. This time, because the four pattern languages on the app are analyzed all with properties, the extent of the related patterns go beyond the languages. Therefore, when other pattern languages are added in the Pattern Library, the patterns can be adapted to the function of related patterns analyzed by property.



Iba T et al, 2015, "The Fundamental Behavioral Properties"

Figure 5: The 24 Behavioral Properties

3.2 To-Practice Pattern List

The To-Practice Pattern List is a list from Pattern Library and Pattern Concierge that users manage and update according to those they found interesting and decided to practice. The patterns necessary to realize a better practice can be put in this list and referred to at any time. When adding a pattern to the list, the users can enter the priority in 4 levels and a period for which the user plans to intensively practice that pattern. The color and order of the patterns added to the list change according to the information (Figure 6). The list can also be used for a dialogue workshop (Iba, 2014), to show and share the patterns previously experienced.

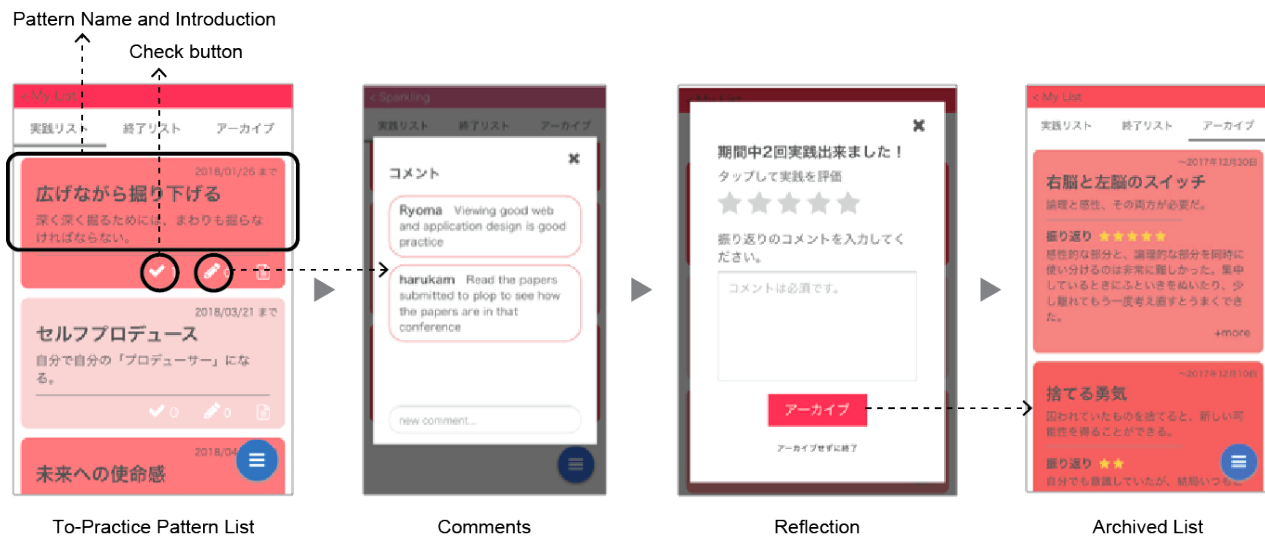


Figure 6: The Flow of To-Practice Pattern List

It is possible to add and delete the patterns on the list from different languages, unlike booklets and cards of a preset language. This list makes it easier to combine patterns from various pattern languages and use them for practice.

The To-Practice Pattern List can be used for both individuals and project teams. Individuals can add patterns to plan for how they want to be in the future or how they can enrich their lives. Project members can add patterns to be shared by all the members and share the experience of practicing the patterns in order to achieve better results in the project (Figure 6).

After adding the patterns to the list, you can press the check button to record that you have practiced the pattern, so that you can be reminded of that pattern more often. There is also a function to comment which allows the user to note and share when they notice or learn through the practicing the patterns (Figure 6). Alexander also emphasizes the importance of quantity of actions to repair and magnify the previous actions, as it will generate a larger and more complex whole little by little, which cannot be done in a single action (Alexander, 1979). This is applicable to all process, not only to the field of architecture.

When the practice period of the pattern is over, users can comment on the pattern in reflection (Figure 6). The comments will generally include how the user practiced the pattern, how they did well, what they learned, and how they wanted to improve next time, and more. Alexander says, *“It is essential that each person feel that his language is personal and his. For this reason, the public archives themselves will never be used, directly, to design buildings. They will merely be sources from which each person creates his own personal language.”* (Alexander, 1971, p120) The process of leaving comments can be said to also be a process to personalize the pattern.

3.3 Pattern Concierge

Pattern Concierge is a function to recommend patterns for the user in an interactive way (Mori et al., 2016a). It is very difficult to find suitable patterns from the enormous number of patterns. This function will be a clue to finding the suitable patterns according to the context. Manabu, the character for the illustrations of Iba style pattern language, suggests the patterns that suit the context of the user (Figure 7). This logic is based on the context written in the patterns. There are 38 groups of divided contexts, where each group contains 3 to 5 patterns. After the dialogue with Manabu, he suggests one of the pattern groups. Figure 8 illustrates the flow of guidance reaching to the patterns.

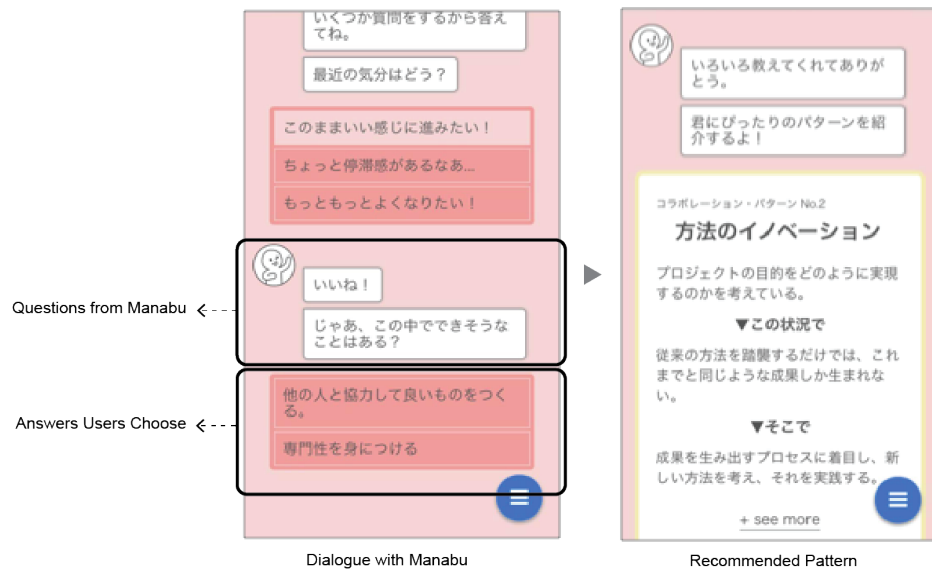


Figure 7: Screens of Pattern Concierge: example of the dialogue (left); example of the patterns recommended (right)

This function is not only easy to use for those who often use patterns, but also for those who know little about patterns. People who are not yet familiar with the patterns can use this function as their first step. Just by passively answering some questions, recommended patterns will appear. When the user gives different answers depending on their context, they receive different patterns, which may help lead them to recognize a change of their situation by themselves.

4. FEEDBACK

Here, we present the feedback we collected from the test users of Pattern App. We released the app in an event called Keio University Shonan Fujisawa Campus (SFC) Open Research Forum 2017 (ORF) on November 22nd to 23rd, 2017 (Figure 9). ORF is a public event where the laboratories from SFC exhibit and demonstrate their achievements of the research. 235 users registered the app in this event.



Figure 9: Open Research Forum 2017

The functions implemented at this time were identical except that there was no sharable To-Practice Pattern List. Therefore, the main purpose of this version was to focus on practicing the patterns by a user alone.

The test users were sampled from people who already had an understanding of pattern languages because we assumed the potential users would be the people already aware and interested in using the method of pattern languages. We asked them to use the app for about a week and received feedback in the form of comments on their use. The latter evaluation will be conducted in future work by our group.

We qualitatively analyzed the comments received on Pattern App, divided into the following two aspects: the whole platform and each function.

4.1 Comments

First, we introduce the comments on the app and the functions, and then an actual case the user had.

Overall usage of the app (Full comments are presented in the appendix):

The feedback mentioned the overall usefulness of the proposed app. To summarize, people reported that the app would be useful for focusing on a pattern to practice, for motivating themselves, for reflecting and for interactive use with other people. On the other hand, some of them were seeking for the better usage on the patterns through the app. When we have more users and enough data, we may make a 'Recommended Patterns List' which introduces the list of patterns most users are adding to the To-Practice Pattern List. This may help the initiative users be aware of the patterns and their usage. One more improvement that we could make was a function to remind users access the app continually.

Pattern Library (Full comments are presented in the appendix):

The comments can be summarized as follows: the Pattern Library is the necessary function, and it could be more useful if the user could search by key words. Some users noticed the related patterns shown, and found them interesting and new.

To-Practice Pattern List (Full comments are presented in the appendix):

The following features were mentioned by many: the simplicity, perspicuity, and the function to leave comments. The comments worked for recording the practice, for reflecting on the practice, and for getting the sense of accomplishment through reading them.

Pattern Concierge (Full comments are presented in the appendix):

The comments mentioned that this function helps the users discover new patterns they had not looked at. Also, some of them found interesting that it is repeatable, because they can answer the questions due to their context. It was apparent that the character Manabu gave the sense of familiarity.

4.2 Actual Case

As an example, we introduce a case in which a user actually employed this app. In this case, this app helped the user become a consultee for his mother and gave her the opportunity to obtain suitable patterns, even though the user himself did not have enough knowledge to become a Pattern Concierge. After being guided by a concierge, the suggested patterns became the vocabulary of communication between the user and the mother, which allowed them to discuss the mother's situation afterward.

The following lists what we can learn from this experience:

1. Answering questions through the Pattern Concierge can help identify what problem the user has and what the user is trying to do.
2. The user can find the answer from both the suggested patterns in the Pattern Concierge, and also from the Pattern Library, because the problem has already been identified.
3. The user can use this as a tool for an offline dialogue with other people.

Below is the case illustrated from one of the users' narrative viewpoint:

I used the app when I was listening to my mother's consultation. She had an increasing amount of work to do for community activities and was not able to spare time for what she really wanted to do. I thought of using a pattern language, and I used the Pattern Concierge in this app while guiding her through conversation.

Below are the items she selected:

"There is a feeling of stagnation"



"I don't know the destination so I don't know what to do"



"I will try being proactive".

It seems that out of the five patterns suggested, two patterns -- "Proto-planning" from the Project Design Patterns and "Talking Thinker" from the Learning Patterns -- came across clearly to her.

Accordingly, although it seemed that she was worried about whether or not she could prioritize what she would like to do personally, these patterns became the trigger for her to be proactive.

Then, she curiously skimmed through the Pattern Library, and chose these two patterns as her next steps: "Brave Changes" and "Self-produce" from the Learning Patterns.

I feel that this app is effective as a tool for interacting with someone, and as a tool to decide for yourself whether or not a certain pattern could be practiced.

5. FUTURE WORKS

Currently, we have only implemented those three basic functions as part of the platform. Our goal is to bring this app closer to the concept of 'Patterns We Live By', facilitating the exchange of pattern usage and thus to familiarize patterns for users, coming into touch with the pattern on a daily basis.. In order to achieve this goal, we plan to have pattern related information to be exchanged with other users in order to make it a place for criticism and open discussion on patterns as mentioned in Section 2.1. Therefore, we will increase the number of pattern languages in the app and the interaction between users. Ultimately, we aim to deepen the implication of platform to help users get the idea of using the pattern languages inspired by other users' selections and experiences of patterns.

Here are the next functions we are considering:

- Exchange of Experiences of Patterns
- Pattern Rankings
- Motivation for Users

Each will be explained below.

- Exchange of Experiences of Patterns

Users write about their experiences and they would be published with the patterns. Experiences can be "liked" and commented to be a place for discussion, and when users receive "likes" or comments, they will be notified. Similar to sharing experiences in a dialogue workshop, users of this platform can check other users' use of patterns and apply it to themselves. Sharing the patterns the users are practicing and their experiences may lead us to make a 'Recommended Pattern Set' as mentioned in section 4.1.

- Pattern Rankings

To ensure other users' trends, pattern rankings that present what patterns other users have included in the To-Practice Pattern list, or favorite pattern rankings, experienced pattern rankings, etc. may be a good idea. These rankings become possible when we analyze the data privately, and we will not disclose the names of the users .

- Motivation for Users

To let users feel achievement and growth after they have continued to use this app, we have two ideas to realize.

1. Measurement

By continuously counting how many times the user pressed the check button on the To-Practice Pattern List, users can objectively measure their actions. In addition, project members can confirm the value of the small actions of each member by sustaining their measurements.

2. Visualization

If behavior is accumulated and visualized in a graph, the user can see that the number is growing, rising to the right. This visualization will give confidence to the users and motivate them to continue this action.

6. CONCLUSION

In this paper, we proposed the platform Pattern App that can manage and update your personal pattern set from multiple pattern languages, and can help users learn about other users' choices and experiences of patterns under the concept of "Patterns We Live By". From now on, we would like to extend the value as a platform by increasing the number of pattern languages in Pattern Library, by increasing the interaction among patterns between users, and by connecting people closer to patterns.

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REFERENCE

- Alexander C. (1971) A+U architecture and urbanism: Publisher A + u-
- Alexander C, Ishikawa S, Silverstein M, Jacobson M, Fiksdahl-King I, Angel S. (1977) A pattern language: towns, buildings, construction, New York: Oxford University Press.
- Alexander C. (1979) The Timeless Way of Building, Cambridge, MA: Oxford University Press.
- Alexander, C. (2002) The Nature of Order: An Essay of the Art of Building and the Nature of the Universe, Book 1, Routledge: The Phenomenon of Life.
- Arao R., Tamefusa A., Kadotani M., Harasawa K., Sakai S., Saruwatari K., and Iba T. (2012) Generative Beauty Patterns: A Pattern Language for Living Lively and Beautiful, *PLoP'12 Proceedings of the 19th Conference on Pattern Languages of Programs*, 2012
- Beck K, Cunningham W. (1987) Using pattern languages for object-oriented programs. the OOPSLA-87 workshop on the specification and design for object-oriented programming, Orlando, FL.
- Kohls C. (2015) "Patterns for Creative Thinking- Idea Generation," EuroPLop'15
- Grant A. (2013) Give and Take: Why Helping Others Drives Our Success, Viking: Penguin Books.
- Iba, T. (2011) "Pattern Language 3.0: Methodological Advances in Sharing Design Knowledge," *International Conference on Collaborative Innovation Networks 2011 (COINs2011)*.
- Iba T, Nakano H, Eto K, Nakanishi T, Takenaka H, Hanyuda E. (2013) Pattern Language: Language toward shaping creative society, Tokyo: Keio University Press Inc.
- Iba, T, Norihiko Kimura, Shingo Sakai. (2014a) "Feeling of Life' System with a Pattern Language, PLoP'14 Proceedings of the 21st Conference on Pattern Languages of Programs, 2014
- Iba, T., and Iba Laboratory. (2014b). Learning Patterns: A Pattern Language for Creative Learning, CreativeShift Lab.
- Iba, T., and Iba Laboratory. (2014c). Collaboration Patterns: A Pattern Language for Creative Collaborations, CreativeShift Lab.
- Iba, T., and Iba Laboratory. (2014d). Presentation Patterns: A Pattern Language for Creative Presentations, CreativeShift Lab.
- Iba T. (2015) "Pattern Languages as Media for Creative Dialogue: Functional Analysis of Dialogue Workshops," Peter Baumgartner, Richard Sickinger (eds), PURPLSOC: The Workshop 2014, pp.212-231
- Iba T, Kimura N, Akado Y, Honda T. (2015) "The Fundamental Behavioral Properties," World Conference on Pursuit of Pattern Languages for Societal Change, July, 2015
- Iba T, Okada M. and Dementia Friendly Japan Initiative (2015) Words for a journey: the art of being with dementia. Yokohama: CreativeShift.
- Iba T, Yoshikawa A, Kaneko T, Kimura N, Kubota T. (2016) "Pattern Objects: Making Patterns Visible in Daily Life" in Designing Networks for Innovation and Improvisation, eds by Matthäus P. Zylka, Hauke Fuehres, Andrea Fronzetti Colladon, Peter A. Gloor, Springer International Publishing, pp.105-1128.
- Inventado P.S. and Scupelli P. (2017) Towards a Community-Centric Pattern Repository. EuroPLoP'17. (July 12-16 2017)
- Manns M L, Rising L. (2004) Fearless change: patterns for introducing new ideas, Boston: AddisonWesley Professional.
- Mori, H., Kimura, N., Ando, S., & Iba, T. (2016a) "Pattern Concierge: Using Push and Pull Patterns to Help Clients Design Their Future," 23rd Conference on Pattern Languages of Programs.
- Mori H., Harashima Y., Ishida T., Yoshikawa A., Iba T. (2016b) "Project Design Patterns: Sharing the Practices in Successful Projects," *PUARL Conference 2016*, USA, Oct., 2016
- Okazaki, Y., Takaoka, A., Okabe, Y., Sakamoto, M., and Iba, T. (2011) "Learning Patterns Card Game," Artifacts, the 3rd International Conference on Collaborative Innovation Networks 2011.
- Pedagogical Patterns Editorial Board (2012) Pedagogical patterns: advice for educators. Joseph Bergin Software Tools, San Bernardino.
- Shimomukai E, Nakamura S, Iba T. (2015) Change making patterns: a pattern language for fostering social entrepreneurship, Yokohama: CreativeShift.

APPENDIX

Here we present the actual comments we got for the overall usage of the app and for each function.

(1) Overall

- I want to use it to make what I'm doing better.
- I felt the patterns getting familiar to me! It is difficult to be conscious of all the patterns because they are enormous, but when I tried to choose which pattern to practice first, my consciousness went firmly to the pattern and it was reflected in what I was involved with.
- It was motivating to open it in the morning and before going to bed to reflect how I did well that day.
- I like the illustrations of the patterns, so I'd like to use the Pattern List and Pattern Concierge with Manabu on a regular reflection.
- People who have someone to coach may utilize this app preeminently when the coach and the student both adopt the idea of patterns and use this.
- It may be good to introduce some recommended usages!
- I thought that it might be good to send the users notifications to remind them access this app!

(2) Pattern Library

- I did not use this so often honestly, but I think that it is an essential function. I can find patterns when I want to read it. The function to search the pattern may be important when more pattern languages are added.
- The function to introduce related patterns is nice. It is good to know related patterns beyond different pattern languages.

(3) To-Practice Pattern List

- I saw pattern language on websites and books, and had been thinking that it is difficult to always be conscious about the patterns even though I thought it was nice. I thought that it is wonderful that I can always see the list of patterns I am willing to practice or have chosen to practice.
- It was convenient that I can list the patterns I want to incorporate now.
- The list is nice because I can see the patterns all through. When I look at the words of the patterns, I get what it means and I can also see in detail what I want to.
- I like that when I open it to check the pattern I practiced, I remember the other patterns on the list as well.
- It is easy to use.
- I am glad that I can leave the comments in the practicing period!
- Since I can add a reflecting comment when moving the pattern to the archived list, I appreciate that I'm able to look back all over in a natural move, guided by this app. I felt that various discoveries came out by being able to look back at what I was trying to do in a certain period.
- I am glad that there is a sense of accomplishment for the reflecting comments and star ratings that remain in the archive! If the total number practiced is also listed, it would make me feel like I want to repeat the practice!

(4) Pattern Concierge

- The Pattern Concierge was meaningful in the sense that even if I was familiar with the pattern to some extent, it lets me add the patterns which I did not choose from the Pattern Library in the To-Practice Pattern List. Rather, as patterns of my choice are formed to some extent, patterns that I do not see tend to increase, so it is convenient that it tells me various things.
- I can find a pattern I did not pay attention to just by watching the list of the patterns suggested. I hope there will be more variation.
- I have included all that was said from the concierge.
- It is good that I can try it again in different circumstances because it recommends me the patterns according to the contexts.
- It is cute.