

New Community Research and Action Networks

Addressing Wicked Problems Using Patterns and Pattern Languages

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ABSTRACT

The goal of this paper is to present a vision of research and associated practice that is intended to help transcend many of the barriers that are preventing society from adopting the sustainable goals that will help them survive, and even thrive in the coming decades. We believe the research enterprise could be expanded to meet contemporary needs, and to see it as more of a collaborative undertaking involving thinking, implementing, monitoring and evaluations of interventions with larger groups of people (not only specialists) and would be more focused on social benefit. The approach integrates social practices with technological support. It is intended to help us work effectively given the constraints that exist today. It is intended to be flexible enough to change with the times and to help create the opportunities to create these changes. It is to be built on the idea of patterns and pattern languages, an evolving paradigm that can help provide a shared vocabulary that can promote shared goals and methodologies, and, above all, shared visions. Patterns are highly influential in the technology sector, and we believe they can be broadly used by communities to address the pressing issues of our time. These range from building an effective healthcare system, to reforming economic activity towards the public interest so as to address the climate emergency.

CCS CONCEPTS

• *Human-centered computing—Collaborative and social computing*

KEYWORDS

Pattern language, design patterns, civic intelligence, wicked problems, research

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1 THE MOVEMENT WE HELPED CREATE

January 1, 2030 has arrived and, as is to be expected it is still the worst of times. And the best. The climate change goals of the Paris accords, as everybody expected, were not met and many of the problems that were anticipated by scientists are now taking place—some quite catastrophic. On the other hand, some progress has been made and it seems to be accelerating, and whether the game is lost is still unclear. Some people have changed their habits, some big geo-engineering projects have failed, and denialism is still present as is a resurgence in various types of religious fundamentalism. Instead of hoping for a future that is simply more convenient (and entertaining), a project and community organizing around social and environmental meliorism has now reached the point where it seems to be a largely sustainable—and resilient—movement comprised of people from academia, labor movements, the arts, and the rest of civil society, as well as government and business. This approach significantly is an explicit application of civic intelligence that focuses on collective problem solving for the common good [13]. As such, it integrates the application of knowledge, broader social collaboration, research and action, creativity, and learning.

Contrary to many of the prevailing, powerful social attitudes, this new movement is willing to accept the challenges of the era, attempt to understand them to the degree possible, and develop and undertake initiatives that they have good reason to believe will result in positive outcomes. One of their guidelines is that no matter what their area of focus is, any initiative should also create more civic intelligence in the world. In other words, in addition to addressing a problem to some degree individually, people (generally those most affected by the problem) now have more collective information, skills, resources, self-efficacy, organization, and creativity (etc.) that will enable them to more successfully address problems that face them.

One of the important aspects of this new movement is creating vibrant, engaged, and interconnected communities that include people not commonly involved in research or development. This was not a fortuitous side effect but a conscious goal and strategy from the onset. It is relatively easy to get involved in the movement. In fact, an important focus is empowering new individuals (help them to become community animators) from diverse locations, skill level, and interests. Another big focus is helping to get people involved in team-based projects; some are long lasting and some more-or-less permanent.

One of the features of the movement that has been improving incrementally the last decade is their creation of early warning systems (EWS), of various levels of sophistication, which act as a type of decentralized nervous system. An EWS provides intelligence as to whether important criteria are improving, static, or going down slowly or precipitously. The system monitors signals from the environment and the human systems that perturb it. In addition, it looks for threats to the normative environment as well, including those from media, government, or hate groups. The EWS, which combines human and computer support, is both anticipatory and diagnostic. It looks for opportunities and threats as well as causes and implications, all of which is used to help define what project teams need to be activated and what types of people should be on the teams.

The question of how to best express ideas and experience so that it is useful to diverse communities arose. Patterns and pattern languages for different domains became a helpful methodology that transcended a variety of traditional boundaries.

2 THE SITUATIONS WE FACE: CONSTRAINTS AND REQUIREMENTS

The problems we face in our global village are almost beyond comprehension. These include climate change and environmental degradation, oppression and mass migrations, even more grotesque division between rich and poor, and a panoply of strong men autocrats ruling over large numbers of the world's population. These problems in many cases have been growing more complex over time. And technology has in many ways made them more acute. These problems cannot be solved in the same sense as a math problem can. Nor can they be fixed as if changing a tire on a car. Neither the problems nor the solutions can be precisely described, nor who exactly should be involved in their resolution. There is no final goal. The resources are difficult to muster, the circumstances are always changing, and there is antagonism, both targeted and diffuse, to any efforts at addressing them.

So why would anybody get up in the morning if the problems they would like to solve are so intransigently unsolvable? The answer to this is that the question of how can I solve the problem is not the right question to ask and that time spent trying to figure out that single magic incantation—the lever long enough, the philosopher's stone, or the one ring to rule the others—is time wasted. The question that replaces the obsessive fixation on singular solutions is: how does one become part of an open, active, and learning movement to alleviate environmental social problems, given the constraints that we actually face, the ones that are

contextual, and the ones that are inherent and are not going anywhere?

To begin to address these types of problems, we wanted to come to terms with the major constraints and resource issues that exist. Only then can the situation become clearer—in all its muddy glory. To some degree the resources being deployed must reflect the attributes of the situation that needs to be changed. To be forewarned is to be forearmed.

- For many reasons we will not need only specialists. And we will need more than one discipline or perspective.
- Adaptation will be key since we do not know what the future will bring.
- It is not possible for everybody to directly communicate with everybody else. Even if they should!
- There is no single plan that can guide all of our actions.
- We cannot be commanded to do the right thing.
- And there is not enough money to pay all of us either.
- There is no magic tech that will do everything that needs to be done.
- Everything is connected. But some things are more connected than others.
- There is and there always will be resistance to this work.

And for each of these, there are partial answers and responses and workarounds, but these are connected in many, often implicit, ways. And it was this that inspired our work. Limitations can be empowering [16] And note that although we are eschewing solutionism, many of the "solutions" that we rule out (the market, technology, etc.) are still likely to provide portions of the capabilities that we need to make progress in addressing these problems, if it is possible to redirect their efforts.

3 PATTERNS AND PATTERN LANGUAGES

The work discussed here draws on the idea of patterns and pattern languages. The pattern language approach began as a way to understand architecture and the built environment [1] and how to create beautiful structures and spaces that were alive. The approach was then adopted by the burgeoning tech community in the 1980s and then back into the social realm in a larger way in the early 'teens (2010-2020) with pattern languages for creativity [5], social change (e.g. [14], group work (groupworks.org), collaboration [7], human-computer interaction (HCI) [6], refugees [10], patterns for the Green New Deal [17], and patterns for pandemics [19].

The terms patterns and pattern languages as originally defined by Alexander [1] are used in specific ways. A pattern in this sense is a generalized description of a problem and a solution. And they are called "patterns" because they are repeatable in a general way. The originators of the pattern approach state that each pattern they identified "...describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over without ever using it the same way twice." Thus, patterns can be used to help provide general approaches to problems that can be tailored to specific situations. By linking problems and solutions, patterns imply research and

action. And pattern languages are collections of patterns that belong together because they are designed to work with each other to address similar problems. Therefore, the pattern language approach offers a certain holism insofar as it offers numerous solutions all within a single, but broad, domain. Additionally, because of its focus on parts of the problem domain (via patterns), different groups can work on parts of a broader issue. Thus, one pattern language could have broad appeal but still be flexible enough to work in specific contexts.

This article is intended to be a contribution to the development of a socio-technological approach that will help people address wicked problems [12]. It is intended to promote effective work given the constraints that we face, some of which are contextual while some are inherent. The approach is intended to be flexible enough to change with the times and to help create the opportunities that are needed to create these new changes. It is to be built on the idea of patterns and pattern languages, building on the idea that they themselves represent a sort of shared vocabulary that can promote shared goals and methodologies, flexible and contextual adaptations, and, above all, shared visions. Patterns can be used in varied situations, including, for example, when doing diagnosis or design. They do not do the work for you, but they can help—especially if they include lived examples, and if adequate support is available via access to other people, in real-time or asynchronously. The work we describe started around the turn of the 21st century and many of the ideas presented here started to take form in 2017 or 2018.

4 A PATTERN LANGUAGE SCENARIO

Before getting into the details of the approach it makes sense to demonstrate some of the power and potential of patterns and pattern languages. The following narrative suggests ways that patterns and pattern languages could be used to help reach some of the goals of the hypothetical movement discussed in the introduction to this paper. We suspect that sketches illustrating useful lines of work are more germane to this paper than a detailed or comprehensive look at the technical infrastructure, which will be provided to some degree in a longer paper on addressing wicked problems, which is still in the works.

Pattern languages are intended to be relevant within a broad context that is described by the developers. That context is also described implicitly through the totality of the patterns within it. For that reason, a pattern language that met the needs of the movement above should probably include patterns that would lead to a broad range of relevant and compelling projects as well as patterns that support sharing, sensemaking, community learning, etc. Because of our focus on civic intelligence our narrative contains actions and activities which help show the various dimensions of that, using patterns that have already been identified and formulated, and some that have been proposed but not yet explicitly formulated.

Note that the pattern names will be **bolded** and unless otherwise noted they are patterns from the Liberating Voices pattern language that is intended to support social engagement and social change [14]. Also note that the patterns that are already developed (i.e.

described with text and graphics) contain multiple examples of how they can be used. The examples are intended to demonstrate the broad uses but also to suggest that, while the narrative below is certainly plausible, a group might just as easily select another set to orient their project.

The **Civic Intelligence** pattern, with its focus on collective knowledge directed towards the common good, is extremely relevant and would make a good foundational pattern for the movement. As discussed above, the civic intelligence perspective promotes broad collaborative thinking and action, which is key to the movement's work. The pattern **Open Research and Action Network** is also an obvious choice, since this paper is proposing an inclusive collaboration between academia, civil society, and other sectors of society. Note that there is substantial overlap between the two patterns selected so far. They are not identical and the interplay of the two, and the order they are considered, may affect the result.

With the ongoing threat of climate disasters, pandemics, social disorder, and authoritarian governments, the challenges of re-making the world are extreme (thus, the pattern, **Sense of Struggle!**). Building on the work of climate scientists and others, we can take some lessons from the Green New Deal (GND). The basic philosophy behind it is that it is not only possible to link social amelioration with carbon reduction, environmental clean-up, ecological restoration, and other actions to reduce climate harms but absolutely critical. So some of the patterns that we use here are from the patterns that were proposed for a Green New Deal [14]. The **Cross Boundary Cooperation** pattern as well as the **Loose Federation** pattern, both not yet formalized as patterns, could be used in relation to the GND as well as to this effort, because they suggest various ways to ensure that the necessary communication occurs.

Voices of the Unheard, one of the Liberating Voices patterns, could be used to help ensure that the voices of people who are at risk from climate change and might not be able to participate in decision-making can still be heard or otherwise represented. It also suggests that the **Just Transition** pattern, identified in the GND literature but not formalized as a pattern, would be an important pattern to add to the movement pattern language, as it would help ensure that people would not suffer during the transition to a more sustainable future, which is likely to include major challenges for many communities and sectors. Also, using the **Meaningful Maps** pattern from Liberating Voices could help show where risks or opportunities exist geographically. A pattern on **Mutual Aid** [3] and another one, **Making Weak Links Stronger** [3] could help bring about the **Relations of Solidarity** pattern which was proposed in the GND pattern language. And, to help breathe life into all of these efforts, the **Community Animator** pattern reminds us that none of this makes any sense without the people, within every aspect of the process, working to help make the movement successful.

The pandemic of 2020 provides an interesting case through which to consider patterns, since many of the issues that surfaced suggest climate change is both an environmental and a social problem. The daily updates on new Covid-19 cases around the world as well as deaths were a familiar feature. In the absence of a

vaccine or other ways of dealing with the virus, “social distancing” was applied around the world with many local variants, in stricter and looser ways, and sooner or later, to slow widespread infection. Because the daily updates often were graphical, the idea of “flattening the curve” was ubiquitous and, at least in a weak form, the **Citizen Access to Simulation** and the **Community Indicators** patterns were being employed. What seemed to be missing however was access to the curve in local communities. One of the authors monitored the situation in King County, Washington, which happened to be one of the more successful counties in the US for dealing with the virus, graphed the curve and made it available on social media—and indeed the curve (Fig 1.) looks fairly benign when compared to curves from other places. (Of course, it is not over until it is over!) Had this curve—and those of other counties—been available, citizens could gauge how well their own efforts were reflected in the collective data and also compare their county’s collective response with other counties. Also, of course, this curve is not a product of the community’s own design, and graphs that showed other relevant data could have been used. Also missing was access to the models behind the scenes that drove any type of simulation. In the area of climate change a strong version of **Citizen Access to Simulation** could provide people with a tool that would allow them to “play” with various scenarios by adjusting the inputs to see how the models responded, thus providing another approach to citizen education that is more accessible to non-scientists.

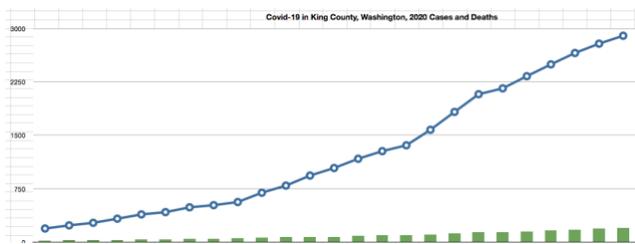


Figure 1: A DIY virus-watching graph

Based on what we may have learned from the pandemic experiences, a pattern called **Early Warning Systems** could be created, itself a spin-off of a pattern in the Liberating Voices language, **Emergency Communication Systems**, or the **Future Design** pattern. The somewhat abstract sounding pattern, **Demystification and Re-enchantment**, could be used to help demystify the climate science, its findings and its approach (also see the **Citizen Science** pattern) while also “re-enchanted” our appreciation of life on earth, its beauty and its wonder.

The **Whole Costs** pattern from Liberating Voices would be needed by a 2030 movement. Because the patterns are supposed to reflect something that we consider positive, **Whole Value** could be more useful than our current version. **Whole Costs** suggests that we examine the costs that we are not seeing, when we purchase something, for example. **Whole Value** suggests we examine the value that we are receiving, but not acknowledging, as well as the value that we may have good reason to expect, but are not receiving. Hence **Whole Value** may cause communities to call for the re-orientation of engineering, for example, or computer science,

to place healing, service or other goals as higher priorities than efficiency or profit. And, finally, to show that the brave new world we are advocating is not so glum, the **Public Recreation** (or **Playscapes**) pattern as well as one on **Arts of Resilience** (both proposed for the Green New Deal pattern language) can be used to help create the new world that also integrates art, music, and play but with fewer damaging consequences.

5 HOW WE DID IT — TECH + COMMUNITY

The work we describe started around the turn of the 20th century and was punctuated with the publication of Liberating Voices [14], a pattern language consisting of 136 patterns for social engagement and social change. Many of the issues that were broached in that book (e.g. evaluation and additional online support for patterns) were brought up again for further exploration around 2017 or 2018 when we began a broad effort that would help us consider the question “Can Pattern Languages Help Address Wicked Problems”? That work describes many findings that inform this paper [18]. It also presents many of the ideas that helped encourage the development of the movement described in the introduction and the software environment that helps support it. It helped to bring together knowledge that researchers (including the authors) have concluded about addressing wicked problems, which, simply described, are those problems that defy simple or strictly formal descriptions, goals, strategies, or solutions. These findings and criticisms that had been raised about pattern languages and other approaches were used to develop strategies for technological development and social design that would be most suitable.

We can think about the work through focusing on three main areas: pattern life-cycles, community use, and technological support. The first two areas focus on the people using the patterns, and the last one focuses on the technological support for that work. We are currently exploring all of these areas. While the first two should be primary for informing the technological work, the need for viable technological support will also influence how the patterns are used by individuals and by groups.

5.1 Pattern life-cycles

To see how patterns are used we are looking in depth into the phases of possible life-cycles of pattern production and use [15]. These phases can be characterized in terms of generic processes that are done in various ways today, using online or paper-based support, done by groups or individuals, etc. We expect to find gaps in the common and implicit pattern use life-cycles. We may find, for example, that people cannot find the patterns they need so they abandon the approach before they even start. We may also find that patterns are useful for some portions of broader processes but not others. It may turn out, for example, that patterns are used to generate ideas and to refine them but not used actually conceptualize and manage a project. Each gap that we identify can help us see areas that need improvement.

5.2 Community use

Because a main part of the plan hinges on effective collective use of patterns, particular attention needs to be paid to actual community use. Part of this means that every phase of the process that could be undertaken by an individual could instead be undertaken by a community the individual belongs to, be that a local (say neighborhood) community, a professional community of practice, an online community of interest, etc. For example, at the onset of a project or at any point in which it may be useful, a user will need to identify relevant patterns. To support this investigation, we are experimenting with ways for several people to indicate independently which patterns they think are important (see Fig. 2), and have the system display the results of the group as a whole. These results can then be used by the group members to discuss various options as suggested by the patterns, and jointly make sense of their relevance and to identify concrete courses of action they may suggest. Other factors to be looked at are the diversity of the people using the patterns, group awareness, the quantity and quality of sharing that takes place within and across communities, and the trust and resilience of the communities. And because the success of this work depends on having a critical mass of users, one of our goals is cultivating that critical mass, and this includes encouraging new users and working with them closely in the beginning to help them overcome issues related to the approach, or to the use of the support technology.

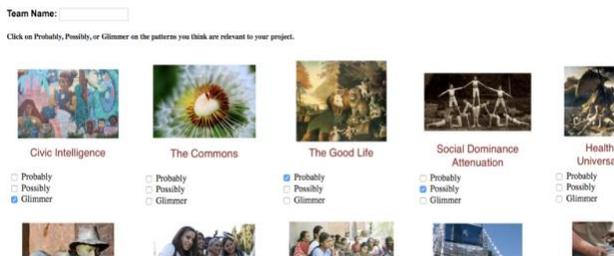


Figure 2: Individual users indicate which patterns they think they are likely to use and ones that look interesting. The collective results are then calculated and presented by the system (not shown)

5.3 Technological support

The goal here is to provide facilities that support pattern repositories and local services that support pattern use. The pattern repository must accommodate a variety of different pattern types and the repository needs to support selection, communication and annotation of the patterns by the pattern using community. In other words, it is not sufficient for a pattern repository to just make accessible the patterns and (potentially) meaningful connections between them: key is that it also supports the process in which those patterns are selected, interpreted and put to good use, in the particular usage context of stakeholders drawing inspiration from those patterns in addressing their wicked problems. In other words, the repository must provide functionalities for effective collaborative sensemaking, in which stakeholders use new

understandings, processes and tools to collaborate in complex thinking and decision-making processes [2].

The fact that there are myriad projects underway that focus on patterns suggests that the approach is broadly appealing. The diversity in approaches that the various projects take makes it more difficult to facilitate sharing and collaboration via a pattern language approach. It may even be possible that this diversity is one reason there is not more cooperation among these projects. One approach to this would be to force (somehow!?) all the pattern developers and users to adopt one template. Our approach, on the other hand, is to accommodate this diversity, which is more in keeping with the underlying rationale of this approach, by allowing for *bricolage* building on patterns from different pattern languages, depending on the circumstances and goals of the community of use [15]. This could be seen as a form of (dynamic) "knowledge gardening", inspired by Douglas Engelbart's fundamental ideas about a Dynamic Knowledge Repository (DKR). A DKR exists as a combination of humans and tools, epistemic communities and the tools they use to aggregate information resources, work products, and collaborations [11]. One way to go forward in the short term, could be to have a table containing the union of pattern features that developers have employed and a "key" to each pattern language or pattern that provides information as to what feature is present in each.

In our upcoming article we consider how a pattern-language approach might conceivably be used to help inform and orient all stages of civic intelligence, collaborative sensemaking, and public problem-solving projects. We realize of course that this comprehensive vision might not be realistic. Our hope (expectation?) is that if not the whole package then as many pieces as possible will be useful. One of the rationales for going for the big picture is that the opportunity for synergy is stronger if we consider the broadest potential usage of the combined patterns. By casting a wide net, instead of restricting ourselves to one specialized language, we might learn that capability X is well-served via patterns and pattern languages, that capability Y is no better or worse than what users were doing before, but capability Z which is drawing patterns from two different pattern languages may in fact may be much improved. This comparative approach might in turn inspire the evolution of the existing pattern languages, and perhaps even spawn new ones.

One of the ways in which we address the comprehensive approach is via the addition of new "meta"-pattern types. In addition to the basic domain patterns included in the various languages, we propose three metapatterns that would be needed to expand the breadth of the applicability. While the need for this functionality has been discussed for years (and used from time to time, generally implicitly) we believe that this is the first characterization of these three basic types of metapatterns. The first type, domain metapatterns, could logically be part of the domain patterns. We prefer, however, to think of them as a type of metapattern in that they augment or extend the basic idea of pattern languages first developed by Alexander et al [1] and adopted by many others efforts in subsequent years. As an example, in A Pattern Language, the first 94 patterns are grouped together under

Towns, which could serve as a domain metapattern that characterizes patterns 1-94. The second type, enabling metapatterns, helps groups identify the resources, skills, etc. that will need to help them attain their goals expressed in domain patterns; these metapatterns are in a sense generic and are not limited to one domain. The third type, pattern management metapatterns, deal specifically with patterns as things in their own right. Hence, these metapatterns describe actions such as identifying new patterns, selecting relevant patterns from existing pattern languages, etc. In other words, the domain of pattern management metapatterns is patterns and pattern languages.

We are currently engaged in several approaches that are helping us to understand the three focus areas above. On the social side we are working with communities on projects that integrate patterns to aid them and to uncover important usage patterns and requirements to inform the tech development. On the technological side we are developing small databases of patterns and pattern languages and APIs to expand access and to encourage the development of innovative approaches to access, development, selection, and use of patterns. One approach that we are investigating in relation to selecting patterns is via the Activist Mirror (labs.publicsphereproject.org/am). The system asks a series of eight questions and, using a rubric for activist types [9], suggests what type of activist the user seems to be, and recommends four patterns that would be most relevant in relation to their answers. And to integrate the two sides we are developing small tests of new software approaches around the patterns including communication / discussion around patterns and information or annotation involving examples, tests, case studies, and other resources. Briefly, below we discuss two related areas, rapid prototyping and evaluation.

Activist Mirror

The Mirror reveals:
a Change Agent

Jane Addams, along with Ellen Gates Starr established the Hull House, where she lived until her death in 1935. Located in a lower class working neighborhood in Chicago, the Hull House was the center of incredible social innovation involving the arts, drama, education, sports, science, and activism. Addams was awarded the Nobel Peace Prize in 1931.

Change Agents help build movements by working supporting tasks. They might work with people to build coalitions or develop software that social change groups can use to help them collaborate more effectively. Change Agents often work "behind the scenes" on "thankless" tasks, yet nothing would be accomplished without them! They should not fall prey to the pessimistic (and untrue) notion that positive social change will never occur.

Thanks to Bill Meyer for his important work characterizing the four activist types (The Practical Strategist, 1990). He is not responsible for the results shown here.

Note that activists don't always fit the same role. They may work in one area for awhile and then change to another. It may be useful to think of a particular situation while you answer the questions and then try again using another situation.

Click for your patterns.

Follow the Money

Indicators

Citizen Science

Opportunity Spaces

Click again for full pattern.

Currently we are only using 22 patterns. There are 136 patterns in the entire Liberating Voices pattern language.

Use the back arrow on your browser to go back and change your responses and get new results.

Figure 3: The Activist Mirror reflects the potential role of the user and recommends four patterns

5.4 Rapid prototyping of patterns and pattern languages

Although the approach that Alexander and his colleagues used to produce A Pattern Language may be the "gold standard" for the development of a pattern language there are very good reasons for not wanting to spend nearly a decade assembling a pattern language (Liberating Voices also took about that long.) And, like an experimental drug that has not been thoroughly tested, potential users might not want to wait to try a pattern before it has been declared fit for duty. Also, because people generally use one or more patterns, not whole pattern languages (although they generally draw their patterns from a single pattern language) they are likely to care more about the particular patterns they are using than the pattern language as a whole. While this does not mean that we do not need or want patterns that generally pass some empirical criteria it does say that depending on the intended use of the pattern, it may not need to be 'platinum certified' (and quite likely this is true of many of the patterns that have been formulated over the years). Moreover, sometimes, the unintended uses of the patterns are even more interesting from a pattern evolution and management point of view. For these reasons, potential users of patterns and pattern languages are likely to want to assemble a group of patterns that they think are more or less viable very quickly. There is a need for rapid prototyping of both pattern languages and individual patterns.

We can consider problems as a way to start thinking about what patterns are needed. Presumably each problem has one or more patterns that could conceivably help alleviate the problem. We can also make a list of categories of the goals we are interested in and connect the patterns to those goals. In this case, the goals are related to broad inclusion, collaboration, action, and learning purposes; if the patterns do not address those goals sufficiently then the hunt for more patterns is still on. We can also look at existing documents and artifacts. When looking for pattern ideas for the Green New Deal, examining the proposed legislation and white papers that the originators developed, for example, yielded several candidate patterns. These started pattern life with a name only but could be fleshed out over time. It is also possible to "mine" pattern concepts via interviews with experts [8] The patterns developed using these approaches would also be subject to the assessment and evaluation of the community of pattern language users that the technology would help support. Patterns probably go through developmental stages (proposed, feasibility being investigated, etc.) in addition to stages of their being used in a project [15] and these stages could be supported technologically.

When one of the authors of this paper developed a prototype pattern language for Green New Deals (because there is not just one), in addition to identifying new potentially relevant patterns, he selected several existing patterns from Liberating Voices that seemed well-suited for the domain. This may be the most common scenario: some of the needed patterns in a given problem domain were available already, and others were needed but not available. Also, because patterns within a single pattern language are often linked, there is good chance that if one pattern is relevant, the ones it is linked to will also be. A pattern language support system ultimately could include ways to stimulate users to look "beyond their pattern" by recommending patterns when the time is right,

thus potentially unlocking some of the pattern language synergy that is built in by the developers.

Finally, one approach to identifying existing patterns that could be relevant to a particular project is ask pattern authors which aspects of their work are most relevant. For example, in developing Patterns for Pandemics, we plan to ask authors two questions to help them consider how the pattern they wrote for the Liberating Voices pattern language might be used in this situation: (1) *How does the pattern help diagnose and explain current events?* and (2) *How could the pattern be used creatively to help develop and design alternative future trajectories?*

5.5 Evaluation

Evaluation of the project is critical since social learning is a central element. And evaluation must be in relation to the goals that were established for the project. Much of the data gathering that needs to be accomplished can be done via the repository. Here is a sampling of the questions that we would like to answer:

- Did a diverse group of people access the patterns? How easy was the process? Did they find the patterns they needed?
- What problems were encountered and were they properly noted and addressed?
- Did users establish their own groups of patterns or pattern languages?
- Did they successfully employ the patterns (in their estimation and in estimation via others or established criteria)?
- Did users contribute patterns? Did users share experiences and resources by annotating patterns and participating in relevant discussion groups?
- Do users plan to continue to use the approach after the end of their current project?
- What percentage of users' time is spent contributing to the shared base of patterns and what percentage is spent using the patterns for their own projects?
- Do patterns resonate with diverse communities? Which attributes of the approach encouraged successful use of the patterns with what communities? Which ones seemed to discourage successful use?

6 TOWARDS 2030: CHALLENGES AND OPPORTUNITIES

The time seems right now, with the explosion of deeply interconnected wicked problems on the one hand, and a society-wide interest in doing things differently on the other hand. Top-down, hierarchical approaches no longer suffice (if they ever did) to address these tangled webs. Instead, we need different forms of bottom-up, distributed approaches to governance and collaborative community-building and weaving (see e.g. Graham's [4] ideas on society being a fractal composite of communities, with each community being a complex adaptive system adjusting situational individual responses to emergent experiences and governance being relational and ever more self-organizing).

One of our main claims is that not only do different communities need different combinations of patterns from a

specific language depending on their needs, they are also likely to need patterns from other pattern languages to support not only their local needs but also to enroll them in a broader, more effective, scaled-up collaboration that we hypothesize will help greater numbers of people to help address the massive wicked problems that face us.

The pattern language orientation is located somewhere between theoretical abstraction and specificity. Patterns do not employ a small number of high-level concepts to build a case for vast changes in social structure or dynamics. Neither do they provide precise step-by-step guidelines that produce given results. Instead, the patterns provide general descriptions of problems and the general approaches that have been employed successfully to address the problems. Hence, they address parts of a broader question in context and are intended to be used with other patterns or approaches. Because of its intermediate position conceptually we believe that this approach can help serve as a type of dynamic Rosetta Stone, that can help bridge various factions who are working in the broad and shifting area of sustainable development, environmental protection where severe environmental and social threats come together wickedly.

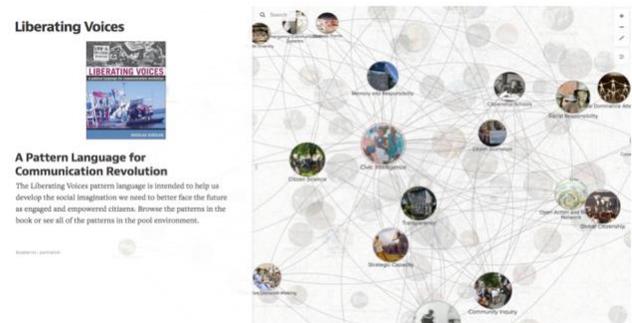


Figure 4: An online network of Liberating Voices patterns could serve as way to explore pattern relationships

The basic pattern language approach has been inspirational and useful to people worldwide. Many have worked with others to develop patterns and pattern languages on diverse topics or to use them to develop projects or both. Yet these pattern language communities are often islands unto themselves. One of the intended goals of the project described here is to help integrate these various projects by facilitating the sharing of patterns and pattern languages without making people conform to any one strict formalism. Providing many avenues for coordination could help strengthen the efforts that are striving to address wicked problems. Here are a few of the efforts we recognize: improving awareness of the pattern language approach; improving the quality and quantity of relevant patterns; improving access to patterns; providing more pattern-sharing approaches and opportunities; increasing the number and diversity of pattern developers and users; improving feedback, storytelling, discussion, and

consultation regarding pattern use; and improving individual phases of pattern development and use.

The experiment of human life on earth is now entering a critical phase. Our hope is that some integrating and coordinating of project work via patterns and pattern languages can help facilitate and help make collective problem-solving (i.e. civic intelligence) a more popular focus. Structural change will be necessary if life on the planet is to thrive. Can this approach help provide some of the foundation for that? The hope is that this approach can engage larger numbers of diverse communities with a civic-minded inclination to engage more effectively with the challenges that are gathering with the intent of destroying the entire precious experiment.

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