Patterns of Peeragogy

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We describe nine design patterns that we have developed in our work on the Peeragogy project, in which we aim to help design the future of learning, inside and outside of institutions. We use these patterns to build an "emergent roadmap" for the project. The primary audience we envision for the paper are teams of people who aspire to collaboratively manage their own free/open/libre learning and development projects.

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INTRODUCTION

This paper outlines an approach to the organization of learning that draws on the principles of free/libre/open source software (FLOSS), free culture, and peer production. Mako Hill suggests that one recipe for success in peer production is to take a familiar idea – for example, an encyclopedia – and then make it easy for people to participate in building it [Hill 2013, Chapter 1]. We will take hold of "learning in institutions" as a map (Figure 1), although it does not fully conform to our chosen tacitly-familiar territory of *peeragogy*. To be clear, peeragogy is for *any group of people who want to learn anything*.[1]

Fig. 1: A university campus. Inset captions describe the buildings: "*Ladies Hall*, *Dormitories*, *University Hall*, *Library and Assembly Hall*, *Science Hall*, *President's Residence*, *University Farm*, *Observatory*." This image serves as a key to the figures that illustrate our patterns.

[1] `https://www.youtube.com/watch?v=TDRGJzoNbAc`

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Although we are thinking about learning and adaptation that may take place far outside of formal institutions, the historical conception of a university helps give shape to our inquiry. The model university is not separate from the life of the state or its citizenry, but aims to "assume leadership in the application of knowledge for the direct improvement of the life of the people in every sphere" [Curti et al. 1949, p. 88]. Research that *adds to the store of knowledge* is another of its fundamental obligations [Curti et al. 1949, p. 550]. While the university provides a familiar model for collaborative knowledge work, it is not the only model available. Considering the role of online collaboration in building reference resources, Q&A sites, and free/libre/open source software, we may well ask: What would an accredited free/libre/open university look like? How would it compare or contrast with the typical or stereotypical image in Figure 1? Would it have similar structural features, like a Dormitory, Library, Science Hall and so on? Would participants take on familiar roles [Corneli and Mikroyannidis 2011]? How would it compare with historical efforts like the Tuskegee Institute that involved students directly in the production of physical infrastructure [Washington 1901; Corneli et al. 2014]?

We use the word *peeragogy* to talk about peer-led multi-way collaboration in relatively non-hierarchical settings. Examples are found in education, but also in business, government, volunteer, and NGO settings. Peeragogy involves both problem solving and problem definition, and results in learning. It can be preferable to focus on finding solutions, since people may know the "problems" all too well [Ariyaratne 1977]. Participants in a peeragogical endeavor collaboratively build emergent structures that are responsive to their changing context, and that, in turn, change that context. In the Peeragogy project, we are developing the theory and practice of peeragogy.

Design patterns offer a methodological framework that we have used to clarify our focus and organize our work. A design pattern expresses a commonly-occurring problem, a solution to that problem, and rationale for choosing this solution [Meszaros and Doble 1998]. This skeleton is typically fleshed out with a *pattern template* that includes additional supporting material; individual patterns are connected with each other in a *pattern language*. What we present here is rather different from previous pattern languages that touch on similar topics – like *Liberating Voices* [Schuler 2008], *Pedagogical Patterns* [Bergin et al. 2012], and *Learning Patterns* [Iba and Iba Laboratory 2014]. At the level of the pattern template, our innovation is simply to add a "What's next" annotation, which anticipates the way the pattern will continue to "resolve".

This addition mirrors the central considerations of our approach, which is all about human interaction, and the challenges, fluidity and unpredictability that come with it. Something that works for one person may not work for another or may not even work for the same person in a slightly different situation. We need to be ready to clarify and adjust what we do as we go. Even so, it is hard to argue with a sensible-sounding formula like "If W applies, do X to get Y." In our view, other pattern languages often achieve this sort of common sense rationality, and then stop. Failure in the prescriptive model only begins when people try to define things more carefully and make context-specific changes – when they actually try to put ideas into practice. The problem lies in the inevitable distance between *do as I say*, *do as I do*, and *do with me* [Deleuze 2004, p. 26].

If people are involved, things get messy. They may think that they are on the same page, only to find out that their understandings are wildly different. For example, everyone may agree that the group needs to go "that way." But how far? How fast? It is rare for a project to be able to set or even define all of the parameters accurately and concisely at the beginning. And yet design becomes a "living language" [Alexander et al. 1977, p. xvii] just insofar as it is linked to action. Many things have changed since Alexander suggested that "you will get the most 'power' over the language, and make it your own most effectively, if you write the changes in, at the appropriate places in the book" [Alexander et al. 1977, p. xl]. We see more clearly what it means to inscribe the changing form of design not just in the margins of a book, or even a shared wiki, but in the lifeworld itself. Other recent authors on patterns share similar views [Reiners et al. 2012; Schümmer et al. 2014; PLAST Collective 2015].

Learning and collaboration are of interest to both organizational studies and computer science, where researchers are increasingly making use of social approaches to software design and development, as well as agent-based models of computation [Minsky 1967; Corneli et al. 2015]. The design pattern community in particular is very familiar with practices that we think of as peeragogical, including shepherding, writers workshops, and

design patterns themselves [Harrison 1999; Coplien and Woolf 1997; Meszaros and Doble 1998]. We hope to help design pattern authors and researchers expand on these strengths. The primary audience we envision for the paper are teams of people who aspire to collaboratively manage their own free/open/libre learning and development projects.

Plan of the work

Table I shows the pattern template that we use throughout the paper. Along with the traditional design patterns components [Meszaros and Doble 1998], each of our patterns is fleshed out with two illustrative examples. The first looks at how the pattern applies in current Wikimedia projects. We selected Wikimedia as a source of examples because the project is familiar, a demonstrated success, and readily accessible. The second example shows how the pattern could be applied in the design of a free/open/libre university. Each pattern concludes with a boxed annotation that describes "*What's Next in the Peeragogy Project*". Following the convention of the design pattern literature, we write the names of patterns in small-caps. Section 1 defines the concept of PEERAGOGY more explicitly as a design pattern. Sections 2–9 present the other patterns in our pattern language. This is followed by an emergent roadmap for the Peeragogy project and a review of the broader contributions of this work. Figure 2 illustrates the interconnections between the patterns, and Table II summarizes their "nuts and bolts".

Motivation for using this pattern.
Context of application.
Forces that operate within the context of application, each with a mnemonic glyph.
Problem the pattern addresses.
Solution to the problem.
Rationale for this solution.
Resolution of the forces, named in bold.
Example 1: How the pattern manifests in current Wikimedia projects.
Example 2: How the pattern could inform the design of a future university.
What's Next in the Peeragogy Project: How the pattern relates to our collective intention in the Peeragogy project

Table I. : Pattern template.

A short motivating example

When one of us was a NEWCOMER to the Peeragogy project, she hit a wall in understanding the "patterns" section in the *Peeragogy Handbook* v1. A more seasoned peer invited her to a series of separate discussions with their own HEARTBEAT to flesh out the patterns and make them more accessible. At that time the list of patterns was simply a list of paragraphs describing recurrent trends. During those sessions, the impact and meaning of patterns captured her imagination. She went on to become the champion for the pattern language and its application in the Peeragogy project. During a "hive editing" session, she proposed the template we initially used to give structure to the patterns. She helped further revise the pattern language for the *Peeragogy Handbook* v3, and attended PLoP 2015. While a new domain can easily be overwhelming, this newcomer found A SPECIFIC PROJECT to start with, and scaffolded her knowledge and contributions from that foundation.

Pattern	**How can we. . .**	**Here's how:**
PEERAGOGY	. . . find solutions together?	*Figure out what the real problems are.*
ROADMAP	. . . get everyone on the same page?	*Build a plan that we keep updating.*
REDUCE, REUSE, RECYCLE	. . . avoid undue isolation?	*Use what's there and share what we make.*
CARRYING CAPACITY	. . . avoid becoming overwhelmed?	*Clearly express when we're frustrated.*
A SPECIFIC PROJECT	. . . avoid becoming perplexed?	*Focus on concrete, doable tasks.*
HEARTBEAT	. . . make the project "real" for participants?	*Keep up a regular, sustaining rhythm.*
WRAPPER	. . . stay in touch?	*Circulate any adjustments to the plan.*
NEWCOMER	. . . make the project accessible to new people?	*Let's learn together with newcomers.*
SCRAPBOOK	. . . maintain focus as time goes by?	*Keep coming back to the priorities.*

Table II. : An overview of the problems and solutions in our pattern language.

Connections between the patterns of peeragogy

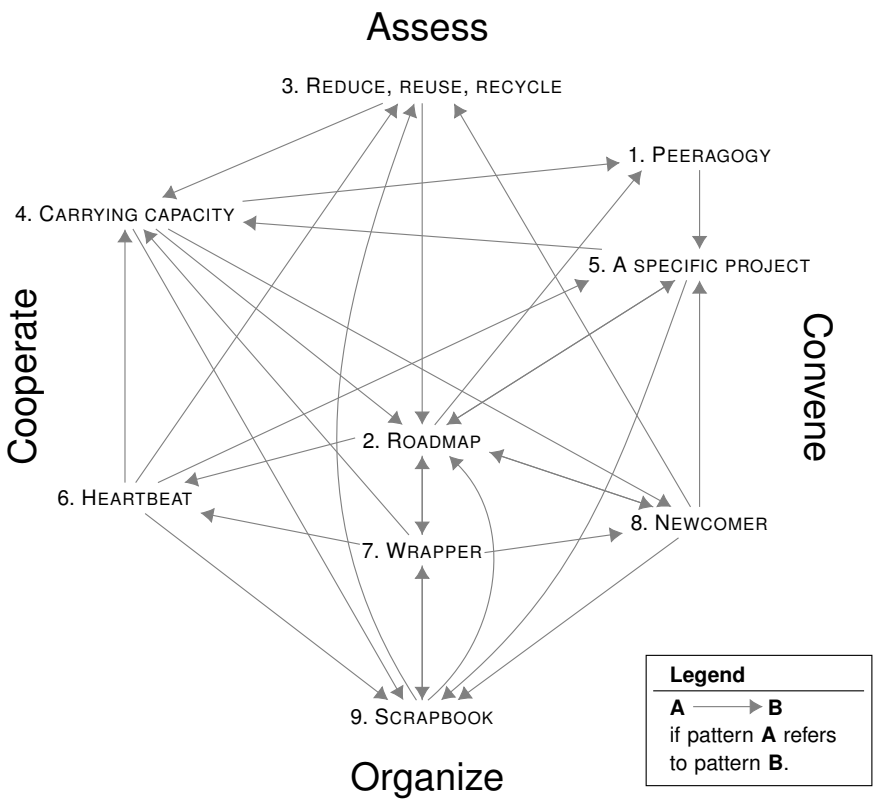

Fig. 2: Peeragogy patterns are highly interconnected. This figure shows how they fit together with and within a wider context. Specifically, the labels at the four edges of the figure correspond to the most closely related sections of the *Peeragogy Handbook*.

PATTERN CATALOG

1. PEERAGOGY

Motivation. This pattern is relevant to anyone who wants to do active learning together with others in a relatively non-hierarchical setting.

Context. Collaborative projects like Wikipedia, StackExchange, and FLOSS represent an implicit challenge to the old "industrial" organization of work. This new way of working appears to promise something more resilient, more exciting, and more humane. The rhetoric has been questioned [Shaw and Hill 2014; Kreiss et al. 2011]. In and across these "free", "open", post-modern organizations, individual participants are learning [Schmidt 2009] – and that they collectively change the methods and infrastructure as they go. Because everyone in these projects primarily learns by putting in effort on a shared work-in-progress, participants are more in touch with an *equality of intelligence* than an *inequality of knowledge* [Rancière 1991, pp. 38, 119]. At the same time, they invoke a form of friendly competition, in which *the best craftmanship wins* [Raymond 2001, p. 89].

Forces. **Threshold**: inclusiveness and specificity are in tension.
Trust: is only built through sharing and reciprocity.

Problem. Even a highly successful project like Wikipedia is a work in progress that can be improved to better *empower and engage people around the world, to develop* richer and more useful *educational content, and to disseminate it* more *effectively* – and deploy it more creatively.[2] How to go about this is a difficult question, and we don't know the answers in advance. There are rigorous challenges facing smaller projects as well, and fewer resources to draw on. Many successful free software projects are not particularly collaborative – and the largest projects are edited only by a small minority of users [Hill 2011; Swartz 2006]. Can we work smarter together?

Solution. The act of asking "can we work smarter together?" puts learning front and center. Peeragogy takes that "center" and distributes it across a pool of heterogeneous relationships. Indeed, peeragogy can be understood as an up-to-date revision of Alexander's NETWORK OF LEARNING [Alexander et al. 1977, p. 99]. It *decentralizes the process of learning and enriches it through contact with many places and people* in interconnected networks that may reach all over the world. Importantly, while people involved in a peeragogical process may be collaborating on A SPECIFIC PROJECT, they don't have to be direct collaborators outside of the learning context or co-located in time or space. Just as theories and practices of pedagogy articulate the transmission of knowledge from teachers to students, peeragogy articulates the way peers produce and use knowledge together (Figure 2).

Rationale. The peeragogical approach particularly addresses the problems of small projects stuck in their individual silos, and large projects becoming overwhelmed by their own complexity. It does this by going the opposite route: explicating *what by definition is tacit* and employing *a continuous design process* [Schümmer et al. 2014, pp. 9–10]. As Howard Rheingold remarks in the foreword to the *Peeragogy Handbook*: "What made this work? Polycentric leadership is one key" [Rheingold et al. 2015, p. iii]. "Peer-led" shouldn't suggest that there are no leaders: rather, it means that multiple leaders act as peers.

Resolution. Peeragogy helps people in different projects describe and solve real problems. If you share the problems that you're experiencing with others, there's a reasonable chance that someone may be able to help you solve them. Bringing a problem across the **threshold** of someone else's awareness helps achieve clarity. This process can guide individual action in ways that we wouldn't have seen on our own, and may lead to new forms of collective action we would never have imagined possible. People who gain experience comprehending problems together build **trust**. Making room for multiple right answers contributes further to resolving the tension between generality and specificity.

[2] `https://wikimediafoundation.org/wiki/Mission_statement`

Example 1. Wikipedia and its sister sites Wiktionary, Wikiversity, etc. (collectively "Wikimedia") rely on user-generated content, peer produced software, and are managed, by and large, by a pool of users who choose to get involved with governance and other "meta" duties.[3] The Wikimedia Foundation maintains the servers and acts on behalf of this "global movement". They achieve something quite impressive: Wikipedia is the 7th most popular website in the world, but the Wikimedia Foundation has under 300 employees. For comparison, the 6th (Amazon) and 8th (QQ) most popular websites are run by companies with over 200K and 28K employees, respectively.[4,5,6,7]

Example 2. Although one of the strengths of PEERAGOGY is to distribute the workload, this does not mean that infrastructure is irrelevant. The students and researchers of the future university will need access to an Observatory and other scientific apparatus if they are to reach *ad astra, per aspera* (Figure 3).[8]

Fig. 3: *Observatory*: Space Surveillance Telescope, New Mexico.

What's Next in the Peeragogy Project We intend to revise and extend the *Patterns of Peeragogy* into a framework that can describe and scaffold the learning that happens inside and outside of institutions.

2. ROADMAP

Motivation. This pattern shows how your group can define the scope of their project and make a realistic plan to address it. This pattern provides the backbone of our pattern language. It can be used to find a shared goal.

Context. PEERAGOGY has both distributed and centralized aspects. The discussants or contributors who collaborate on a project have different points of view and heterogeneous priorities, but they come together in conversations and joint activities.

Forces.
- **Variety**: people have different goals and interests in mind.
- **Clarity**: some goals may be quite specific, and some rather vague.
- **Coherence**: only some of these goals will be well-aligned.

Problem. In order to collaborate, people need a way to share current, though incomplete, understanding of the space they are working in, and to nurture relationships with one another and the other elements of this space. At the outset, there may not even be a coherent vision for a project – but a only loose collection of motivations and sentiments. Once the project is up and running, people are likely to pull in different directions.

Solution. Building a guide to the goals, activities, experiments and working methods can help NEWCOMERS and old-timers alike understand their relationship with the project. It may combine features of a manifesto, a syllabus, and an issue tracker. It may be a design pattern or a pattern language [Kohls 2010]. The distinguishing qualities of a project ROADMAP are that it should be adaptive to circumstances, and that it should ultimately get us from *here* to *there*. By this same token, any given version of the roadmap is seen as fallible. In lieu of widespread participation, the project's WRAPPER should attempt to synthesize an accurate roadmap that is informed by participants' behavior, and should help moderate in case of conflict. Nevertheless, full consensus is not necessary: different goals, with different *heres* and *theres*, can be pursued separately, while maintaining communication.

[3] `https://www.wikimedia.org/`
[4] `https://en.wikipedia.org/wiki/Wikimedia_Foundation#Employees`
[5] `http://phx.corporate-ir.net/phoenix.zhtml?c=97664&p=irol-newsArticle&ID=2100418`
[6] `https://www.google.com/finance?cid=695431`
[7] `http://www.alexa.com/topsites`
[8] Latin: "With difficulty, to the stars."

Rationale. The group evolves from a less-sophisticated to a more-sophisticated manner of operating by using the roadmap. Using the roadmap builds a collective awareness of how things are working in practice. In the Peeragogy project our initial roadmap was a "crowdsourced" outline of the first edition of the *Peeragogy Handbook*. Later, it took the form of a schedule of meetings following a regular HEARTBEAT, supplemented by a list of upcoming deadlines. Most recently, our roadmap is expressed in the emergent objectives collected at the end of current paper. We have seen that a list of nice-to-have features created in a top-down fashion is comparatively unlikely to go anywhere! A backlog of tasks and a realistic plan for accomplishing them are vastly different things. An adaptive roadmap is an antidote to TUNNEL VISION [Dikel et al. 2001, pp. 121–124].

Resolution. An emergent roadmap is rooted in real problems and justifiable solutions-in-progress in all their **variety** and communicates both resolution and follow-through. The process of meshing varied issues with one another requires thought and discussion, and this encourages **clarity**. The test of **coherence** is that contributed goals and ideas should be actionable. The ultimate quality-control test is if it worked, i.e., did it come to pass that the task(s) the roadmap was created to achieve ended up being achieved? If all of the issues that the roadmap outlines are not resolved, the roadmap itself should be revised. Without a roadmap, we would never know.

Example 1. The *Help* link present on every Wikipedia page could be seen as a localized ROADMAP for individual user engagement: it tells users what they can do with the site, and gives instructions on how to do it.[9] For someone who knows what they're doing, there are around 30 pages listing articles with various kinds of problems, for example articles tagged with style issues, or "orphaned" articles (i.e., articles with no links from other pages in the encyclopedia).[10,11,12] In 2010-2011, Wikimedia developed a strategic plan drawing on community input [Kim et al. 2011]. In 2015, a two-week Community Consultation was carried out; synthesis resulted in "a direction that will guide the decisions for the organization."[13,14] Community-organized WikiProjects often invite and guide involvement on A SPECIFIC PROJECT.

Fig. 4: *President's Residence*, University of Alabama.

Example 2. In a future university run in a peer produced manner, a fancy President's Residence presumably wouldn't be needed (Figure 4). Leadership would be carried out in a more collaborative and distributed fashion. However, depending on just how distributed things are, it may turn out to be useful for project facilitators to gather at a University Hall. Whereas there is strength in numbers, there is leverage in organization. This is what the ROADMAP provides.

What's Next in the Peeragogy Project If it becomes clear that something needs to change about the project, that is a clue that we might need to revise our patterns or record a new one. We can use the names of the patterns to tag our upcoming tasks.

3. REDUCE, REUSE, RECYCLE

Motivation. This pattern can guide project participants in identifying and managing available resources.

[9] https://en.wikipedia.org/wiki/Help:Contents
[10] https://en.wikipedia.org/wiki/Category:Wikipedia_article_cleanup
[11] https://en.wikipedia.org/wiki/Category:Wikipedia_articles_with_style_issues
[12] https://en.wikipedia.org/wiki/Category:All_orphaned_articles
[13] https://blog.wikimedia.org/2015/02/23/strategy-consultation/
[14] https://blog.wikimedia.org/2015/08/27/strategy-potential-mobile-multimedia-translation/

Context. In a peer production context, you are simultaneously "making stuff" and building on the work of others.

Forces. **Derivative**: you don't have to do everything yourself!
Sensemaking: resources are useful only when you can make sense of them.
Sharing: your understanding gains robustness when you share with others.

Problem. Many projects die because the cost of REINVENTING THE WHEEL [c2] is too high. However, this is just one possible symptom of overfocus on a few priorities. Concerns may also arise if the project's output is not actually used by anyone.

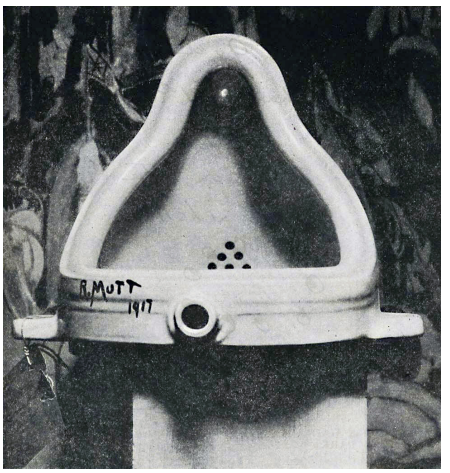

Fig. 5: A paradigmatic example of found-art. "Fountain by R. Mutt, Photograph by Alfred Stieglitz, THE EXHIBIT REFUSED BY THE INDEPENDENTS".

Solution. "Steal like an artist," and make it possible for other people to build on your work too (Figure 5). In the Peeragogy project, we have used off-the-shelf and hosted software suited to the task at hand (including: Drupal, Google+, Google Hangouts, Google Docs, Wordpress, pandoc, Github, ShareLaTeX). Early on we agreed to release our *Peeragogy Handbook* under the terms of the Creative Commons Public Domain Dedication (CC0), the legal instrument that grants the greatest possible leeway to downstream users.[15] This has allowed us and others to repurpose and improve its contents in other settings, including the current paper. Follow the steps indicated by the keywords in the pattern's title:

—*Reduce* the panoply of interesting interrelated ideas and methods to a functional core (e.g. writing a book).
—*Reuse* resources relevant to this aim, factoring in "things I was going to have to do anyway" from everyone involved.
—*Recycle* what you've created in new connections and relationships.

Rationale. Clearly we are not the first people to notice the problems with wheel-reinvention, including "missing opportunities, repeating common mistakes, and working harder than we need to."[16] As a guest in one of our hangouts, Willow Brugh, of Geeks without Bounds and the MIT Media Lab, remarked that *people often think that they need to build a community, and so fail to recognize that they are already part of a community.*[17] We converted our old pattern catalog from the *Peeragogy Handbook* into this paper, sharing it with a new community and gaining new perspectives; could we do something similar again?

Resolution. Reweaving old material into **derivative** designs and new material into existing frameworks, we build deeper understanding, and carry out collective **sensemaking**. The project's ROADMAP develops by making sense of existing resources – including our worries and concerns. Often we only know what these are when we attempt to **share** them. Drawing on a wide range of resources boosts our collective CARRYING CAPACITY.

Example 1. Contributors are encouraged to recycle existing works that are compatible with the Wikimedia-wide Creative Commons Attribution-ShareAlike (CC-By-SA) license.[18] Some sub-projects have been created purely to help repurpose other existing works in this way.[19] On the downstream side, DBPedia is an important resource

[15] https://creativecommons.org/publicdomain/zero/1.0/
[16] https://blog.wikimedia.org/2013/11/19/learning-patterns-new-way-share-important-lessons/
[17] https://www.youtube.com/watch?v=NpyQfYVKfBI
[18] https://creativecommons.org/weblog/entry/15411/
[19] https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Mathematics/PlanetMath_Exchange

for the semantic web, built by collating data from Wikipedia's "infoboxes".[20] These infoboxes are themselves increasingly being populated automatically using information from WikiData.[21] Researchers have been able to develop tools that reuse Wikipedia content in other ways [Reinhold 2006; Riche et al. 2010], However, these research projects do not always result in a tool that is accessible to day-to-day users.

Example 2. The knowledge resources and collaboration tools currently available online are what make a low-cost, high-quality, formally-accredited future university conceivable. However, the available resources are not always as organized as they would need to be for educative purposes, so peeragogues can usefully put effort into REDUCE, REUSE, RECYCLE'ing available resources into a functioning university Library.

> *What's Next in the Peeragogy Project* Are there other educational resources and peeragogical case studies that we could fold into our work? Can we recycle material from the *Peeragogy Handbook* into a format that is easier to understand and apply?

4. CARRYING CAPACITY

Motivation. This pattern can help project participants recognize and communicate their stresses to make themselves and the project more resilient.

Context. One of the important maxims from the world of FLOSS is: "Given enough eyeballs, all bugs are shallow" [Raymond 2001, p. 30]. A partial converse is also true: there's only so much any one person can do, since we all have limited time and energy.

Forces. **Antifragility**: each person's potential can only be realized if people take on enough, but not too much. 

Independence: in a peeragogy context, it is often impossible to delegate work to others. 

Problem. How can we help prevent those people who are involved with the project from over-promising or over-committing, and subsequently crashing and burning? First, let's be clear that there are lots of ways things can go wrong. Simplistic expectations – like *assuming that others will do the work for you* [Torvalds and Vaughan-Nichols 2011] – can undermine your ability to correctly gauge your own strengths, weaknesses, and commitments. Without careful, critical engagement, you might not even notice when there's a problem. Where one person has trouble letting go, others may have trouble speaking up. Pressure builds when communication isn't going well.

Solution. Serious frustration is a sign that it's time to revisit the group's ROADMAP and your own individual plan. Are these realistic? If you have a "buddy" they can provide a reality check. Maybe things are not *that hard* after all – and maybe they don't need to be done *right now*. Generalizing from this: the project can promote an open dialog by creating opportunities for people to share their worries and generate an emergent plan for addressing them [Seikkula and Arnkil 2006]. Use the project SCRAPBOOK to make note of obstacles. For example, if you'd like to pass a baton, you'll need someone there who can take it. Maybe you can't find that person right away, but you can bring up the concern and get it onto the project's ROADMAP. The situation is always changing, but if we continue to create suitable checkpoints and benchmarks, then we can take steps to take care of an issue that's getting bogged down.

Rationale. Think of the project as an ecosystem populated by acts of participation. As we get to know more about ourselves and each other, we know what sorts of things we can expect, and we are able to work together

[20] `http://wiki.dbpedia.org/`

[21] `https://www.wikidata.org/wiki/Wikidata:Main_Page`

more sustainably [Ostrom 2010]. We moderate stress and improve collective outcomes by taking concerns seriously.

Resolution. Guiding and rebalancing behavior in a social context can begin with speaking up about a concern. When we acknowledge concerns, we must take into account our own boundedness. We have find an opportunity to make ourselves helpful, without impinging on others' **independence**. This doesn't mean allowing all possible stresses to run rampant: we work to stay within the realm of **antifragility**, where manageable stress *improves* the system rather than degrading it [Taleb 2012]. As we share concerns and are met with care and practical support, our actions begin to align better with expectations (often as a result of forming more realistic expectations).

Example 1. Wikipedia aims to emphasize a neutral point of view, but its users are not neutral.[22] Users "speak up" about topics that matter to them.[23] Coverage and participation are not neutral in another less sanguine sense. More information on Wikipedia deals with Europe than all of the locations outside of Europe [Graham et al. 2014]. As we remarked in the PEERAGOGY pattern, most of the actual work is contributed by a small percentage of users. The technology limits the kinds of things that can be said [Graham et al. 2014]. The total number of active editors has been falling since 2007.[24] Some blame outmoded technology and an insider culture [Simonite 2013], or a stringent editorial approach that emerged in response to the site's popularity [Halfaker et al. 2013]. Others highlight the rise of successful competition, often inspired by wiki models, but driven by "corporate logic" [Kreiss et al. 2011; Morell 2011]. Some proposed solutions focus on various indicators of "community health".[25]

Example 2. Progressive thinkers have for some time subscribed to the view that "there shall be no women in case there be not men, nor men in case there be not women" [Rabelais 1894, Chapter 1.LII]. A separate Ladies Hall seems entirely archaic (Figure 6). However, in light of the extreme gender imbalance in free software, and still striking imbalance at Wikipedia [Ghosh et al. 2002; Reagle 2012], it will be important to do whatever it takes to make women and girls welcome, not least because this is a significant factor in boosting our CARRYING CAPACITY.

Fig. 6: *Ladies Hall*: Queens College, North Carolina.

What's Next in the Peeragogy Project Making it easy and fruitful for others to get involved is one of the best ways to redistribute the load. This often requires knowledge transfer and skill development among those involved; see NEWCOMER.

5. A SPECIFIC PROJECT

Motivation. This pattern can help project participants get started, get focused, and make concrete change. It is especially useful for someone who is currently feeling stuck.

Context. We often find ourselves confronted with what seems to be a difficult, complex, or even insurmountable problem. It won't go away, but a workable solution doesn't present itself, either. If there is a candidate solution, it's also clear there are not enough resources for it to be feasible.

[22] https://en.wikipedia.org/wiki/Wikipedia:Neutral_point_of_view
[23] https://en.wikipedia.org/wiki/Wikipedia:Activist
[24] https://strategy.wikimedia.org/wiki/Editor_Trends_Study/Results
[25] https://lists.wikimedia.org/pipermail/wiki-research-l/2016-January/004959.html

Forces. **Difficulty**: bringing about meaningful change is often hard work.
Inertia: when things are hard we may feel stuck, wring our hands, or preach to the choir.

Problem. One is often blinded by one's prejudices and preferences. Some may put considerable energy into pondering, discussing, exploring and feeling stuck. Some may want more concrete progress, and notice the time passing by. In a group setting, when the forward-movers ultimately try to act, those who are more wrapped up in the experience of pondering and exploring may rebel, if they feel that they are being left behind. Inaction may seem like the only safe choice, but it has risks too. And, once moving, things can easily get bogged down again.

Solution. One way to make progress when you're stuck is to ask a specific question to someone who may be able to help you get unstuck. Formulating a question helps your thinking become more concrete. Sometimes you'll see that a solution was within your grasp all along. Often, one question won't be enough, but you can repeat the process. In this way, you can reduce a large, complex, or ephemeral concern into a collection of smaller, specific, manageable tasks with clear next steps and success criteria. Use a SCRAPBOOK to make note of all the small things, and weave them into your project ROADMAP. This will show how the small pieces relate to the bigger picture. If you have a fairly specific idea about what you want to do, but you're finding it difficult to get it done, don't just ask for advice: recruit material help (cf. CARRYING CAPACITY). One example of a specific project from the Peeragogy project is our work on this paper, which had a specific target audience, a set of associated deadlines, and allowed us to get help from pattern experts.

Rationale. We've seen time and again that having a specific project is a recipe for getting concrete, and that getting concrete is necessary for bringing about change. Asking for help (which is what happens when you vocalize a question) is one of the best ways to gain coherence. Making yourself understood can go a long way toward resolving deeper difficulties.

Resolution. Where you run into **difficulty**, getting specific paves the way for incremental forward progress and helps to overcome **inertia**. The struggle between consensus and action is resolved in a tangible project that combines action with dialog. Learning something new is a strong sign that things are working. In the Peeragogy project, we have completed many projects during our weekly hangouts, for example "hive editing" an abstract for submission to a conference.

Example 1. At first glance, the Wikimedia Foundation's mission may seem like a good idea, but hard to do anything about.[26] In practice, many Wikipedians contribute to the mission by working on A SPECIFIC PROJECT. Within Wikipedia, these are known as "WikiProjects."[27,28] Guidance is available on how to start new WikiProjects.[29] The Wikimedia Foundation also runs other public projects, including the Wikipedia Education Program and the GLAM Wiki (for Galleries, Libraries, Archives, and Museums).[30,31] The latter maintains a *list of case studies that describes specific projects undertaken by cultural organizations and Wikimedia*.[32]


Fig. 7: *Dormitory*, Ruin Academy, Taipei, Taiwan.

Example 2. Collegial and convivial peer support via remote collaboration or short-term meet-ups may fill some of the requirements

[26] https://wikimediafoundation.org/wiki/Mission_statement
[27] https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Council/Directory
[28] https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Council/Guide
[29] https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Council/Guide/WikiProject
[30] https://outreach.wikimedia.org/wiki/Education/Wikipedia_Education_Collaborative/Tasks
[31] https://outreach.wikimedia.org/wiki/GLAM
[32] https://outreach.wikimedia.org/wiki/GLAM/Case_studies

of “student life”. Peeragogy can also happen in neighborhoods, and among persons sharing long-term co-habitation. While a traditional Dormitory may not be necessary, a shared rented or cooperatively-owned living/working environment could be an asset for peeragogues working together on A SPECIFIC PROJECT (Figure 7).

> *What’s Next in the Peeragogy Project* Let’s use our pattern catalog to build specific, tangible “what’s next” steps, add them to our ROADMAP, and carry them out with concrete actions. Let’s be sure we know who’s responsible for what, and employ a “buddy system” to help get things done.

6. HEARTBEAT

Motivation. This pattern can help project participants stay in touch, and stay motivated.

Context. A number of people have a shared interest, and have connected with each other about it. However, they are not going to spend 24 hours a day, 7 days a week working together, either because they are busy with other things, or because working separately on some tasks is vastly more efficient.

Forces. **Differentiation**: the time we spend together isn’t all equally meaningful. 
Entropy: something needs to hold the project together, or it will fall apart. 

Problem. How will the effort be sustained and coordinated sufficiently? How do we know this an active collaboration, and not just a bunch of people milling about? Is there a *there, there?*

Solution. People seem to naturally gravitate to something with a pulse. *Once a day* (stand-ups), *once a week* (meetings), or *once a year* (conferences, festivals) are common variants. When the project is populated by more than just a few people, it’s likely that there will be several HEARTBEATS, building a sophisticated polyrhythm. A well-running project will feel “like an improvisational jazz ensemble” [Dikel et al. 2001]. Much as the band director may gesture to specific players to invite them to solo or sync up, a project facilitator may craft individual emails to ask someone to lead an activity or invite them to re-engage. Two common rhythm components are weekly synchronous meetings with an open agenda, combined with *ad hoc* meetings for focused work on A SPECIFIC PROJECT. The precise details will depend on the degree of integration required by the group.

Rationale. The project’s heartbeat is what sustains it. Just as *people matter more than code* [Torvalds and Vaughan-Nichols 2011], so does the life of the working group matter more than mechanics of the work structure. Indeed, there is an quick way to do a reality check and find the project’s strongest pulse: the activities that sustain a healthy project should sustain us, too (cf. CARRYING CAPACITY).

Resolution. Noticing when a new HEARTBEAT is beginning to emerge is a way to be aware of the shifting priorities in the group, and contributes to further **differentiation**. This may ultimately be a good source of new patterns. On the other hand, if a specific activity is no longer sustaining the project, stop doing it, much as you would move an out-of-date pattern to the SCRAPBOOK in order to make room for other concerns. The power of the HEARTBEAT is that the project can be as focused and intensive as it needs to be, working against **entropy** in the ways that start to be required as time goes by.

Example 1. The yearly in-person gathering, Wikimania, is the most visible example of a HEARTBEAT for the Wikimedia movement.[33] Local chapters and projects may run additional in-person get-togethers.[34] Also of note is the twice-yearly call for proposals for individual engagement grants.[35] There are other shorter cycles. Each day

[33] https://meta.wikimedia.org/wiki/Wikimania
[34] http://wikiconferenceusa.org/
[35] https://meta.wikimedia.org/wiki/Grants:IEG

Fig. 8: *University Farm*: al-Biruni University, Kapisa province, Afghanistan.

a highly-vetted Featured Article appears on the front page of Wikipedia, and is circulated to a special-purpose mailing list.[36,37,38] The discussion of articles for deletion lasts at least seven days.[39]

Example 2. Although it may sound quaint, some variant of the University Farm could help to physically sustain peeragogues, while putting the project's HEARTBEAT in tune with that of the seasons (Figure 8). In the current distributed mode, we tend our window boxes and allotment gardens. New developments should unfold in a *logical order growing out of the needs of the community* [Washington 1901, Chapter IX].

> *What's Next in the Peeragogy Project* Identifying and fostering new HEARTBEATS and new working groups can help make the community more robust. This is the time dimension of spin-off projects described in REDUCE, REUSE, RECYCLE.

7. WRAPPER

Motivation. This pattern suggests to find at least one person to fill an important role managing the project's public interface, and keeping participants up to date about activities.

Context. You are part of an active, long-running, and possibly quite complex project with more than a handful of participants. How do you manage?

Forces. **Interface**: the project shows people how they can use it.
Familiarity: the leader/follower dichotomy is easy to understand.
Equity: peeragogy aims for fairness.

Problem. In an active project, it can be effectively impossible to stay up to date with all of the details. Not everyone will be able to attend every meeting (see HEARTBEAT) or read every email. Project participants can easily get lost and drift away. The experience can be much more difficult for NEWCOMERS: joining an existing project

[36] https://en.wikipedia.org/wiki/Wikipedia:Today%27s_featured_article
[37] https://en.wikipedia.org/wiki/Wikipedia:Featured_article_candidates
[38] https://lists.wikimedia.org/mailman/listinfo/daily-article-l
[39] https://en.wikipedia.org/wiki/Wikipedia:Articles_for_deletion

can feel like trying to climb aboard a rapidly moving vehicle. Information overload is not the only concern: there is also a problem with missing information. If key skills are not shared, they can quickly become bottlenecks (see CARRYING CAPACITY).

Solution. Someone involved with the project should regularly create a wrap-up summary, distinct from other project communications, that makes current activities comprehensible to people who may not have been following all of the details. In addition, project members should keep other informative resources like the landing page, ROADMAP, and documentation up to date. Check empirically to see if they really show interested parties how they can get involved. Building on the idea of a "project dashboard" in Figure 9, we can guide potential contributors to live help; we can then see what questions they ask.[40] The WRAPPER is both a role, and, sometimes, an artifact. Our *Handbook*'s cover literally wraps up its contents; the collaboratively written chat notes from our weekly Hangouts give a collaboratively-written overview of what was discussed in the meeting. Meetings themselves can be structured to give people a chance to sum up what they've accomplished during the week, as well as any problems they are running into. Between meetings, each participant is advised to maintain some sort of "learning log" in the form of a personal SCRAPBOOK, so that outstanding concerns are surfaced and available to discuss.

Rationale. According to the theory proposed by Yochai Benkler, for free/open "commons-based" projects to work, it is important for participants to be able to contribute small pieces, and for the project to have a way to stitch those pieces together [Benkler 2002]. The WRAPPER helps perform this integrative stitching function. If you value participation, you may have to do some serious work to facilitate access to process.

Resolution. Well-maintained records chronicle the project's history; up-to-date documentation makes the project more robust; a coherent look-and-feel offers an accessible **interface** to the outside world. Regularly circulated summaries can help to engage or re-engage members of a project, and can give an emotional boost to peeragogues who see their contributions and concerns mentioned, giving less engaged participants the **familiar** experience of "following" someone else's updates. People will judge from experience whether the project strives for **equity** or strives to maintain hidden power differentials.

Example 1. There are many data streams around the Wikimedia project. They comprise an elaborate WRAPPER function for the project, with components that range from Today's Featured Article, which appears on the front page of Wikipedia, to formal annual reports from the nonprofit.[41,42]

Example 2. In-person meetings are just as relevant for contemporary humans as they were a century ago, even though we have learned more about how to assemble on the fly [Rheingold 2007]. Getting together for conventions, dance parties, and commencement ceremonies could comprise an important part of the future university's WRAPPER function, even if these events do not always take place in one specific Assembly Hall.

> *What's Next in the Peeragogy Project* Let's make sure we have protocols in place that enable us to share progress, and to revise our "next steps" if people are getting stuck. Let's improve the interaction design for peeragogy.org so that it's clear how people can get involved.

8. NEWCOMER

Motivation. This pattern can help project participants be aware of the issues faced by newcomers, and cultivate a "beginner's mind" themselves.

[40] `https://gitter.im/orgs/Peeragogy/rooms`
[41] `https://en.wikipedia.org/wiki/Wikipedia:Today%27s_featured_article`
[42] `https://wikimediafoundation.org/wiki/Annual_Report`

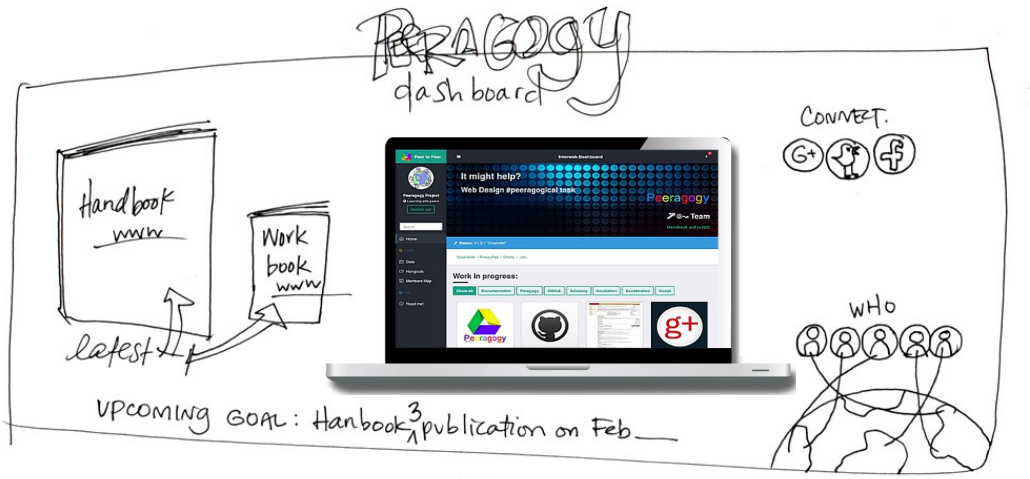

Fig. 9: Design for a Peeragogy project dashboard (sketch by Amanda Lyons, prototype by Fabrizio Terzi; images used with permission).

Context. When there's learning happening, it's because there is someone who is new to a topic, or to something about the topic.

Forces. **Individuation**: each person learning optimally is what's best for the community.
Mutuality: our individuality does not isolate us from one another, but draws us together.

Problem. Newcomers can feel overwhelmed by the amount of things to learn. They often don't know where to start. They may have a bunch of ideas that the old-timers have never considered – or they may think they have new ideas, which are actually a different take on an old idea; see REDUCE, REUSE, RECYCLE. People who are new to the project can tell you what makes their participation difficult. Since you're learning as you go as well, you can ask yourself the same question: what aspects of this encounter are difficult for me?

Solution. Instead of thinking of newcomers as "them", and trying to provide solutions, we focus on newcomers as "us" – which makes the search for solutions that much more urgent. We permit ourselves to ask naive questions. We entertain vague ideas. We add concreteness by trying A SPECIFIC PROJECT. We may then genuinely turn to others for help. We aim to foster a culture in which the focus for everyone is on addressing our own learning challenges rather than on "providing" solutions for others [Boud and Lee 2005]. When you begin a new project, try to systematically take notes and gather data to analyze and reflect upon later; leave artifacts for other future newcomers to use and build upon in their own research. In practice this may be a lot to ask for someone just joining a group, but over time we may have many ways to structure our collective engagement so that it leads to research cycles based on the "action research" steps *reflect*, *plan*, *act*, and *observe*. Note that there is a parallel with the four facets *assess*, *convene*, *organize*, *cooperate* from Figure 2. The history of the action research approach, with particular emphasis on educational applications, is surveyed in [McNiff 2013, Chapter 3]. One method for doing the reflection/assessment step is presented in the SCRAPBOOK pattern. Be flexible: networked attention (even more so than rigid cycles [Engeström 1999]) leads to new ways of knowing and expanded access to knowledge-production [Simondon 2012; Wagner 2008].

Rationale. A newcomer's confusion about how best to get involved or what the point of all this actually is may be due to a lack of structure in the project ROADMAP. Sharing vulnerability and confusion gives us a chance to learn.

Resolution. An awareness of the difficulties that newcomers face can help us be more compassionate to ourselves and others. We strengthen the community by supporting all participants' **individuation**. We have a better chance of making the project useful for others if we're clear about how it is useful to *us*. By welcoming newcomers, we enhance the sense of **mutuality** with people who have never encountered the project before, and learn together with them. The facts start to become useful when we understand how people perceive them [Freire 1982].

Example 1. Wikipedia NEWCOMERS can make use of resources that include a "Teahouse" where questions are welcomed, a platform extension that changes the user interface for new editors, and lots of documentation.[43,44,45] The efforts of exceptional newcomers may be given special recognition.[46] Newcomer "survival" is of interest to the Wikimedia Foundation.[47] However, "Nearly all editors begin with a burst of activity, then quickly tail off" [Panciera et al. 2009]. The degree to which those editors who are retained strive to maintain a "beginner's mind" is less clear. As regards learning their way around the community, there is quantitative support [Panciera et al. 2009] for the claim that "novice users learn the rules and conventions for contributing both through observation and direct coaching from more knowledgeable others" [Bryant et al. 2005].

Example 2. It will often be pragmatic to connect NEWCOMERS with employment directly, so that the future university may see a closer coupling of science and industry than would be found in the old Science Hall (Figure 10). Inspiration can be drawn the London-based freelancing cooperative Founders&Coders, which is able to offer intensive training in web development at no cost to successful applicants, on the basis that some trainees will choose to join the cooperative as paying members later on.[48]

Fig. 10: *Science Hall*: Aspatria Agricultural College, Aspatria, Cumberland, UK

What's Next in the Peeragogy Project More detailed guides can show NEWCOMERS how they can contribute and what to expect when they do. We should have different guides for different "user stories". We can start by listing some of the things we're currently learning about.

9. SCRAPBOOK

Motivation. This pattern describes a way to make the project meaningful.

Context. We have been working together for a while now. We have maintained and revised our pattern catalog, and we are achieving some of the "What's Next" steps associated with some of the patterns.

Forces. **Attention**: due to limited energy, we need to ask: where should we set the focus?
Interest: new experiences catch our attention.
Meaning: shared history makes things meaningful.

[43] https://en.wikipedia.org/wiki/Wikipedia:Teahouse
[44] https://en.wikipedia.org/wiki/Wikipedia:GettingStarted
[45] https://en.wikipedia.org/wiki/Help:Editing
[46] https://en.wikipedia.org/wiki/Template:The_New_Editor%27s_Barnstar
[47] https://meta.wikimedia.org/wiki/Research:Newcomer_survival_models
[48] http://www.foundersandcoders.com/academy/

Problem. Not all of the ideas we've come up with have proved workable. Not all of the patterns we've noticed remain equally relevant. In particular, some patterns no longer lead to concrete next steps.

Solution. In order to maintain focus, is important to "tune" and "prune" the things we give our attention to. We can connect this understanding to any actions undertaken in the project by asking questions like these:

> (1) Review what was supposed to happen. (2) Establish what is happening/happened. (3) Determine what's right and wrong with what we are doing/have done. (4) What did we learn or change? (5) What else should we change going forward? [Rheingold et al. 2015, Chapter 28], after [US Army 1993].

Other review processes have been formalized, including the design review in architecture and the postmortem in theater and other teamwork settings [Mathers et al. 2013; Kerth 2001]. The review process may benefit from having an experienced facilitator on board [Gabriel 2002, pp. 67, 142–143]. As current priorities become clearer, we decide where to focus. Anything that isn't receiving active attention should be moved to a SCRAPBOOK. This may encompass:

—*Retired patterns* that are tabled or completed (no more next steps);

—*Proto-patterns* made of problems, issues, and concerns;

—*A back-catalog* of publications, reports, or other artifacts.

In the Peeragogy project, alongside our patterns we initially maintained a collection of antipatterns (like 'MAGICAL THINKING') but the next steps coming from these seemed particularly convoluted and abstract. So, we archived them.[49] We present a list of outstanding problems – without known solutions – right up front in the Introduction to the *Peeragogy Handbook* [Rheingold et al. 2015, Chapter 1]. Other proto-patterns include 'ONBOARDING' and 'DON'T QUIT YOUR DAY JOB', which arose in our review of this paper (see "Emergent Roadmap", below). Our back-catalog includes academic papers [Corneli et al. 2014, 2013; Corneli 2012; Corneli and Danoff 2011] and a thesis [Corneli 2014]. Everyone can maintain their own personal SCRAPBOOK as along with a communal one. Furthermore, you don't need to limit yourself to *your own* creativity: include interesting ideas from other sources (see REDUCE, REUSE, RECYCLE). In some cases a designated WRAPPER may have to do further work to elicit and organize contributions.

Rationale. We want to keep attention focused on the most relevant issues. If a pattern, task, or concern does not lead to concrete "next steps" at the moment, sufficient time for reflection may offer a better understanding, and it may prove useful and actionable in a different context.

Resolution. Judicious use of the SCRAPBOOK can help focus project participants' **attention** on current concerns, without losing grasp of items of **interest**. The currently active pattern catalog is leaner and more action-oriented as a result. If the ROADMAP shows where we're going, it is the SCRAPBOOK that shows most clearly where we've been, and collects the observations that are most **meaningful** to us.

Example 1. The history of the Wikimedia Foundation, and of Wikipedia, are maintained as wiki pages.[50,51] One of the entries on Wikipedia details outstanding issues, in the form of critiques.[52] There are many tools available to

[49] http://paragogy.net/Scrapbook
[50] https://wikimediafoundation.org/wiki/History_of_the_Wikimedia_Foundation
[51] https://en.wikipedia.org/wiki/Wikipedia
[52] https://en.wikipedia.org/wiki/Criticism_of_Wikipedia

Fig. 11: *Park*: Christ's Pieces, Cambridge, UK.

help facilitate the process of vetting proposed fine-grained changes to articles.[53,54] Policy concerns are typically discussed at the Village Pump, and there are mechanisms in place for settling disputes.[55,56]

Example 2. Just as a university campus grows and changes over time, future peeragogues will be drawn to new problems and patterns. They will trace new paths and build new emergent structures (Figure 11).

> *What's Next in the Peeragogy Project* After pruning back our pattern catalog, we want it to grow again: new patterns are needed. One strategy would be to turn the whole *Peeragogy Handbook* into design patterns.

EMERGENT ROADMAP

Table III reprises the "What's Next" steps from all of the previous patterns, offering another view on the Peeragogy project's ROADMAP in a concrete emergent form. This table has been vetted by project participants, who suggested revisions. This led to an outline for a new pattern, 'ONBOARDING', a facilitative process that would complement NEWCOMER and WRAPPER.[57] We also tagged many of the items in our list of upcoming tasks with the names of patterns in the pattern catalog.[58] However, the techniques that we have described in these patterns reach far beyond our own project. In many cases, the ideas are ancient, or even primordial (like HEARTBEAT). The patterns can be applied with or without high technology. The Peeragogy project is one of

> "[T]ens of thousands of projects in the traditions of world improvement élan – without any central committee that would have to, or even could, tell the active what their next operations should be." [Sloterdijk 2013, p. 402]

[53] https://en.wikipedia.org/wiki/Special:RecentChanges
[54] https://en.wikipedia.org/wiki/Wikipedia:Recent_changes_patrol#Tools
[55] https://en.wikipedia.org/wiki/Wikipedia:Village_pump_(policy)
[56] https://en.wikipedia.org/wiki/Wikipedia:Requests_for_comment
[57] https://github.com/Peeragogy/Onboarding-Project/issues/1
[58] https://goo.gl/tcN3q6

1. PEERAGOGY
We intend to revise and extend the *Patterns of Peeragogy* into a framework that can describe and scaffold the learning that happens inside and outside of institutions.
2. ROADMAP
If it becomes clear that something needs to change about the project, that is a clue that we might need to revise our patterns or record a new one. We can use the names of the patterns to tag our upcoming tasks.
3. REDUCE, REUSE, RECYCLE
Are there other educational resources and peeragogical case studies that we could fold into our work? Can we recycle material from the *Peeragogy Handbook* into a format that is easier to understand and apply?
4. CARRYING CAPACITY
Making it easy and fruitful for others to get involved is one of the best ways to redistribute the load. This often requires knowledge transfer and skill development among those involved; see NEWCOMER.
5. A SPECIFIC PROJECT
Let's use our pattern catalog to build specific, tangible "what's next" steps, add them to our ROADMAP, and carry them out with concrete actions. Let's be sure we know who's responsible for what, and employ a "buddy system" to help get things done.
6. HEARTBEAT
Identifying and fostering new HEARTBEATS and new working groups can help make the community more robust. This is the time dimension of spin-off projects described in REDUCE, REUSE, RECYCLE.
7. WRAPPER
Let's make sure we have protocols in place that enable us to share progress, and to revise our "next steps" if people are getting stuck. Let's improve the interaction design for peeragogy.org so that it's clear how people can get involved.
8. NEWCOMER
More detailed guides can show NEWCOMERS how they can contribute and what to expect when they do. We should have different guides for different "user stories". We can start by listing some of the things we're currently learning about.
9. SCRAPBOOK
After pruning back our pattern catalog, we want it to grow again: new patterns are needed. One strategy would be to turn the whole *Peeragogy Handbook* into design patterns.

Table III. : What's next in the Peeragogy project

When we talk about "next steps," we aim to show what can be realistically expected from us. And yet, the emergent ROADMAP also goes beyond specific individuals in the project, who will come and go.

Despite its tendency to longevity, robustness, and widespread applicability, peeragogy does have limits. For example, the benefits to collaboration notwithstanding, "there is no substitute for really hard thinking on your own" [Atiyah 1974]. Nevertheless, even the most independent knowledge worker reads and publishes: and humans are social animals. The question is usually how best – not whether – to involve others [Coase 1937; Benkler 2002]. This relates to another prospective pattern: 'DON'T QUIT YOUR DAY JOB'. Peer learning and peer production can build amazing resources, but they don't always pay the bills. That said, we have thought a lot about how the Peeragogy project could be deployed as a project accelerator built the commons-based peer production way, and

what that might mean from a business standpoint [Corneli et al. 2014]. Possible revenue streams include book sales and membership fees – as well as good old fashioned service provision.[59] At the moment there is no final agreement, but the presence of questions about the business aspects of the project may be a "clue" pointing in the direction of another pattern.

There is a further issue that presents more of a paradox. We can't dictate the behavior of other participants, and we often can't guess ourselves what's coming up. A peeragogical ROADMAP should prepare people for the *absence* of clear step-by-step direction, the *presence* of different viewpoints and priorities, and the consequent *requirement* to be reasonably self-directed. Many features of the peeragogical approach would be irrelevant to a project that is managed in a top-down fashion, and that can rely on other coordination mechanisms (like contracts) to manage work. Peeragogy is relevant when we must define or redefine the problems together.

CONCLUSION

This paper presents nine patterns of peeragogy and connects them to concrete next steps for the Peeragogy project. In order to demonstrate generality, we included examples that illustrate how the patterns manifest in current Wikimedia projects, and how they could inform the design of a future university rooted in the values and methods of peer production. The university metaphor need not constrain the future application of the ideas, which cut across many modes of engagement (Figure 12). Even so, a project to translate the free/libre/open university from metaphor to reality would offer an intriguing opportunity to test the generality of Hill's hypothesis on the mobilizing potential of "the combination of a familiar goal (e.g., 'simply reproduce Encyclopedia Britannica') with innovative methods (e.g., 'anybody can edit anything')" [Hill 2013, p. 13]. We close by reviewing our approach to the organization of learning, using three dimensions of analysis that have been previously applied to describe research on peer production [Benkler et al. 2015].

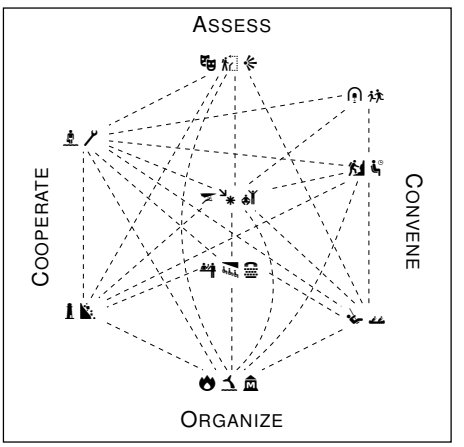

Fig. 12: Mnemonic

Organization. Managing work on our project with design patterns that are augmented with a "What's next" follow-through step allows us to "set and execute goals in a decentralized manner" [Benkler et al. 2015], reintegrating structure in the form of an emergent ROADMAP. Our methods apply at varied levels of scale and degrees of formality, inside or outside of institutional frameworks. If you already write patterns, you can add a "What's next" step to them and try the approach for yourself.

Motivation. The future of learning may be the *Chartres of programming* [Alexander 1999], but it will have plenty in common with the bazaar [Raymond 2001]. Philipp Schmidt indicates that *learning is at the core of peer production communities* [Schmidt 2009]. Our patterns help to explicate the way these communities work, but more importantly, we hope these patterns will help potentiate a global culture of collaborative learning, inside and outside of institutions.

Quality. "By intervening in real communities, these efforts achieve a level of external validity that lab-based experiments cannot" [Benkler et al. 2015]. The "What's next" annotation piloted here will be helpful to other design pattern authors who aim to use patterns as part of a research intervention. Peer production is not guaranteed to out-compete proprietary solutions [Benkler et al. 2015; Hill 2011]: its potential for success will depend on the way the problems are framed, and our ability to follow through.

[59] https://github.com/Peeragogy/peeragogy-handbook/blob/master/en/Peeragogy-Business_Model_Canvas.pdf

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