

Writers' Workshops As Scientific Methodology

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Software design patterns are both things in the world and pieces of literature. A pattern is a configuration or solution to a problem in the design and/or implementation of software that is repeatedly found, though almost always in slightly different form depending on the circumstances. A pattern then is not a programming language construct or an idiom, though in some cases it might be possible to generalize a pattern that way. Many software systems are put together from a set of patterns in a structured way. In this case a pattern language might be in play. A pattern language is a set of patterns that can be used with each other in a particular way or set of ways to achieve a larger system.

Patterns and pattern languages arise in the world because software designers and implementers tend to solve the same problems in the same ways—sometimes because developers communicate best practices with each other, sometimes because they see each others' solutions and adapt them and improve on them, and sometimes because the best solutions are (somehow) cosmically attractive. The result is an artificial world of naturally occurring software that is filled with expressed pattern languages of all sorts, and it becomes an almost scientific endeavor to identify and describe them. Perhaps it's not science in the most proper sense, but it is a science-like endeavor in that the world of software is being described by a set of pattern languages; these pattern languages form the model or theory that is the basis of this science.

The endeavor then is to discover those pattern languages and to describe them, and that's where the literature comes in. The software patterns community has decided that natural language is the best medium for describing discovered pattern languages. The structure of the natural language descriptions typically follow a format, so there is a hint of formality in this endeavor, but human language is the basis.

Natural sciences tend to use either mathematics or other formal languages as the basis of describing their models and the world. That's because the most important thing for these sciences is to unambiguously describe their knowledge. For the patterns community, the most important thing is to be able to pass on knowledge to practitioners—to software designers and implementers—who might not be

comfortable with formal languages (aside from programming languages) and who need to adapt the patterns to the context at hand.

The corpus of patterns and pattern languages—which form the science of software construction—therefore form a literature in the usual sense of the word: it is set of texts in natural language. This is also the case for natural and other sciences as well, and there is a process by which these texts are produced. The usual scientific way is that scientists are trained in grad school to write do research and write scientific papers by their teachers and advisors. These papers are reviewed by other scientists to decide whether they are proper texts for their discipline. These papers are intended to be read only by other scientists, and so their readability and clarity are secondary to their freedom from ambiguity—in a way, it's better for scientific papers to be incomprehensible than to be subject to interpretation by scientists of ordinary skill.

Software patterns, in contrast, are intended to be read by regular people, and so clarity and readability are very important—otherwise, the knowledge is not transferred. For this reason the patterns community decided to organize their activities differently from other sciences. People/researchers find the patterns as best they could and write them up, either as patterns, pattern collections, or pattern languages. Then instead of simply offering these texts to a peer-review committee in hopes of publishing them in a journal or at a conference, authors engage in a process that starts with *shepherds*, moves on to *writers' workshops*, and culminates in publication—on the Web, in conferences, in journals, or in or as books. This follows more closely the literary process than the scientific one, and to do so was a deliberate decision based on the belief that the most important aspect of the process was the quality of the final literature that was created.

The overall purpose of the processes used by the patterns community is to provide assistance to authors who wish to contribute to the patterns literature. As such it is not as competitive as the scientific process.

As important as any other aspect of the process is that writing is considered central to the final product, not just the ideas or the patterns or the pattern languages. Because

the goal is to produce a literature that conveys ideas and techniques to practitioners, the writing is crucial.

It is illuminating to examine this process.

Shepherding

A shepherd is an experienced author who is helping another author prepare for a writers' workshop. Shepherds are an important part of the software patterns community and culture. A shepherd typically reads a piece before it is workshopped and provides advice on how to get it in shape. Often, the shepherd is part of an acceptance process for the workshop: the shepherd works with the author and makes a recommendation to the group responsible for inviting authors (aka, the program committee), so there is often a deadline associated with shepherding.

The shepherd is part of the overall workshop culture—the shepherd and author are exchanging gifts—in the sense of the gift economy [1, 3, 4, 7] as opposed to the monetary economy. He or she is perhaps one of the first outside readers for a work destined for the workshop. The relationship, though, is clearly and narrowly defined. The shepherd is an acknowledged, experienced pattern author who also has significant experience in the writers' workshop, perhaps as a moderator or leader. The interaction is brief but sharply directed.

Although some publications use shepherds to help the author revise the work until it's done, the shepherd here is helping the author prepare the work for the workshop.

Most interaction between author and shepherd is by email, so there is the issue of how to establish a good working relationship that is not just another anonymous peer review. The interaction is short, so there is not a lot of time to go back and forth. A shepherd is a volunteer, and shepherding is usually done on the spur of the moment, which means it is most likely interrupting the shepherd's regular work.

Normally there are three iterations during shepherding, spaced over about a month. The shepherd is a critic and hence there can be a natural barrier between the shepherd and the author. The relationship is not like a peer reviewer with a name. The relationship is brief but long enough that some social skills are required. Therefore, the relationship is naturally more intimate and more like a teacher / student relationship or mentor / apprentice.

Although the shepherd is typically part of the process of accepting a paper for a writers' workshop, the relationship is defined so that the author is in full control of the paper—the shepherd neither requires nor expects his or her suggestions to be taken.

Shepherding mirrors the writers' workshop process: the arc of the interaction is typically the same for both. In both cases the goal is to teach. The shepherd is teaching the author, just as the author is trying to teach his or her readers.

Writers' Workshops

The writers' workshop begins when ten or so people decide to read, review, and critique each other's work under the guidance of a moderator. The workshop is a formal gathering, perhaps over a series of sessions that lasts at least as long as it takes to go through everyone's work—and the group can stay together continuing to review later drafts and new work, much like a sewing circle or poker game. The longer the group stays together the better—up to a point where you need to bring in new people.

The seed for the writers' workshop was planted at the end of the 19th century at the University of Iowa resulting in the Iowa Writers' Workshop, which is one of the best known and most prestigious of the creative writing programs in the United States. [8] The writers' workshop has been in use by the writing community ever since, and it is among the most effective ways for novice and intermediate writers to get good fast and to learn the critical skills to continue to improve.

The writers' workshop is one of several somewhat counterintuitive practices in which what seems like an individual art or craft is done or assisted by a group or crowd. Other practices include brainstorming, open-source development, pair programming, and the design charrette.

The fundamental approach used by the writers' workshop is not limited to writing, drawings, and designs, but can be applied—and has been applied—to anything that people make: software, patterns, pattern languages, organizations, presentations, brochures, marketing campaigns, business plans, companies, plays, performances, music, conference plans, food, interior decoration, landscaping, hairstyles, perfume choices, and so on.

The writers' workshop brings together people who make things and the things they have made in a way that enables effective criticism and suggestions for improvement while maintaining an atmosphere in which the individual is not harmed by the experience of people criticizing the work.

The formality and stylized behavior of the writers' workshop is what makes it work. There are three roles one can play in a workshop: *author*, *moderator*, or *participant*.

An author is someone whose pattern language is being workshopped. The ideal for the author during the workshop would be to be a fly on the wall in a room where truthful but polite people are frankly discussing the work. Take away the defensiveness of the author when he or she speaks up for the work and add the face and presence of the author to remind the reviewers that a real person is behind the work, who wants to make the work better and improve as a writer. Achieving this is the goal of the writers' workshop.

Authors are the primary participants in the workshop. Sometimes a workshop will have participants who are not

authors, but in general the workshop works best when only authors and a workshop moderator are in the circle.

The moderator's essential job is to make sure the workshop's ground rules are followed, that the author does not defend the work or inappropriately introduce it, that the author does not speak during the main part of the workshop, that the members of the group do not address the author, that the author is not embarrassed, and that the members remain courteous and focused only on the work and not the author nor the author's intentions. The moderator makes sure the comments and discussion are moving forward—and not in circles—and that points are made in a way the author can use for improvements to the work. When it seems that by clarifying something about the work the group can more effectively move forward, the moderator might ask the author to clarify the point but never to defend. Some moderators are experts either in writing or in the subject of the pattern language; such moderators act as teachers, sometimes even giving short lectures; such moderators are ideal.

Workshop Process

Before the group first gets together to review a particular piece, that piece is handed out so the group can prepare. Each reader might write notes on the piece in preparation. When the group is ready to start, it forms into a circle. The group's ground rules are stated by the moderator. The author selects and reads aloud a short passage from the work or the entire work if it's short enough. The author might ask the members of the group to focus on a particular concern. The author is allowed to introduce the piece exactly as it would be introduced when read, consumed, or performed.

At this point until near the end of the session the author does not speak; all conversation is directed, if to anyone, to the moderator. In fact, the moderator should keep people from looking at the author or speaking directly to him or her.

The moderator asks for the piece to be summarized. In this section of the workshop the only thing discussed is what the piece seems to be about or what the group members got from the piece. No criticism is allowed here: the idea is to get only a sense of how the piece was perceived by the reviewers. This is an area where the creative writers' and technical writers' workshops differ most: the technical writers' workshop, because the texts are largely factual, focuses on the content of the work more than the creative writers' workshop.

Once the moderator determines that there is little new information coming out, the group moves on to discuss what "worked" in the piece, what people liked or found effective. This is the place where positive comments are made.

Once there is nothing new being said, the group turns to improving the piece. Sometimes it isn't possible to say how to make an improvement, but the ideal situation is to

present a fix along with the criticism—and some technical workshops require all comments for improvement to be in the form of a fix.

Finally, the author is allowed to ask questions of the group—perhaps clearing up points that were made or asking about specific parts of the piece. The author is not allowed to defend the work.

The group then thanks the author.

A workshop for one piece usually takes about 45 minutes to an hour—involved pieces can go for 2 hours. In some workshops an audience is allowed to observe the workshop in addition to the participant authors. In general, this is a risky thing to do because of the possible embarrassment for the authors.

Let's take a look at each of these steps in the process to understand how they contribute to make the pattern language—and its presentation—better.

Author Reads Aloud

To begin, the moderator introduces the author. If the workshop leader's practice is to say something about how experienced the author is, this is the place for that. The author then effectively introduces himself or herself by reading: a paragraph, a section, usually something that is central to the piece. For a software pattern or pattern language, a pattern or part of one would be read; for a paper, a page or paragraph would be read; and for code, some comments would be read.

For an author, one goal of the workshop is to get as accurate a picture of the complete reaction to the work in progress as possible. Some of that picture emerges when the workshop reacts to hearing the work read aloud.

Any special instructions for the group regarding a piece are given at this point. Someone who has workshopped a piece several times and thinks it is complete will usually say so and will ask for specific things to look at.

The author then becomes silent.

Summarize the Work

Review starts with the most basic feedback: What did people actually get from the work? Perhaps the comments start with a statement of the genre down to some level of detail: was the work a design pattern aimed at C++ programmers, for example.

This is followed by a summary of the work, in as much detail as the moderator thinks makes sense for the piece and the time allowed. The comments are stated in neutral, observational language. There are no value judgments made at this point. For some who are sensitive to specific bits of content, it can be hard to resist summarizing the work us-

ing judging words. But the moderator tries to manage this, and also keeps the conversation from going in circles.

In many workshops this is the most important part of the workshop experience for an author. If the author is way off in thinking that something is on the page when it actually isn't or if the words on the page are confusing, then hearing a sympathetic group of people struggling to talk about what's there or stating summaries that seem as if they are about a different piece can have quite an impact, especially because this part of the process is the least likely to set off strong critical remarks.

So effective can be this stage of the workshop that some workshop leaders stay entirely within it, requiring that all comments be phrased as observations of what's on the page.

Positive Feedback

The criticism part of the writers' workshop begins with giving the author positive feedback: What did the reviewers really like, what worked particularly well, what would the reviewers keep no matter what else changes about the piece, what parts are remembered best, what parts stayed with the reviewer?

Since it's pretty hard to find a piece that has no pluses, this guarantees that the author will hear that there is something worthwhile about the work and that he or she should keep going with it. The author will hear that the people who will later be making comments about how to improve the work are doing so from a frame of mind that includes liking parts of it.

By looking at the positives of a piece, the members of the workshop can begin to work on a deepened sense of what makes pieces good. Western tradition tends to teach us that something is good if there is nothing bad about it—that all the broken parts have been fixed. By looking for good parts as well as not so good parts, and as a result of eventually noticing the places in between, the workshop members can teach each other the traits of "good stuff," both in writing and within the genre being workshopped.

Part of the reason the writers' workshop works is that it contains within it the seeds of a technique called *positive deviance*.^[10] Positive deviance, as a group improvement process, is based on the observation that in every group of people engaged in some activity, most are doing the activity at the same, middle level, some are worse than that, and some excel. The idea is to spread the techniques of those who excel to the others. Groups this works for generally have a great deal of shared culture, practices, and beliefs, and therefore the likelihood of adopting the successful techniques is better than if those techniques originated outside the group.

Each piece in the writers' workshop very likely demonstrates this sort of bell-shaped distribution of writing levels:

most is about at the same, middle level, some is not as good, and some excels. When workshop reviewers point out sections they like or find well done or effective—the sections that excel—this encourages the author to raise the level of writing by doing more of the good stuff. Presumably, if a writer wrote the passages that excel, that person is capable, in theory, of writing that way consistently. By pointing to the author himself or herself as the model to follow, the workshop is not asking the author to do something he or she thinks impossible.

On the other hand, it might be a mystery to a writer what makes the good passages good, and that writer may not have any idea what to do to achieve that level uniformly, but the fact that at least the author is capable of short bursts of good writing implies that good writing uniformly is not *a priori* beyond his or her grasp.

The moderator does not allow any negative or equivocating statements to be made during this part of the process. Not only is this not the time for it, but allowing such comments to leak into this part of the workshop weakens its effect in creating a safe setting for the author.

Suggestions for Improvement

The heart of the writers' workshop occurs when the group is asked to supply suggestions for improvement. Implied, of course, by "improvement" is the idea that the work has some relatively weak places. Because of this, the danger is that the reviewers will gravitate toward simply pointing out the problems, reasoning that because they are not the experts, the author will be in a better position to figure out how to repair the work. But the purpose of the workshop is to find avenues for improvement, not mere criticism.

When things are going well, each comment in this phase of the process is either a direct suggestion for improvement or a statement of a problem along with a suggestion for how to address it. Good suggestions are concrete and something that the author can use, not a general suggestion like "fix this problem somehow."

In the best workshops, this phase of commentary turns into an upward spiral of reinforcing comments with better and better approaches to the weaknesses. This not only provides ideas to the author but demonstrates that there are lots of ways to approach revision and not simply a particular right answer that the author stupidly missed.

An effective moderator views this phase of the process as the time to be vigilant and quick to restrain. He or she watches the author for signs of distress, listens attentively for any hint of insult to the author, and pays close attention to the author's reactions, both by observing the author and by putting himself or herself in the author's place. Such a moderator is prepared to take control of the workshop, to

reprimand people, or even stop the workshop if things are bad enough.

The good moderator is the advocate for the author, who cannot speak, cannot defend himself or herself. The success of a moderator depends on how well he or she represents the author's interests and feelings, creates a balanced dynamic of participation, asks those who think quickly and tend to speak up first to hold back, encourages those who are quiet to give themselves a push and jump into the discourse, lets people know that everyone's opinion counts, listens very carefully, and is prepared to give thoughtful, insightful feedback on every piece of writing.

The best members of a workshop endeavor to offer no criticisms without an accompanying and balancing positive suggestion for how to improve the work. They know they are authors too and their turns will come.

Clarifications

The author at this time can ask questions, request clarifications, or depending on the culture developed within any particular workshop, ask for comments about specific passages or aspects of the piece. In almost all cases, this part of the workshop is quite short—most of the time only a few minutes are reserved for it. Though the ethos of the workshop is still in force, this is where one of its fundamental preconditions is dropped: the author and reviewers interact directly. A clarification can be as simple as a request to repeat a poorly heard comment or to explain what was meant by a certain suggestion, or it can be as deep as whether an unmentioned approach to solve a problem seems like it could work.

The author still must not defend the piece or explain what he or she was trying to do except insofar as this is in pursuit of a suggestion of how to improve the work. The author does not need to apologize or defend the piece—it stands on its own as what it is, imperfect as it may be. The workshop may in fact later be asked to review a revision of the work.

How It Fits Together

When a workshop gathers pattern authors who are expert in particular topics or systems, there is the potential for the pattern languages they have written to be vastly improved based on their combined experience and knowledge. When they are also interested in improving their pattern languages as literature, there is similar potential for improvement. What is required is a context within which these potentials can be realized.

The complication is that because the work of mining patterns and patterns languages as well as writing them up is individual work and therefore the problems of ego and ownership come up. The writers' workshop process as developed in the creative fields is a mechanism that facilitates

authors sharing ownership of their works and focusing on improving the work. The structure of the process is designed to make things safe for an author when they need to be, so that suggestions can be heard and accepted. The Socratic nature of the interchange as practiced by effective moderators ensures that there is an atmosphere of exploration and refinement. In these ways, the process operates like open source in turning a private endeavor into a public one.

Writers' Workshops in the Patterns Community

The patterns community operates three or four conferences a year internationally, and each is a set of writers' workshops rather than presentations or standard workshops. Being run this way, these conferences represent the ongoing work of the community—its science making, as it were—rather than reporting on the work as is generally the case for other scientific conferences.

These practices are part of the community's goal of producing a literature of software pattern languages that describes the best ways of designing and implementing software systems. This literature therefore represents the current best theory for well-operating software.

Furthermore, the use of writers' workshops by the patterns community goes beyond their use at conferences. Although the exact form of the workshop as described above may not be always followed, the general thrust of the practice appears in retrospectives, agile methodologies, and open-source projects.

Making Science

Science proceeds in two major steps: observation and experimentation produces the raw material of science; creating models and descriptions produces the final products of science. This characterization, of course, is coarse but contains some essence of truth and accuracy. It might be that observation can proceed only given a (tentative) hypothesis, as Popper suggested [9]; that normal science tries to solve the puzzle of inconsistent observations until a breaking point is reached, as Kuhn suggested [5]; that a hard inner common idea behind a set of theories—a research programme—is shielded from refutation until inconsistencies build up too much, as Lakatos suggested [6]; or even that there is no—and should not be—a fixed scientific method, but that anarchy does and should rule, as Feyerabend suggested [2]. That is, it may be that the interaction of theory building (description writing) and observation/exploration is fractal and complex, but in a sense that is more than a figurative one, the project of science is to probe and explore the world, on one hand, and come up with a story about how it works, on the other. Because there is a belief that experimenting, observing, and coming up with models requires intelligence while writing the description might re-

quire (but might not) talent, there is a bias in the sciences against using the description-making part of the process to its fullest potential.

The software patterns community has taken a different approach, embracing the part of the process that creates the written representation of knowledge. The experience of the community has been that the process of reflecting on the written record is a means to bring to bear more observations, better generalizations, and more insightful abstractions than are produced by lone researchers. This experience is borne out by open-source and other collaborative endeavors.

Conclusion

Writers' workshops have been used extensively by the software patterns community since 1995 as part of their program to describe successful software systems in terms of pattern languages. The use of writers' workshops is not simply part of a process of improving the presentation of pattern languages—though that is important—but is also part of discovering the best characterization of the pattern language that unifies a set of programs.

The impulse to use techniques beyond traditional science and computer science also arises from a desire to educate while exploring. It's partly the result of taking a point of view that mining and describing pattern languages is not a process of invention but one of observation and recognition.

The literature of software patterns is large and growing each year. The software patterns community is growing at a steady pace, and its influence is strong and on the rise. Unlike popular fad-like movements in the software research and commercial communities, software patterns promises no instantaneous improvements but relies on a long steady process of careful examination and description.

The writers' workshop process has been used in a variety of disciplines, and it would be a useful tool for any scientific or technical process.

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