

The Seven Stages of Expertise in Software Engineering

Meilir Page-Jones

© Copyright 1998, Wayland Systems Inc. All rights reserved.
In this article, an indefinite "he" means "he or she".)

[This is an edited version of an article originally written for software engineers. The Seven Stages apply to traders as well. The notes in green are from Steve.]

For almost two decades we at Wayland Systems Inc. have toiled to transfer the latest developments in software engineering to practitioners at large and small companies around the world. We set out to discover what makes some students succeed others fail.

We found one factor which is turned out to be more important and fundamental than the others. This factor is the way that people are able to absorb new information and then to apply it to their work — in other words the stages of expertise through which we all pass as we learn and use new and powerful disciplines.

At first we were aware only that there were two types of person: novice and expert. That was hardly earth-shattering news. However, further research revealed that there are actually seven stages of expertise through which a person may pass on the jour-

ney from total ignorance to world-class knowledge. With devastating acumen we numbered them Stages 1 through 7. (We also gave them names: Naïve, Untrained, Student (Trained), Apprentice, Journeyman, Master and Expert.). The Seven Stages, in many ways explain the nature of learning.

A participant at a conference asked me how universal these seven stages are.

"Very universal," I answered.

"You mean that I could even apply them to the skill of bear-hunting?" he retorted unexpectedly.

"Yes," I said.

So, if you'll bear with me, I should like to illustrate the Seven Stages of Expertise with reference to hunting (although I'm most definitely not a fan of such an activity).

Stage 1: Naïve

A Stage 1 person has never seen or heard of bears. It would not occur to a Stage 1, if he encountered a bear, that the bear could be hunted. Neither would he realize that a bear is a potential source of danger.

Stage 2: Untrained

A Stage 2 person has seen an occasional bear and has read articles in airline magazines suggesting that bears may be hunted. Moreover, a Stage 2 probably has friends that have hunted bears and has learned some desultory but intriguing facts about bears and their habits. He is motivated to learn more.

Stage 3: Student

A Stage 3 has attended a 5-day seminar on bear hunting. During this seminar, the participants form into teams of three or four and practice hunting very small bears under the ever-watchful eye of the instructor. After a few interim setbacks, by Friday afternoon all the teams have successfully hunted their bears. They fill out evaluation forms attesting that "bear hunting is very useful and relevant to my job." However, they are barely prepared for the world of real bears. You could say that most Stage 3s know just enough to be dangerous!

Stage 4: Apprentice

The Stage 4, having completed formal bear-hunting education, is full of confidence. He's ready to transcend the minuscule bears of the 5-day workshop and go out for real bears, larger bears, and fiercer bears. He's ready for Ursa Major. His family is also keen to send him out with the latest bear-hunting techniques because they want fur and they want it yesterday. Unfortunately, in the resulting scramble the budding bear hunter may be sent out without a map and with the wrong caliber arrow in his longbow. In the heat of ursine confrontation, the Stage 4 may also forget or misinterpret his classroom instruction and precipitate disaster. It's typical that some Stage 4s get *some* bears; but it's also typical that some bears get some Stage 4s.

Stage 5: Journeyman

The Stage 5 has survived the traumas of Stage 4 and has bear hunting down cold. The Stage 5 uses modern bear-hunting techniques naturally and automatically; in fact, he can't imagine how he ever got along without them. He is accurate and productive: The Steering Committee merely points out the bear and he hunts it within both budget and deadline. The Stage 5 is the exemplary modern hunter that salespeople of bear-hunting seminars refer to in their brochures.

Stage 6: Master

Stage 6 bear hunters have internalized not only the mechanics of bear hunting but also the principles underlying the techniques. **Stage 6s know more than rules: They know why the rules exist and even when it's permissible to break them.** For example, a Stage 3 or 4 may stand upwind of a bear accidentally and scare off the bear. However, a Stage 6 may know that by wearing Yogi-Spray Deodorant he can stand upwind without being detected and can thus surprise the bear from an unexpected quarter. Because of their deep knowledge, Stage 6s are very capable of training others in hunting techniques.

Stage 7: Researcher

Stage 7s are asked to write books and give talks at bear-hunting user groups. They are also engaged in extending and generalizing bear-hunting techniques to solve new problems. They contribute to the body of bear-hunting knowledge. For example, a Stage 7 may extend bear-hunting to work also on Big Foot or he may even develop the ultimate Yeti-Oriented Hunting Methodology.

The bear-hunting analogy, of course, is a stand-in for trading. Now let's come back to the world of trading and see how the Seven Stages of Expertise apply to us.

Stage 1: Naïve

A Stage 1, in our realm, may not have heard of Elliot waves, Simplified Elliot, or anything similar. He may be vaguely aware of their existence but may not see their possible relevance to his situation. At best the Stage 1 is uncomfortable and at least wants to find a way to fix that.

Stage 2: Aware

Stage 2s are actively seeking better trading techniques. Stage 2s may survey magazines, confer with colleagues or attend one-day overviews of the techniques. Their interest level is high but their knowledge level is low, being limited to a few terms and definitions and not based on any practical knowledge or experience.

Stage 3: Student

Stage 3s have attended at least one 5-day workshop on Trading techniques. In these workshops they tackled small but realistic case studies that resembled their own projects in miniature. *That maps to day 4 and 5 of Paul's course.* The case studies provided valuable kinesthetic reinforcement of the formal lecture material and were thus indispensable. However, the case studies' apparent realism may convey to the Stage 3 a confidence that is often unwarranted.

If a Stage 3 absorbs everything from a seminar, then he is *minimally* equipped to tackle the real world. Usually, however, a Stage 3 does not grasp everything or has difficulty scaling the techniques up from the training environment. You could say that most Stage 3s know just enough to be dangerous!

This is us at the end of our five days with Paul or Mickey, or what an MD is like after graduating Med School. Physicians don't go directly into practice after graduation because it's well understood that medicine is a learn-by-doing activity, not (solely) a learn-by-reading activity. Same holds true for anything that we learn by trying it and getting feedback (either from our observed results or from a mentor).

Stage 4: Apprentice

Beginning *Paul's Stage 1* is the rite of passage to Stage 4. Achieving "Stage 4-hood" is for many people the most difficult transition of the six transitions between stages. The fledgling Stage 4 is asked to take untried (by him) techniques and apply them in real-time. At the same time, he is attempting to recall what he learned to do in class, and what not to do. Without mentoring (or supervision) he is likely to encounter a series of minor setbacks or major failures. Since many people throw up their hands at this point and revert to their old mediocre but familiar ways, a large proportion of Stage 3s never make it through Stage 4. The ones that do survive are stronger and better equipped to be Journeymen.

This is arguably the most critical phase. It's the one where we accumulate the saddle-time, learn from our mistakes and learn from our mentors. In medicine the apprenticeship stage is considered very important; physicians have two apprenticeships, internship and residency. In both cases they are taught/ mentored by attending physicians who are Stage 6s and 7s. The combination of organized mentorship and (saddle-)time is what it takes to transform a Stage 4 Apprentice into a Stage 5 Journeyman.

A good diagnostician looks at a patient and sometimes, just "knows" what's wrong (intuition). Stage 4 is where our development of intuition starts. If you see something often enough you can recognize it without thinking about it. "Education is hanging around until you've caught on (Frost)."

Stage 5: Journeyman

Stage 5s have made it. Their talent for trading is "latched" in place and there is little risk of their reverting to the past. In the Stage 5 the techniques yield for the first time the results that the marketing folks promised; and on each successive trade a Stage 5 further hones his skill and enhances his confidence. A Stage 5 is self-sufficient—more often the source of advice than its recipient.

Stage 6: Master

The Stage 6 not only is an adept technician, but also possesses a profound methodological foundation. Beyond the "whats" and "hows", the Stage 6 knows the "whys". This depth allows him sometimes to break a surface rule, while adhering to a more fundamental methodological principle. The Stage 6 is a good instructor because his theoretical and practical knowledge give him the wherewithal to tackle difficult student questions.

Stage 7: Researcher

The Stage 7 is concerned with delivering the latest developments in trading to a wider audience, via books, articles and conference appearances. The Stage 7 looks out for flaws in contemporary trading techniques and for consequent ways to improve the techniques. He also scans the horizon for new problems towards whose solution can be extended and generalized. The Stage 7 is at a methodological pinnacle.

Conclusion

These Seven Stages of Expertise are a valuable way to measure one's level of accomplishment as a trader. You might think about yourself as a trader and consider which of the stages you are in with respect to trading. You may also decide what (if anything) you should do to progress to the next stage. *[Hint: it may rhyme with straddle-grime.]*

Finally, to help cement the concepts, consider as a set the Seven Stages as they apply to medicine. Note especially that each stage (except the first) has a familiar

name for those who are in it. That vocabulary is indicative of broad acceptance and perhaps value.

Stage 1: Naïve. Probably unknown in America; everyone has heard of medicine.

Stage 2: Untrained = Layman. Most of us are.

Stage 3: Student = Med Student. Studied medicine but hasn't done it yet; need practice.

Stage 4: Apprentice = Intern, Resident. In medicine, the Apprentice (mentored learning) Stage is important enough to have two different steps, one for general medicine and one for a specialty. Paul's Pictures and the Webinars are the framework for our apprenticeship. Try not to underestimate the importance of Stage 4. Pictures and Webinars are arguably as valuable to us as a rotation through Radiology might be to an MD!

Stage 5: Journeyman = Practitioner. Finally, we've arrived. A Stage 5 is an accomplished physician, teacher, plumber, electrician, trader.

Stage 6: Master = Attending. The attendings go on rounds with the interns who learn medicine case-by-case at the feet of the masters. Our learning is trade-by-trade.

Stage 7: Researcher = Researcher. Researchers generally contribute to the body of knowledge or state of the art. They are the inventors and thinkers.

Each of the Stages are in medical educational practice are well defined and together constitute a career path. Many other disciplines have similar career paths.

Entry level plumbers initially work for a master plumber (the master-apprentice relationship once again), get their licenses, become journeymen and eventually become masters themselves, imparting their hard-won knowledge to others.

Teachers go to teaching school (Stage 3), do a stint as student teachers under guidance (Stage 4) and then go out on their own as Stage 5s. Many go no further.

In fact, most of us don't ever go past Stage 5 and never need to. Becoming a Stage 5 is an accomplishment. Most teachers spend their careers teaching. Most doctors spend their careers in practice and most plumbers are more content to plumb than to write books about plumbing. We can expect to spend our trading careers happily trading.

Some, Mickey for example, make it to Stage 6, and others, like Paul, become Stage 7s. All disciplines need Stage 6s and 7s.

Acknowledgments

I should like to thank my colleague Claude Maley for inspiring me in the first place to go out and search for the Seven Stages at our client sites and my colleague Steven Weiss for helping me to name and define the characteristics of each of the Seven Stages.