

Lyle's Law of Simplicity

eVER SINCE I GOT MY FIRST Kodak Brownie camera, I have considered myself something of a photographer. While this conceit was never validated by any critical acclaim (although one photograph did take a blue ribbon at the Pennington County Fair), I have had a lot of fun with the hobby.

In 1958 I acquired my first 35 mm camera and, after shooting a few rolls of black and white film, discovered the wonderful world of color slides. As you might imagine, a photographic zealot with three children—each with an annual birthday as well as annual Christmases and sundry other celebrations—plus summers filled with vacation and other travels—plus flowers, trees, and bugs, can produce a lot of slides in 40 years. Hundreds of slides. Thousands of slides. Then comes the question that must certainly have arisen right after the invention of the daguerreotype—what does one *do* with that slide collection?

Fortunately, technology has come to my rescue. With a computer, a scanner, and a CD-ROM burner, we can reduce those boxes of slides to a few billion ones and zeros and zip them on disks that can then be distributed to everyone with the slightest interest in the photographs and let them do with them as they will. So with the exercise of some will power, we reduced the collection to some 800 slides and sent them away to be scanned.

The problem now is that each of these slides has to have a modicum of information attached to it so it will have meaning for the viewer when the photographer is not there to provide an explanation. My wife, who is heavily invested in this project, volunteered to do a lot of this labeling if I would just explain to her how to use the appropriate software package. The explanation went quite well, I thought, until right at the end when I said—unwisely, it seems—“Fortunately, the software is pretty intuitive.” My wife replied, with perhaps just the slightest chill in her voice, “Maybe to you.”

The lesson—one that I have learned a thousand and one times and forgotten a thousand—is that different people have different kinds of intuition and different tolerances for dealing with complexity. And the conclusion to be drawn from that lesson is that, to the extent possible, complexity should be diminished. I will go so far as

to codify this principle in Lyle's Law of Simplicity, *Eschew complexification*.

I was introduced to this word *complexification* in an article by *Boston Globe* columnist Ellen Goodman (May 26, 2006), in which she described a “tooth-cleaning system” that comes with an instructional DVD. Good grief. A complexified toothbrush. Mathematicians will point out that complexification has a more benign meaning as well—the mapping of a set of real variables into a set of complex variables—but here I want to deal with the non-mathematical meaning, i.e., making things more complex.

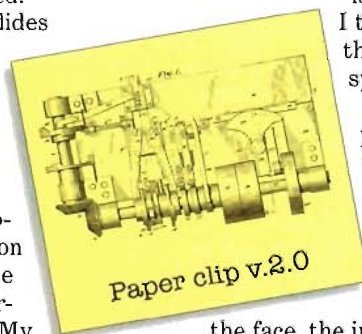
First, let us consider what this law tells a design engineer. Engineers have for many years acknowledged, if not always applied, the KISS principle—Keep It Simple, Stupid. Generally, this is taken to mean that we should use the fewest components, the simplest algorithms, the fewest lines of code, etc., often to improve reliability and/or reduce cost. While these are worthy goals, they are not the main point of the law of simplicity. In general, the KISS principle is focused on the product—how to make the least complicated gizmo. The Law of Simplicity focuses instead on the user.

KISS says, “Don't complicate it.” This law says, “Don't make it complicated.” What, you ask—and well you might—is the difference? To answer this question, I turn to American Sign Language, an idiom that often seems to be more expressive than spoken words.

To indicate the verb *complicate*, the signer places one hand above the other, palms horizontal and facing each other but not touching, and moves them in circles, suggesting that things are mixed together. To say *complicated* or *complex*, the arms are placed vertically, index fingers are extended, and, as the hands are passed across in front of the face, the index fingers are bent. The sign is intended to suggest a crossing of the eyes when someone is in a state of confusion. It doesn't seem so bad to complicate things as long as they don't end up complicated or complex. In designing a device or system, it might be better to complicate it if, by doing so, you can make it less complex. Go ahead and mix a lot of components and algorithms together (compromise on KISS?) but hide these complications from the user who sees only a device that is less complex.



Eschew complexification



One cause of complexification is the natural desire of marketers to add features to their product in order to differentiate it from the competition. The problem comes when the customer may not want those capabilities but has to: a) pay for them and b) learn to either use them or disable them. I suspect that b) is the worst. My guess is that most users would rather have to enable a feature they want, rather than disable one they don't want. (Software designers take heed.)

When designing a product for human use, empathy is a great design tool. The summer before my senior year, I worked for the Collins Radio Company. My task was to design a production test panel to be used in the final checkout of one of the boxes

of an avionic system. As my boss was helping me define the product, he gave me an excellent bit of advice. "Remember," he said, "that you will be spending three months learning all about what this box is required to do. The person using your piece of test equipment will spend about an hour learning to operate it." He could have added, "Eschew complexification."

Like most laws, the Law of Simplicity speaks to our lives outside engineering, too. Certainly those of us who are retired or are nearing retirement recognize that we have complexified our lives with possessions, commitments, and various entanglements and that it is time for some *de*complexification. But some complexity is good. Relationships

with other people make your life more complex, but they enrich it in far greater proportion. Don't eschew your friends.

What you do want to eschew are those burdens that add complexity without enrichment. Don't lie. It's too complex to have to remember what you said. Don't gossip. It's too complex to always feel that you have hurt a friend. Don't cheat. It's too complex to live with the fact that you've done something that a real engineer can never do.

We will never eliminate all complexity—nor would we want to—but we can keep it in check, both in our designs and in our lives.

—Lyle D. Feisel, Ph.D., P.E.
Iowa Alpha '61

Examine the Possibilities

FORWARD
THINKING

UNITED STATES PATENT AND TRADEMARK OFFICE

Stand at the center of scientific and technological progress at the United States Patent and Trademark Office, securing exclusive rights for inventors over their discoveries worldwide. The United States Patent and Trademark Office continues to experience significant growth in the filing of patent applications, which translates into immediate opportunities for engineers and scientists to become Patent Examiners.

Patent Examiners

As a Patent Examiner, you will analyze patent applications using your specialized engineering knowledge and technical research skills to evaluate concepts and designs. Your responsibilities will involve determining the acceptability of patent protection, while meeting weekly performance goals. You must possess a BS or advanced degree in engineering or science, technical competence in the area for which you are hired, and strong oral and written communications skills to be successful.

Electrical and computer engineers may be eligible for a recruitment incentive of up to \$9,900 per year for a maximum of four years. A service agreement will be required.

Now Hiring — Immediate Openings

Visit our website at www.USPTOcareers.gov to learn more about how your engineering skills can help keep American ingenuity on the cutting edge.

Examine your career possibilities. Our excellent benefits include enhanced federal salary rates, flextime schedules, health coverage, vacation and sick leave, law school tuition reimbursement and more. US citizenship is required. Equal Opportunity Employer.



Please visit our website at:
www.USPTOcareers.gov