



SOCIETY OF ACTUARIES

Article from:

The Actuary

November 1988 – Volume 22, No. 10

Expert explains cont'd

not written down anywhere, but are handed down through some master-apprentice relationship, which means you need to elicit the knowledge directly from the experts. The trouble is that experts usually can't correctly articulate the rules they use to solve problems.

Another problem is that human experts do not typically reason using the "if...then" rules that are used by many expert systems. At the same time, one of the typical methods of human problem solving, reasoning by analogy, is currently unavailable in expert systems.

Poppel: How else can you come up with rules, if you don't ask the experts?

Siegel: One way is by induction. This method uses specific cases to induce a general rule. If you're building a system for loan approval, you might plug in a bunch of loan applications and whether or not they defaulted, and try to induce what would have been good criteria for loan approval.

One problem with induction is that even though it seems objective, someone is still making the judgment as to what the important items are to plug in. Another problem with induction is that if you took, for example, all the underwriting decisions made in your company over the past year and tried to induce whatever rules were used to arrive at them, you'd get by definition an expert system that was as good as your average underwriter.

Poppel: So how do you make rules?

Siegel: We make the rules by having the experts write them within our software shell, which we call Decision Master. The shell is designed to be simple enough for a nonprogrammer to operate. In addition, someone like me helps them try to figure out the rules from their own knowledge sources, such as manuals. Then, through an iterative process of testing and revising, the rules are fine-tuned until they work the way we want them to.

Poppel: Is it fun being involved with something new?

Siegel: One of the reasons I got out of mainstream psychology is that I thought all the good stuff had been discovered already. That's probably not true, but there is something to getting in at the very beginning when there's less background to know and a lot to

discover, such as the best ways to elicit knowledge from experts.

Poppel: How can someone decide if a particular business application is suitable for an expert system?

Siegel: Expert systems make the most sense in areas with only a few experts. If everyone is an expert, it probably doesn't pay to have an expert system. If there are no experts, you can't really have an expert system.

Poppel: Actually, it seems that an expert system would be very useful in an area where there are no human experts.

Siegel: True, building one would be an interesting challenge. You might try to induce the rules, or you might take bits and pieces from a lot of people who each can solve part of a problem.

The prime application is one where there are only a few experts, they make a lot of money, and you're afraid of losing them. Any job where people are referring frequently to manuals, looking up what they're supposed to be doing, is a likely target.

Poppel: Are expert systems cheaper than people?

Siegel: In many cases, an expert system would be cheaper and more efficient than people, although not every department would be able to cost-justify a system. Human experts have bad days and take time off; expert systems can work almost constantly. Besides, if a key expert leaves, replacing that person may be expensive or impossible. Expert systems can help alleviate this problem.

Expert systems also can produce a higher quality, more consistent product. Sometimes there are so many underwriting rules, and exceptions and changes to the rules, that the underwriters can't keep up with them. Different underwriters obey different subsets of the rules and interpret them differently.

Poppel: What criteria should someone look for when choosing an expert system vendor?

Siegel: One thing to look for is flexibility. You'd like to be able to generate your rules in the way that makes the most sense for a particular application, be it induction or writing the rules by hand. It's also nice if the system can run on many different machines. You'd also like the shell to be written in such a way that it's easy to follow

what it's doing — this makes it easier to work with.

Poppel: If you found yourself at a party with a bunch of actuaries, what would you want to tell them about expert systems?

Siegel: One reason actuaries should be interested in expert systems is that the rules developed by actuaries will be followed with more consistency. It will also be possible to have more complex rules. Right now, the actuary is forced to develop rules and procedures that can be followed by human beings. For example, the rule may be, if the proposed insured is older than 40 and the amount of insurance exceeds \$100,000, order a paramedical exam. The "right" rule would probably factor in the PI's family history, the cost of an exam, and the agent's track record. An expert system could handle a rule like this, while a person underwriting 50 cases a day would find it unwieldy.

Expert systems also produce a lot of data for actuaries to work with, allowing them to test many "what-if?" scenarios.

Finally, I'd say, "Those tests aren't really that hard, are they?"

91% say they're pleased with *The Actuary*

Readers are pleased with the redesigned *Actuary*, according to responses received on a membership questionnaire mailed out with the June newsletter.

Of the 308 respondents, 91% checked yes to the question, "Are you satisfied with the content and types of articles?" Asked, "Do you find *The Actuary* easy to read," 93% answered yes. *The Actuary* was redesigned with the September 1987 issue in hope of making it a more effective communications vehicle.

Many readers had suggestions for further improvement, including shorter articles and more humor. Others want to see more articles on pension issues, FES/FEM, and Society activities. Many had suggestions for specific articles, which are being considered by *Actuary* Editor Linda B. Emory for future issues.