The Future of OR

By Andrew Hines
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Lee W. Schruben is a professor and former chair of Industrial Engineering and Operations Research at UC Berkeley, and one of the world's leading authorities on simulation theory and practice. He has consulted widely in the high-tech and biotech industries, as well as in banking and in auto making. He spoke to BNET about the challenges ahead for OR and for those in the OR field.

BNET: What are the big unsolved problems for OR in practice today?
Schruben: We have to realize that what we're actually doing is forecasting. We are trying to model what will happen in the future, and that's the biggest practical challenge — how to get away from models with static assumptions and develop predictive models that can respond in real time to changes in the world.

BNET: What do you mean by static assumptions?
Schruben: As it is now, we collect data and build a model based on assumptions we think are reasonable at the time. But our results only tell us what would have happened in the past, when those assumptions were valid. Most models assume that input data are independent and identically distributed (IID), but that's almost never true. Assuming IID data is assuming that events in the world don't depend on each other, and that the probability of them happening doesn't change over time. But things are changing constantly in business.

BNET: So what is the right approach to OR modeling?
Schruben: We have to integrate forecasting and risk analysis with OR modeling. We have to integrate models with dynamic market information and forecasting. Simulation is the workhorse to do this, because it can handle that kind of dynamic complexity, whereas most OR models tend to be optimization, static kind of models.

BNET: Do you think it's accurate to say that OR is more of a theoretical exercise than a practical solution to business problems? Or is the practical application of OR techniques more of a defining factor now?
Schruben: There's a lot of theoretical OR that has given the field a bad name. This comes from the "managerial insight" section of OR research papers. Most of the insights are either obvious or wrong. And these insights are often couched in such obscure terms that they confuse and disillusion managers. So the theoretical stuff tends to give the field a bad name. But the practical application of OR is the reason we're still in business. There's no question that OR in practice has made a huge impact on business.

BNET: How much do you think packaged business analysis programs, like SAP or Oracle's ERP solutions, help or hinder the advancement of OR in business practice?
Schruben: In order to compete, software companies have to say "all problems are solved by our software," which just isn't true. In that sense, packaged or embedded solutions are probably hindering

OR in practice. A lot of out-of-the-box OR techniques are 20 years old. Innovation is largely coming from academic researchers, but unfortunately, a lot of these software companies don't welcome academic input. In the ideal world, there would be a lot more collaboration.

BNET: How do you see the role of OR in business changing over the next 10 years?
Schruben: I'm hoping that managers become much more knowledgeable about analytics and OR. I see the education of new MBAs focusing much more on business analysis. MBAs need to be able to ask the right questions and develop a systematic way of thinking about problems. Learning particular analytic techniques alone won't get you very far, but the training will teach you how to discipline your thinking, how to ask the right questions and become a wise software consumer. Software vendors need to say, "Wow, we can't keep up with the MBAs."

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