LD6-10 **Distribuciones de probabilidad en industria petrolera** 2 de mayo de 2006

Estimados suscriptores:
En el mensaje LD6-06 les platiqué sobre el artículo "Probability Management" publicado en OR/MS Today por Sam Savage, Stefan Scholtes y Daniel Zweidler. En el más reciente número de OR/MS Today (abril 2006) se presenta la segunda parte del artículo y en él se abordan aspectos más específicos para hacer más fácil y confiable el uso de distribuciones de probabilidad como variables de entrada en modelos de decisión para empresas.

Además se describe brevemente el proceso mediante el cual la empresa petrolera Shell implementó varias de las ideas propuestas en el artículo.

Les anexo los párrafos introductorios del artículo (que expresan brevemente el planteamiento general) y la sección sobre Shell. Espero que les parezca interesante.

Con mis mejores deseos.

Roberto Ley Borrás

Probability Management. Part 2.
In the first article in this series we presented the seven deadly sins of averaging. To counter them, we introduced the concept of Probability Management, which focuses on estimating, maintaining and communicating the distributions of the random variables driving a business. We presented the three underpinnings of probability management as follows:

1. Interactive simulation: illuminates uncertainty and risk much as light bulbs illuminate darkness.

2. Centrally generated stochastic libraries of probability distributions: provide standardized probability distributions across the enterprise, much as the power plants provide standardized sources of electricity to light bulbs.

3. Certification authority: analogous to the power authority that ensures that you get the expected voltage from your wall socket. We refer to the person or office with this authority as the Chief Probability Officer or CPO.
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Only a few people within an organization have the expertise to estimate probability distributions, and even fewer have the managerial authority to get their estimates accepted on an enterprise-wide basis. For this reason, the authors expect interactive simulation to reach its full potential only in organizations that invest in the capability to generate and manage probability distributions centrally.
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At Shell, the stochastic library had to be assembled from vast amounts of data gathered worldwide. The first decision was the level of granularity at which to model projects. The level chosen was the "exploration venture," which included a number of projects within a single geographical region. As the first step towards creating a stochastic library, the exploration

engineers within each venture were responsible for providing initial estimates of the distribution of oil and gas volumes in that venture.

When assembling distributions of possible hydrocarbon volumes and economic value of exploration, it is important to acknowledge the consequences of the "Prospector Myth" as described by Pete Rose and Gary Citron [5]. Explorers by their very nature are not only very optimistic, but also often fail to recognize the full range of possible outcomes of an exploration venture. Painting the numerical picture of an exploration venture and its various execution alternatives is a mélange of art and science underpinned by experience.

The distributions of hydrocarbon volumes were assumed to be independent across ventures. Conversely, the economic evaluations of the ventures have strong relationships resulting from global oil and regional gas prices. The volumetric distributions were converted to coherent distributions of economic output by using discrete distributions of oil and gas prices and associated drilling and development cost assumption. For the economic evaluations, the input parameters are distributed globally through a shared library updated on an annual basis.

To provide the assurance that the ventures and their execution alternatives are not only feasible as described, but also portray the cost and value elements appropriately, seasoned explorers and economists review the input to the coherent simulation that generates the stochastic library of outcomes for exploration ventures and their alternative execution plans. They will also engage in further dialog with the engineers and managers in the field to ensure consistency across ventures

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