

**A Microworlds of Exploration and Development:  
Creating a Learning Laboratory for the Oil & Gas Industry**

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**Abstract:**

Much has been written of the use of computer simulation coupled with an interface as part of a learning laboratory. Through the use of a fun, easy -to-access interface participants can explore the system principles at play in their own work environments in a structured workshop setting. But do these learning laboratories bring about change in the way managers make decisions? The authors will discuss the success they have had in introducing teams of managers to the concepts of system dynamics through the use of computer simulation. Over the past four years, the authors have worked with six teams within two separate oil and gas companies. These efforts have led to significant changes in the way the team members look at their business and the choices they have made to prepare themselves for the future. This cumulative experience has provided the foundation for the release of a commercially available "Microworld" which allows the user to experience the dynamics of running an oil and gas exploration and development company. This software eliminates a good portion of the up-front time and expense needed to get to a meaningful system dynamics model of a business. It is expected that incorporating this simulator in a workshop setting will provide a quick and effective method to introduce the concepts of system dynamics to an industry that is in the midst of a great deal of change.

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**What is a MicroWorld?**

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- Combines system dynamics model with user interface
- Provides easy access to simulation
- Compresses months of experience to a few hours

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**Learning Laboratory**

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- Workshop environment with Microworld
- Provides context for the simulation
- Allows teams to discuss the relevance and learning opportunities

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**The Great Game of Business**

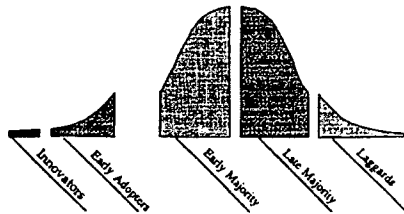
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- Unlocking the Power and Profitability of Open Book Management
- To create an environment in which people can continuously learn and grow
- If you're keeping score, there must be a game going on somewhere. The only issue is whether or not the players know it.
- Create job security by giving people a scorecard and a way to influence the score

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**Crossing the Chasm**

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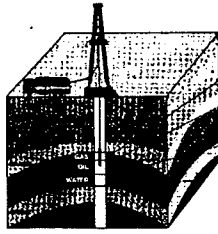
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**Experience in the Oil Patch**

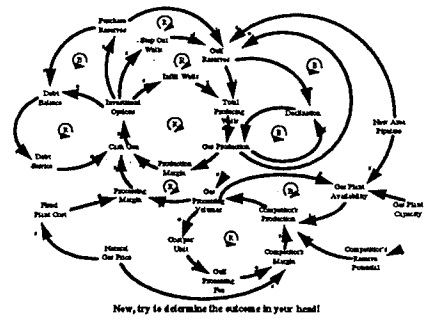
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- Gulf Canada
  - 2 Geographic Areas
- Amoco Canada
  - Heavy Oil
  - Conventional Gas
- Amoco Bolivia
- Unocal - Gulf of Mexico

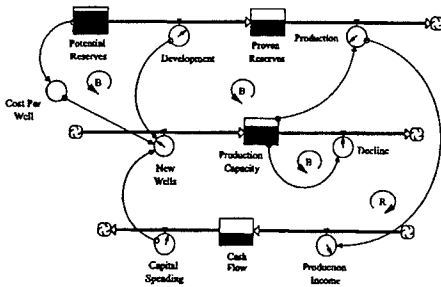
### Schematic of an Oil Well



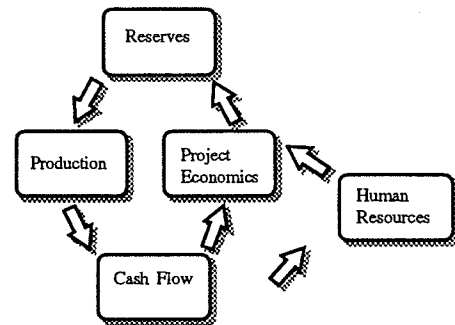
### Causal Loop Diagram



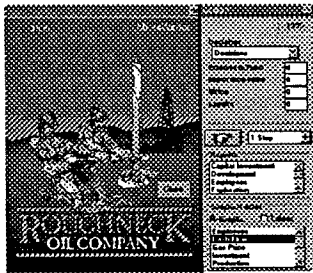
### iThink representation



### Policy Sector Diagram

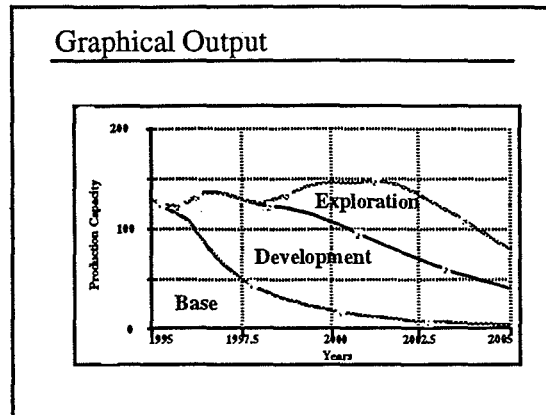
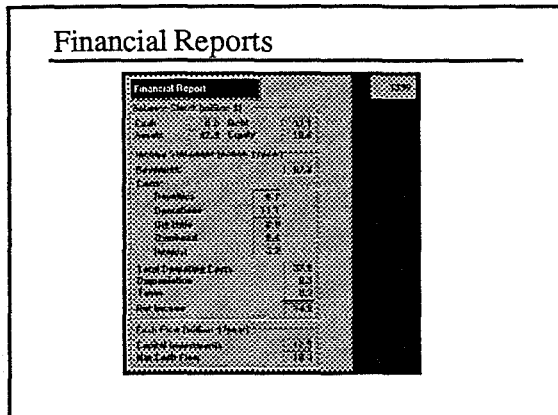


### Roughneck Simulator



### Decisions

- Exploration Wells
  - Find more reserves for your company,
  - this is how you'll grow
- Projects to Fund
  - Develop Reserves into Producing Assets,
  - build up your cash flow
- Hiring and Layoffs
  - Hire enough people to get the job done,
  - but look out for you overhead



## REFERENCES

- de Geus, A. 1988. Planning As Learning. *Harvard Business Review*. 66/2: 70-74.
- Diehl, E.1990. *Micro World Creator™ User's Manual*. Cambridge, MA: Micro Worlds, Inc.
- Diehl, E. 1992. Participatory Simulation Software for Managers: The Design Philosophy Behind Micro World Creator. *European Journal of Operational Research*..
- Graham, A., Morecroft, J., Senge, P., & Sterman, J. 1992. Model Supported Case Studies for Management Education. *European Journal of Operational Research*..
- Genta, Peter J. and Neville Sokol. Applying a Systems Thinking Approach to Business Process Re-Engineering: A Case Study of a Canadian Oil and Gas Producer. *1993 Proceedings of the International System Dynamics Conference*.
- Moore, Geoffrey A. 1995 *Crossing the Chasm* New York: HarperCollins Publisher.
- Richmond, B., Peterson, S., Vescuso, P., 1987. An Academic User's Guide to STELLA. High Performance Systems. Lyme N.H.
- Richmond, B. 1990. Systems Thinking: A Critical Set of Critical Thinking Skills for the 90s and Beyond. *System Dynamics '90*. 2: 934.
- Senge, P. 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday/Currency.
- Stack, Jack. 1992. *The Great Game of Business*. New York: Doubleday/Currency.