

**FROM DISCUSSION TO DIALOGUE:\***  
**How an interactive modeling process was used with managers  
to resolve conflict and generate meaning.**

David C. Lane

City University Business School, Frobisher Crescent,  
Barbican Centre, London, EC2Y 8HB, U.K.

**ABSTRACT**

Managers involved in the production and trading of a commodity had adopted conflicting positions regarding the macro-dynamic behaviour of output and revenues in their market. The tools of system dynamics were used to articulate the assumptions of the participants and, in so doing, support a dialogue in which the understanding that the managers had of the key variables could be altered. The eventual use of a small STELLA model allowed the managers to isolate two specific, micro effects from which the conflict emanated. Further idea sharing allowed a consensus to be achieved on these two and, furnished with this new understanding, the participants aligned behind a single view of the market's behaviour.

**§1 THE PROBLEM**

The business managers of a multinational corporation involved with the production and distribution of a traded commodity were unable to agree on the effects on revenues of a reduction in production output and the general relationship between volume, price and revenue in their market. The commodity in question was produced in the area but could also be traded-in via a market which itself drew on another neighbouring source of production. The debate had generated two conflicting camps with diametrically opposed views of the way that the market would respond. Specifically, staff in the Production Strategy department took a very different view from the head of the local Commodity Trading group regarding the effects on cash flows that might result from the temporary shut-down of some of their manufacturing capacity for preventative maintenance. The producing department felt that, during the maintenance period, the company's revenues would not fall too badly, whilst it was the opinion of the trading department that

\* A longer version of this paper will be available for distribution at the Conference.

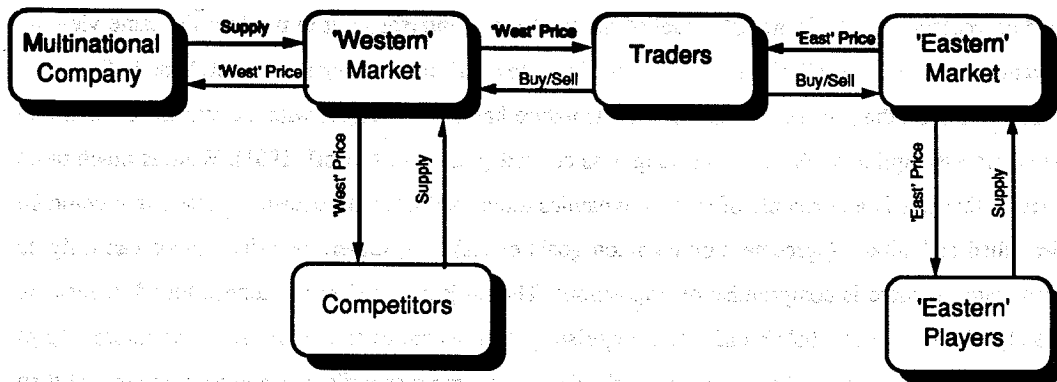
the revenue drop would be about the same proportionally as the production reduction. (In the description given here the local market will be referred to as 'western' and the neighbouring one as 'eastern', though these terms are used only for the purposes of clarity.)

## **§2. PROJECT PROCESS**

A team of external consultants used system dynamics tools (Forrester, 1961) in a process consulting mode to articulate the mental models of the two 'camps'. Using causal loop diagrams, sub-system overviews and a computer model, the consultants were able to move between the two groups and provide a common language which enabled those managers possessing different ideas to share their views. As the problem involved conflicting dynamic hypotheses, the project concentrated on establishing the structure of the commodity market system (see Meadows, 1970).

The first stage of the project consisted of meetings with members of the two departments concerned, in order to find the key factors which made them hold their respective positions. Causal loop diagrams were used for this and proved to be very flexible and comprehensible as a means for representing ideas during discussions and sharing views on the major structures. The articulation and clear representation of the variables and loops perceived to be important to the problem allowed the participants to express the relationships between them and hence the importance and subjective meaning that the participants attached to them. This dialogue stage, a free exchange of meaning between people (Senge, 1990, after Bohm), was iterative, as individual understanding was expressed and debated and knowledge about the system was created amongst the managers. When a reasonable degree of convergence had taken place, a sub-systems overview was created to show the different areas of concern and the nature of the information that was passed between them (see Figure 1).

Having produced this structure for the main dynamic effects - supported by both parties - a system dynamics model was constructed using the computer language STELLA to try to express the relative strengths (Richmond, Vescuso & Peterson, 1987). Across a second series of meetings, a model of some 45 equations was slowly crafted. This revealed that the producers predominantly based their opinion on the assertion that competitors in the local market would have difficulty in expanding their capacity to fill the supply gap resulting from the maintenance. Hence, although the company volume would fall the effects on revenues of this would be partially mitigated by the price moving up. The traders held the view that small price changes would result in the traded market responding by shipping-in more volume of the commodity from an 'eastern' market, thus taking advantage of the increased margin. This fact would severely limit any upward price movement, resulting in a fall of company revenues which would be almost proportional to the production reduction whilst the maintenance took place.



**Figure 1.** Sub-systems over-view of the model used in the project. Note how it was possible to define distinct parts of the model which were then created in detail by specialist in the respective area. They were then linked together by appropriate information flows.

### §3 PROJECT CLOSURE

At all stages of the process great care was taken to ensure client ownership. The benefit was shown in the outcome of the study. With all parties supporting the structure of the model, the added value resulted from the disentangling of high-level hypotheses of behaviour to find the basic assumptions. The macro-level hypotheses held by the two camps were carefully probed until it was possible to identify the actual microscopic effect on which the conflict centred. These were no more than two graphical convertors which represented the two specific effects discussed in the previous section. This meant that a discussion which was in danger of becoming a "Yes it will/No it won't" event was steered into a constructive discussion about specific issues.

A more open dialogue on the two key effects resulted in the resolution of the conflict as one of the camps accepted that its micro-level view was incorrect. The traders accepted the detailed understanding of the competitors' position implied by the producers, but maintained that, because of the economic characteristics of the 'eastern' market, increases in traded imports would occur very rapidly. The producers eventually agreed with the traders' on the behaviour of revenues, on the grounds that they had not accounted for the fact that the trading effect would be so large. The learning thus consisted of the realisation that both sides shared predominantly the same mental model of the problem and, specifically for the producers, that the response time for trading was less than they had thought. The producers did not feel the need to go back to the STELLA model; they were able to build the new assumption on the

traders' reaction into their mental model of the market and interrogate it to produce the same view on revenues as the traders. (Curiosity led the consultants to confirm this using the STELLA model!)

Reflecting on the project, we can see that its nature has some linkages with the situations for which 'strategic assumption surfacing and testing' was created (Mason & Mitroff, 1981). What is much more clear is that this is an example of system dynamics tools used not with decision-makers that could be described as 'unitary' (agreement on common goals exists), but, rather, 'pluralist' (goals can only be formulated if there is compromise or imposition). The project therefore challenges Flood & Jackson (1991) who use these labels broadly to categorise system dynamics as unitary. It is also interesting to note that after supporting the movement of the debate to a more specific disagreement, the model then ceased to be important. Having altered and converged their mental models at the micro-level, the teams could readily see that this implied that the alternative macro-level outcome was more likely; their dialogue over the issue had generated the learning which rendered this behaviour meaningful so that the participants 'aligned' behind a single view of the market's behaviour (Checkland, 1985 and Senge, 1990).

## **REFERENCES**

- Checkland, P.B. 1985. From Optimization to Learning: A Development of Systems Thinking for the 1990s. *JORS*, 36: 757-767.
- Flood, R.L. & M.C.Jackson. 1991. *Creative Problem Solving: Total Systems Intervention*. Chichester: Wiley.
- Forrester, J.W. [1961] 1985. *Industrial Dynamics*. Cambridge, MA: MIT Press.
- Mason, R.O & I.I.Mitroff. 1981. *Challenging Strategic Planning Assumptions*. New York: Wiley.
- Meadows, D.L. 1970. *Dynamics of Commodity Production Cycles*. Cambridge, MA: MIT Press.
- Richmond, B.M., P.Vescuso & S.Peterson. 1987. *STELLA for Business*, Distributed by High Performance Systems, 13 Dartmouth College Highway, Lyme, NH 03768, USA.
- Senge, P. 1990. *The Fifth Discipline*. New York: Doubleday/Currency.