
**AN ARCHETYPE BASED
MANAGEMENT TEAM FLIGHT SIMULATOR**

By

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Abstract

The potential of simulation technology to facilitate learning has been evident for many years. Yet in our experience most Management Simulators, while interesting and fun, are only partially fulfilling that potential. Particularly challenging has been the use of simulations to support team rather than individual learning. In the past two years Innovation Associates and Gould-Kreutzer Associates have produced and used Management Team Flight Simulators (MTFS) which support team learning through several new approaches. Our experience in creating these MTFS provides strong anecdotal evidence that with these approaches a very simple model can have a powerful impact on team learning.

Summary

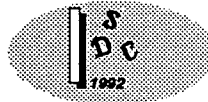
The potential of simulation technology to facilitate learning has been evident for many years. Yet in our experience most Management Simulators, while interesting and fun, are only partially fulfilling that potential. Particularly challenging has been the use of simulations to support team rather than individual learning. In the past two years Innovation Associates and Gould-Kreutzer Associates have produced and used Management Team Flight Simulators (MTFS) which support team learning through several new approaches. These approaches include:

- Portraying the various mental models of managers
- Basing the core model on a classic system archetype
- Transforming the model into a "white box" through the interface design
- Linking of "structure" and "behavior" during the simulation
- Using the simulator explicitly in the context of team learning

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Why a Management Team Flight Simulator

Many readers may be familiar with the analogy of simulators and "practice fields." We wouldn't expect an athletic team to play a game without practicing. Nor would we expect an orchestra or theater company to give a performance without rehearsing. Yet we expect managers to perform equally challenging tasks without allowing them to practice their skills. Particularly difficult for managerial teams is making decisions about complex issues. In these situations there are often diverse, even polarized, perspectives among the team members. What is typically "learned" by managers is how to argue their position with



sufficient force that their view prevails and an apparent consensus is reached. Often the team doesn't accept the validity of the decision - and a "made" decision becomes "unmade". This phenomenon is pervasive and complex, however one contributing factor is the notion of "correct/incorrect" opinions. What is lacking is a forum in which teams can discover that there is no single correct perspective, but many perspectives each of which is true under certain circumstances. When team members recognize the validity of multiple views, much more effective decision-making can take place. A MTFs can provide such a forum.

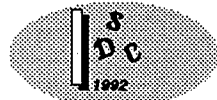
An Example

The first MTFs that Innovation Associates and Gould-Kreutzer Associates created jointly grew out of an IA consulting project for a large high technology company. The company's field service division was experiencing poor financial performance. In the past when faced with similar problems the company had down-sized. Some of the senior executives still saw down-sizing as the appropriate action. Others, however, held different opinions. They viewed down-sizing as a horrible mistake - claiming that a cutback in field service personnel would reduce an already mediocre service quality which could, in turn, impact product sales (a separate division). They recommended a quality improvement approach based on maintaining an adequate number of personnel to support the customer base.

The management team thought that a simulation model could help them examine various ways of improving their performance. On the way to building a fairly comprehensive simulation, we constructed a very small STELLA model to "get their feet wet." That one-page model proved so successful in helping the group move to a more systemic perspective that it was developed into our first MTFs, which we call COPEX. (See description further on.)

In retrospect we believe the model had impact for the following reasons.

- Although representing a complex situation, the model was organized around a simple principle, the "Fixes That Backfire" archetype identified in Senge's The Fifth Discipline. (In this case the unintended side effect produced by the down-sizing process was reduction in service quality. In the short term this successfully reduces costs. However in the long term, under most circumstances, down-sizing reduces quality and hence sales, causing the financial problem to grow worse.) This simple organizing principle provided managers with a common framework to view the problem.
- The model was understandable. It was small enough that all the assumptions could be reviewed in a few minutes, and none of the equation formulations were complex. This allowed managers to begin to see how the business structure as represented in the model could inevitably lead to the financial performance they were experiencing. However even with this very simple model, most managers needed an "interpreter", a modeling expert who could explain each simulation.
- The model was customizable and neutral. The management team was bitterly divided in their theories about the business. For example, some felt that the market was highly sensitive to service quality while others believed that it was insensitive. Rather than forcing them to agree on these assumptions, we encouraged each manager to put in his or her view before running the simulation. This communicated that we found their perspectives valid and weren't trying to predetermine a result. As is often the case they found that regardless of different assumptions about the market, certain business results were inevitable. This of course is the classic systems thinking lesson that "structure determines behavior." An interesting corollary to the concept of model neutrality is that none of their current perspectives "solved" the problem. Down-sizing, which appeared sensible from the point of fiscal



responsibility tended to create, at best, a non-growth, break-even company and at worst a death spiral. A quality approach as suggested by the client involved adding people to improve service quality which in theory would increase sales, but at an increasingly unprofitable level. The business system as structured could not achieve both financial rewards and sufficient service quality to allow the business to grow.

- All perspectives were needed to find an answer. What emerged from discussions around this small model was analogous to the parable of the blind men and the elephant--each side was seeing only part of the system and arguing that their part was actually the whole. Team learning, or as it is sometimes called, "collective intelligence" occurred when the perspectives were combined. The managers explored ways to redesign the business to allow both profitability and growth. For example, a high leverage area appeared to be in R&D--developing a product which required less repair and thus less service investment.

Design principles for a Management Team Flight Simulator

The success of this small model was unplanned although fortuitous, and required knowledgeable consultants to interpret and guide its use. Our next step was to extract the lessons from that experience and to use technology to ensure that these results were repeatable. The following five principles represent some of our major learnings:

- **Design the simulation to explicitly embody the various mental models of managers.** Doing so will create within the team a more powerful shared understanding as each perspective adds to the collective intelligence.
- **Use a simple concept to illuminate a complex problem.** Basing the core model on a classic system archetype provides a powerful framework to remember the learnings of the simulation and to recognize analogous situations.
- **Create a "white box" -- an interface where assumptions are clearly explained.** Most effective is an interface where the most hotly argued assumptions can be altered to suit each user.
- **Explicitly link "structure" and "behavior".** Behavioral results are most powerfully understood when presented with the causal structure. (One technique for doing this is illustrated in the COPEX description below.) Not only will this cause important learning but it will minimize the need for a consultant/facilitator to explain the results.
- **Use the simulator in the context of team learning.** Emphasize understanding the current situation as the key to improvement. Don't ask "Which are the correct assumptions about the business?" Instead ask "In what ways do we see the situation differently, under what circumstances is each perspective valid, and what impact do these different perspectives have on our ability to move forward?"

A Description of the COPEX MTFS

The following describes how the COPEX MTFS implements the above guidelines.

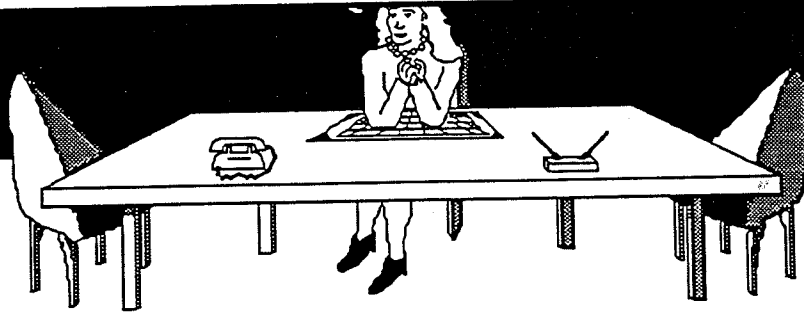
Design the simulation to explicitly embody the various mental models of managers. COPEX does this by an unfolding story line, each chapter of which unveils a different participants' view of the system. As we go through each round the mental models of the participants reveal more and more of the system under study--slowly building a more complex picture. (In each round the same model is used but a different causal structure is



described). Here are the screens which show the "conference room" with the first two managers and their thoughts. The thoughts are displayed by clicking on a dialog bubble.

As the VP of Finance, I've been charged by our CEO with cutting costs so that our profit picture will improve. Most of our costs come from our large field service force. Frankly we have no alternative but to downsize this year. In fact, I'll have to continue to let people go until our profits turn around. Only if our profits come back to a healthy level can we start adding additional field personnel.

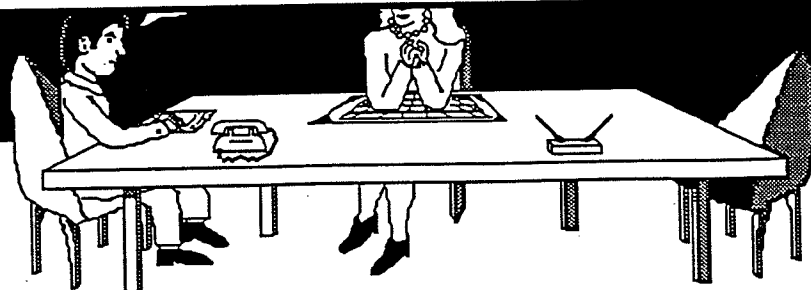
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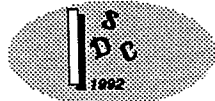
Quit

You've made a classic error. You've neglected to think about the impact of reducing our service force on the quality of service we can provide. We started out with too few people to handle our installed base of products, so we had mediocre quality - which got worse when we downsized. No wonder we lost sales! What we need to do is just the opposite - add people until we get our service up. If we take a Quality approach you'll see the business turn around!

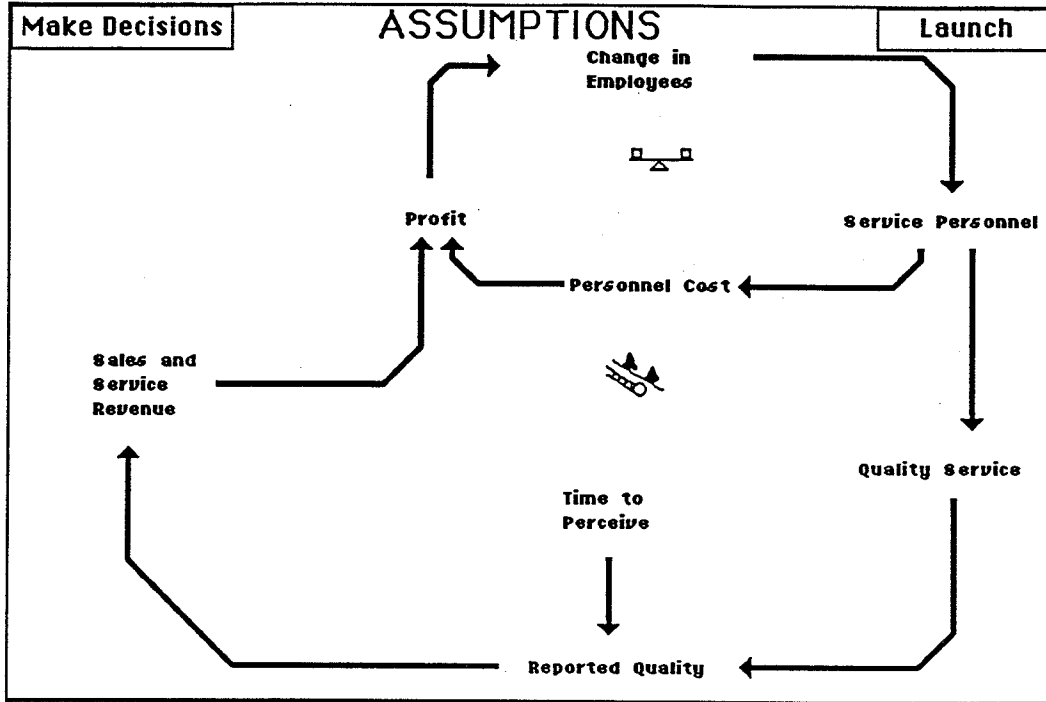
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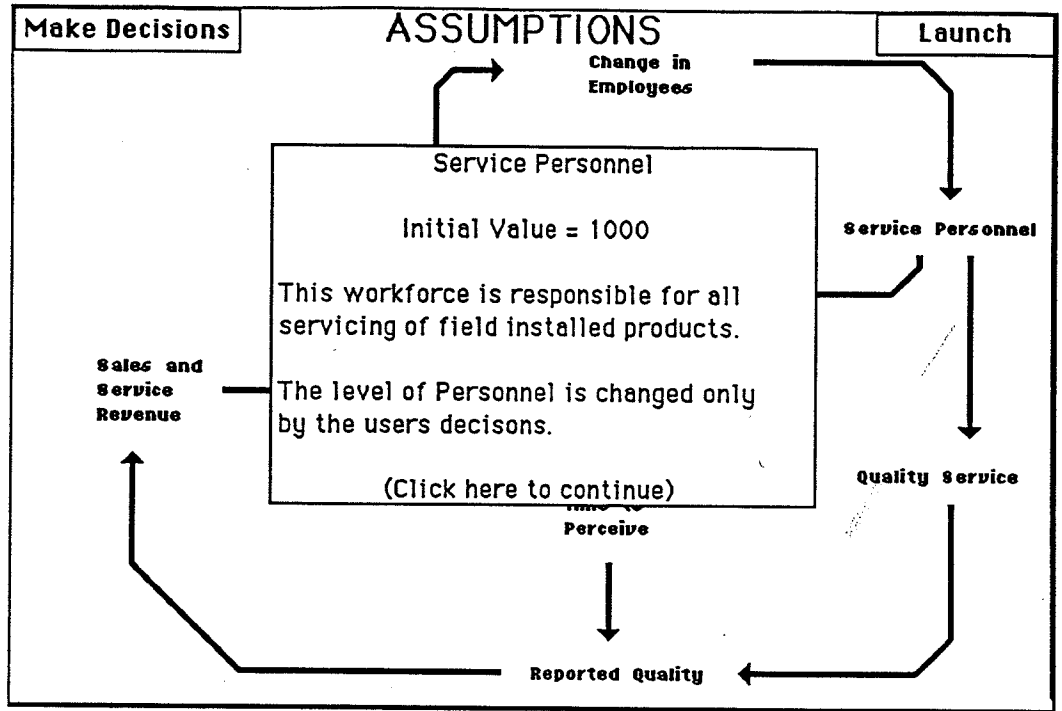


Use a simple concept to illuminate a complex problem. This was accomplished by organizing COPEX around an archetype. The causal structure is laid out to highlight the "Fixes that Fail" structure, and in each round there is a debrief that emphasizes that framework.



Create a "white box". COPEX encourages the user to "buy into" the model by revealing the model assumptions, and providing opportunities for customization. Variables are defined within the causal structure.






We can't allow the managers to change all the model assumptions without making it difficult for them to compare runs; however, our experience shows that the most vehement arguments focus around the intangible factors typically captured by non-linear table functions. These are what we allow users to change. By providing predefined variations which capture the range of "mental models" (high low medium sensitivity) we allow customization as well as comparison of results so that collective meaning can develop..

Service Quality is measured on a scale of 1 to 10, and is driven by the adequacy of the workforce to meet the repair load. The initial service quality is 6 which is lower than the competition's. You can choose how much service quality varies as the workload increases.

Quality Service

Quality Of Service 

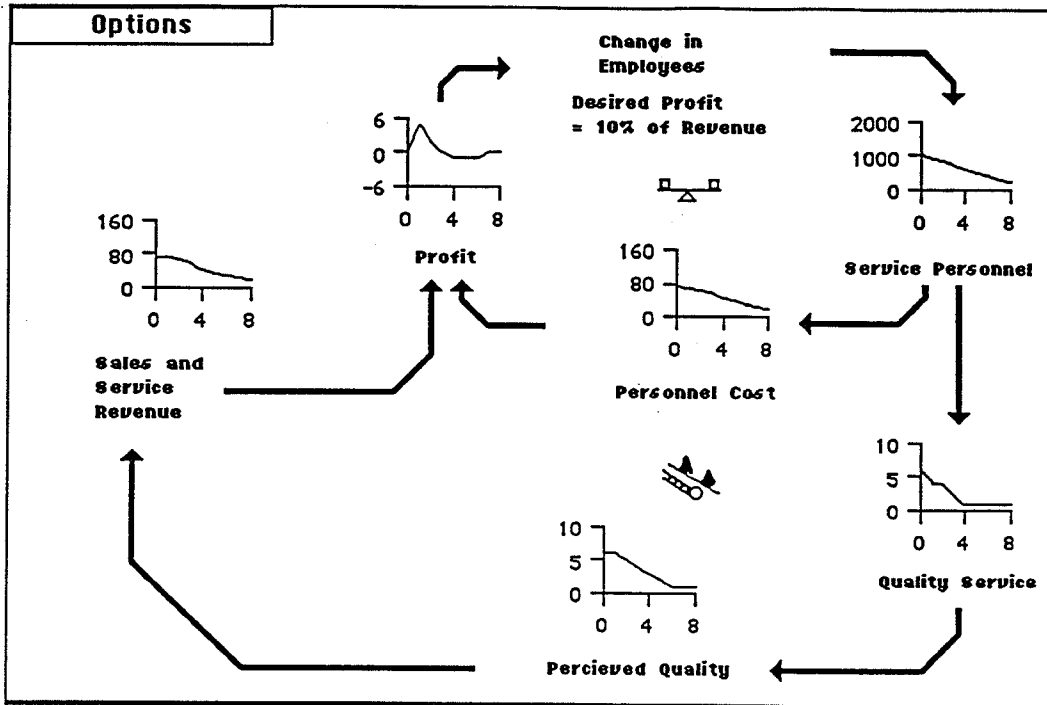
Repair Load

Less Sensitive Moderate More Sensitive

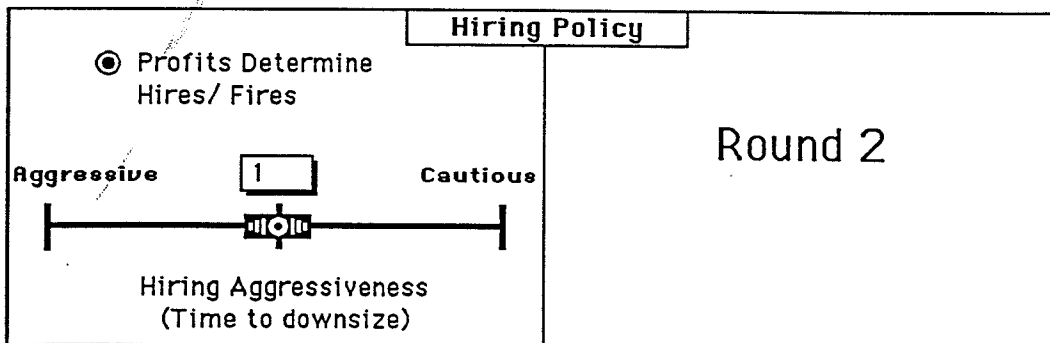
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Structure Causes Behavior. COPEX graphically demonstrates this point with an innovative feature. The output of the simulation is plotted onto the causal loop that represents one of the participants mental model. It is easy for the user to see how the structure of the system causes that behavior. The causal links between variables become evident. This feature usually eliminates the need for an interpreter.

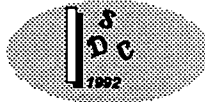


In addition, we distinguish between assumptions about the business (structure) and assumptions about policy.



For example the speed of down-sizing has negligible effect on the results. This recognition helps move the team from arguments about tactics to more fundamental discussions.

Since the creation of COPEX we have developed a "run comparison feature" that enables the user to compare the outputs from different simulations. By visually demonstrating that



a wide variety of assumptions within the same structure lead to essentially the same pattern of behavior, the MTFS effectively communicates one of the key systems thinking principles.

Use the simulator in the context of team learning. The COPEX MTFS is used as a demonstration in workshops focused on learning. As such we set a context that focuses on:

- What different explanations of the business results do the managers have?
- What is the thinking that lies behind their proposed solutions?
- Are there conditions under which their solutions would be effective?
- Are there solutions which are effective under a wide variety of conditions?
- Why do these "high leverage" areas have impact?

Conclusion

While COPEX was developed as a demonstration MTFS, the same design principles have been used successfully in organizational settings with highly polarized management teams. Although the development of a MTFS adds extra cost to a modeling project we believe the investment is well justified when a team truly understands a model, and believes that it fairly represents both their individual thinking and their collective intelligence.

About Innovation Associates and Gould-Kreutzer Associates

Gould-Kreutzer Associates is a consulting and training company which specializes in using systems thinking approaches to facilitate team learning and improved decision making. By using a variety of graphical facilitation techniques, such as causal loop diagramming, archetypes, and the Hexagon Technique, we map out and transform the mental models of our clients into simulation models, management flight simulators, Executive Strategy Systems, and learning laboratories.

Innovation Associates is a consulting and training company which uses multiple disciplines to help organizations create their own future. In the arena of Systems Thinking they enhance team learning through a variety of approaches, including classic archetypes as metaphors for organizational behavior, and Management Team Flight Simulators.

REFERENCES

Senge, Peter. 1990. The Fifth Discipline: The Art & Practice of The Learning Organization. New York: Double Day Currency.

