

Exploring Detail and Dynamic Complexity

by

Tony Gill

Phrontis Limited,
Cherwell Innovation Centre,
77 Heyford Park, Upper Heyford,
Bicester, OX6 3HD, UK
Telephone: +44 1869 238027 Fax: +44 1869 238028
email: TonyGill@phrontis.com
Web: <http://www.phrontis.com>

Abstract

Management scientists have used various approaches to capture and annotate detail complexity by elaborating relevant business processes (eg, using deployment flow charting) and organizational processes (eg, using the viable system model). Simultaneously, during the last 10 – 15 years, powerful software and hardware systems have enhanced people's ability to model and simulate dynamic complexity using system dynamics. Managers are increasingly recognising that this enables a better understanding of systemic behaviour and importantly informs their decision making processes.

This paper explores a pragmatic way of using detail and dynamic complexity in the same study. Whether we like it or not, people are beginning to combine detail and dynamic complexity within the same intervention in order to gain additional insights on the workings of their organization in a competitive environment. Critically important is the need to address the associated problems (eg, the potential for paradigm incommensurability). In essence, this is at the heart of what has been defined as multimethodology.

Introduction

TQM, BPR and the ever increasing power of Information Technology (IT) have given people in organizations ways of defining and managing far greater complexity than has been possible in previous decades. The growing use of Enterprise Resource Planning (ERP) systems is an instance of this. As we move into the new millennium new forms of organization made possible by outsourcing, the growing use of call centres and IT are emerging – eg, web based, networked and virtual organizations. Organizations seem to be bombarded by a stream of fads which if their proponents are to be believed have to be adopted by any organization wishing to still be in business say five or ten years from now. How are we to manage this complexity over time?

Managers at all levels in organizations are subjected to more and more (dis?)information as organizations in both the public and private sectors large and small have to deal with change and general information overload. As managers our mechanisms for coping are to develop models of the situation. These models – mathematical, graphical, word-based or whatever – are aids to help us make sense of the world around us. They help to inform our decision making processes. When shared with others, they facilitate understanding about complex

situations. Models are important to all managers who develop them implicitly or explicitly. The title of a paper by Conant and Ashby (1970) 'Every good regulator of a system must be a model of that system' implies the need for managers to have good models of the systems they are trying to manage. What is a good model?

I am in the early stages of research where the intention is develop models that will capture sufficient complexity to be useful to managers at various levels within the organization. I believe that there is a need for models to be able to capture both detail and dynamic complexity. This of course takes us to the issue of purpose of the model which cannot be answered in general terms but is context dependent. My research will address the issue of purpose when it will be possible to define purpose contextually.

My research agenda is to develop models under the banner of multimethodology (Mingers and Gill, 1997). In this paper, use of Beer's Viable System Model (VSM) is combined with use of Forrester's System Dynamics (SD) in the same domain of interest. For the purposes of this paper (Conference) given the limited time, I propose to use the Beefeater[®] Restaurants Microworld developed by Warren et al. (1996) as the domain of interest. The simulation model using SD is well developed and the case gives sufficient data for an overview VSM model to demonstrate the use of multimethodology.

The Viable System Model (VSM)

When we are trying to understand how a large and complex organization, such as Whitbread PLC, goes about delivering services and products to its customers, we find that both the Organizational Chart, showing the hierarchical pyramid, and the matrix structure are not very useful. Where is the customer in this structure? From our perspective, we are interested in customer visits to Beefeater[®] Restaurants. Simply these structures are inadequate for trying to capture the detailed complexity that exists between Whitbread and its environment.

The notion of recursion provides a powerful way to capture this detail complexity. By 1982, most of Whitbread's corporate structure was focussed on the UK as a whole. No doubt there were regional structures that focused on a specific region. For the average Beefeater[®] Restaurants' customer, it is at the level of the restaurant that Whitbread carries out its primary activities, ie serves meals and drinks. All other levels of Whitbread exist to provide the management necessary to assist delivery of the service and products. Generally, we would expect that all the activities of Beefeater[®] Restaurants are well managed and co-ordinated. Based on this belief, as consumers we have certain expectations of ambience, levels of service and menu attractiveness. That is why when you enter a different Beefeater[®] Restaurant anywhere else in the country it is likely to have the same 'look-and-feel' as your home Beefeater[®] Restaurant – management have designed things that way.

This illustrates well the notion of an embedded structure. Beefeater[®] Restaurants are embedded within areas; areas are embedded with regions; regions are embedded within the corporate structure. Each embedded level of the organization is likely to have its own management and regulatory structure. Where this is genuinely the case we refer to this as a recursive structure (the systemic role of management recurs at each level). This is in effect a way of devolving strategy throughout the organization and thereby improving the chances of the effective management of complexity. This recursive structure is often referred to as the 'unfolding of complexity' Espejo (1989) and is illustrated in figure 1.

Unfolding of Complexity

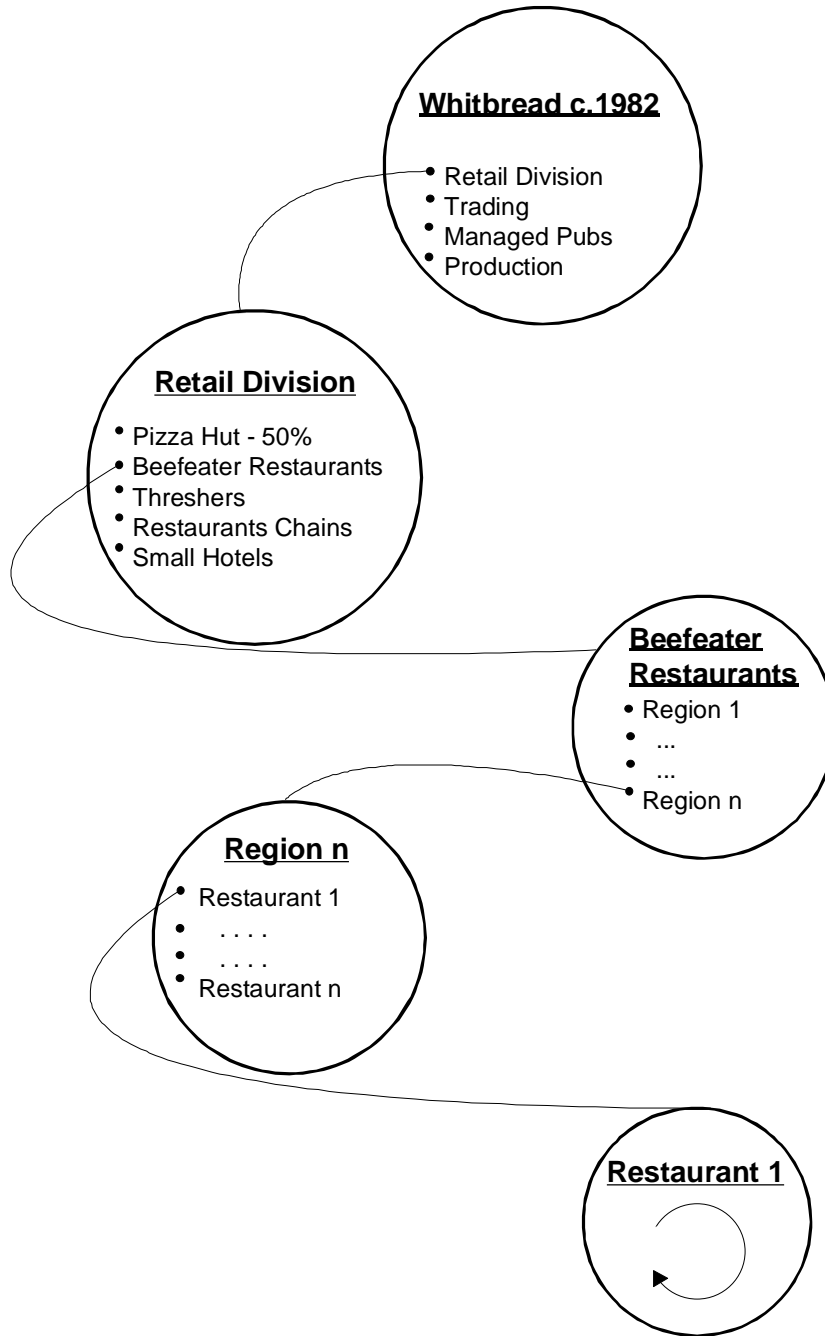


Figure 1

Beer (1979, 1981, 1985) describes five systems within each level of recursion. Espejo (1989) refers to these as Policy, Intelligence, Monitoring-Control, Co-ordination and Implementation. For the purposes of this paper, System 1 or Implementation refers to the primary activities of the organization; all the other systems form part of the overall regulatory systems. These regulatory systems will include the operation of many of the traditional

functional management areas of the business that are likely to be distributed among the various Beer systems (systems 1 – 5) as well as between levels of recursion. For any organization to remain viable over time the operation of the five systems at all levels of recursion is essential. The interconnectivity between the five systems at each level of recursion is fundamental to this holistic view of the organization. Equally important is the interconnectivity between each system and its equivalent system at higher and lower levels of recursion.

A dual tension has to be managed by managers at all levels of recursion. This is the balance between *autonomy* (to manage complexity at the local customer facing level) *and control* (to maintain cohesion of the whole organization) ie, the debate of centralisation versus decentralisation; and *continuity* (continue to generate profits today) *and change* (anticipate how to attract tomorrow's customers). The VSM offers an structure for organizations to manage this dual tension.

Additionally, the VSM offers a way to accumulate complexity at appropriate levels of recursion and to build considerable knowledge on how the organization works. This detail complexity is added on an as needs basis depending on the purpose of the enquiry. Beer talks about balancing horizontal and vertical variety. This accords well with the process view of organization eg, TQM and BPR and addresses the organizational structure needs that are often not well catered for in BPR initiatives. For more on both the VSM and process view of organization visit <http://www.phrontis.com/systhink.htm>.

System Dynamics and the Beefeater[®] Restaurants Microworld

There is no need to discuss the seminal work in system dynamics by Jay Forrester within this community. His work is the reason for our presence at this SD conference in Bergen.

The Beefeater[®] Restaurants Microworld (Warren et al. 1996) is a rich case study that uses system dynamics and simulation to illustrate outcomes of policy decisions. The challenge for management is to develop a profitable chain of restaurants in the UK. This implies several things: developing a strong reputation with customers and a prolific presence throughout the UK; balancing market demands with corporate financial growth plans.

In this microworld, as managers you develop and run the Beefeater[®] Restaurants chain, report to Corporate HQ through the Retail Division and manage the managers of the individual restaurants. Decisions you are required to make are spending levels relating to: maintenance; labour; new product development; meal prices; marketing; capital requirements. As in the real world there is a considerable amount of data available during the simulation runs and as befits the dynamic nature of the situation you have to take regular decisions based on this data. A demo of the simulation is available at <http://www.globalstrategydynamics.com/productsanddownloads.htm>

Exploring complexity

It may be apparent by now that SD and the VSM are providing different insights on the same situation ie, the Beefeater[®] Restaurants. Both review the structure of the organization. SD defines the structure relevant to the problem situation; this structure is the cause of behaviour that emerges; for managers this behaviour manifests itself in the results (events) of business performance based on policy decisions. The VSM is used as a diagnostic tool to review

structural weaknesses in the organization's structure and in the co-ordination of actions in much the same way as a medical doctor uses his/her knowledge of the structure of the human body (skeleton, nervous system, digestive system, etc.) to diagnose what is causing illness/distress for the patient. Using both SD and the VSM, a possible outcome will be to make structural adjustments to improve system performance.

My research hypothesis is that using both the VSM and SD on an iterative basis (the VSM to inform SD and SD to inform VSM) will improve all models. This is in keeping with the notions of multimethodology (Mingers and Gill 1997). In all cases models are an abstraction of reality and over time will need updating to remain relevant.

The Beefeater[®] Restaurants Microworld has been deliberately developed as a microworld in keeping with the purposes of its creators. It is an excellent training tool that explores the dynamic resource based view of the firm as developed by Kim Warren. The material presented is thus kept to a minimum within these requirements. In this sense dynamic complexity is well articulated.

However, it is not so easy to develop detail complexity to any significant degree based on the material presented. Some of the information gaps concerning organizational processes arising from the application of the VSM include:

- maintaining self regulation within the constraints of higher level recursion guidelines to ensure organizational cohesion and problem solving at as local a level as possible – this will give clues about the culture and centralisation of control within the Beefeater[®] Restaurants and Whitbread group as a whole.
- setting of minimal level diktats limited as much as possible to those which ensure compliance with the national legal obligations of the corporation (co-ordinate rather than command so as not to interfere with local autonomy) – again this will give clues about the culture and centralisation of control within the Beefeater[®] Restaurants and Whitbread group as a whole.
- balancing Intelligence with Control to ensure adequate policy formulation and more importantly to ensure adaptation over time. For Beefeater[®] Restaurants, this is about new product development and the planning process.
- resources bargaining for both intellectual, capital and financial assets. This process tries to establish the effectiveness of the resource allocation and budgeting process.
- accountability for resources to ensure optimal use over time – this reviews the performance metrics framework applicable for each level of recursion.
- co-ordination of activities to optimise the output of all units located at the same level of recursion while at the same time minimising the negative effects of these operating units as they compete for resources and management time. This is a source of significant angst for many multi-divisional organizations. There are several indications within the material presented that this is a problem for Whitbread and its divisions.
- monitoring at the appropriate level of recursion so as not to interfere with the autonomy of the lower recursive units. Without this process in place it is likely that the allocation of resources is going to be suboptimal. It is about gaining knowledge and understanding of local conditions to support decision taking.
- maintaining adequate market place links to understand the consequences of possible futures due to changes in social attitudes, political direction, technological advances, economic conditions and cycles, and issues relating to the greater environment that may impact on the business.

As the story of Whitbread and the Beefeater[®] Restaurants unfolds over a period of some 15 years, it soon becomes apparent that the Unfolding of Complexity (model) shown in Figure 1 requires several updates. In real life, decision making requires regular inputs of both detail and dynamic complexity. Often this may mean an update of the models used to inform the decision making processes. In later years, Whitbread did acquire and integrate the Berni restaurant chain within the retail division. Yes this changed the dynamic complexity within Beefeater[®] Restaurants but it also changed much of the detail complexity that the VSM can cope with eg, IT integration, accounting systems, management structures. I believe that the ability to explore detail and dynamic complexity is fundamental to the current trend of linking SD models to ERP (enterprise resource planning) systems eg, SAP, BAAN etc. If we are to approach 'near real time management', as is now technically possible, then we need to have good models of the system we are trying to manage.

References

- Beer, S. (1979). *The Heart of Enterprise*, John Wiley & Sons, Chichester
- Beer, S. (1981). *Brain of the Firm* Second Edition, John Wiley & Sons, Chichester
- Beer, S. (1985). *Diagnosing the System for Organizations*, John Wiley & Sons, Chichester
- Conant, R. and Ashby, W.R. (1970). 'Every good regulator of a system must be a model of that system', *International Journal of System Science*, **1**, 89-97
- Espejo, R. and Harnden, R. editors (1989). *The Viable System Model: Interpretations and Applications of Stafford Beer's VSM*, John Wiley & Sons, Chichester
- Mingers, J. and Gill, A. (1997) eds. *Multimethodology: the theory and practice of combining management science methodologies*, John Wiley & Sons, Chichester.
- Warren, K., Langley, P., Larsen, E. and van Ackere, A (1996). *the Beefeater[®] Restaurants Microworld* Global Strategy Dynamics, Princes Risborough, UK.