

**Studying the Sense & Respond Model
for Designing Adaptive Enterprises,
and the Influence of Russell Ackoff's System of Thinking**

David Ing
Marketing Scientist

IBM Corporation
Advanced Business Institute
Route 9W
Palisades, NY 10964-8001
U.S.A.
&
IBM Canada Ltd.
3600 Steeles Avenue E., H7/980
Markham, Ontario
Canada L3R 9Z7

Toronto: (416) 410-5958
Internet: daviding@ca.ibm.com

May 5, 1999

**Extracted from the Proceedings of the Conference to Celebrate Russell L. Ackoff, and the
Advent of Systems Thinking, Villanova University, May 4-6, 1999, pp. 111-119.**

Full conference proceedings are available at <http://www.villanova.edu/~ackoff/> .



*IBM Advanced Business Institute
at Palisades, New York*

Business Applications of Systems III

Moderator: Mohammad Najdawi, Villanova University

1. *"Structural Process Improvement at the Naval Inventory Control Point."*, Gary Burchill, Center for Quality Management.
2. ***"Studying the Sense & Respond Model for Designing Adaptive Enterprises and the Influence of Russell Ackoff's System of Thinking."*** David Ing, IBM Advanced Business Institute.
3. *"Implementation of Learning & Adaptation at General Motors."* Wendy Coles, General Motors Corporation.

Studying the Sense & Respond Model for Designing Adaptive Enterprises, and the Influence of Russell Ackoff's System of Thinking

David Ing¹⁴

In the process of developing a system specification for the Sense & Respond model -- an approach to strategy in which enterprises are designed as adaptive, purposeful, open, social systems -- the author was directed to read Russell Ackoff's writings. This article describes how reading *The Democratic Corporation*, *Creating the Corporate Future* and *On Purposeful Systems* led to a greater appreciation of the practice of enterprise design.

KEY WORDS: Sense & Respond, adaptive enterprise design, social systems, purposeful systems

1. PURPOSE OF THIS ARTICLE

This article describes the influence of Russell Ackoff's writings on an important business research initiative within the IBM Corporation. This initiative is known as the Sense & Respond model. Its goal is to help IBM's customers to think about issues associated with discontinuous change in the business environment, and the functions in which information technologies can enable their organizations to become successful, adaptive systems.

2. HOW DOES A PERSON APPROACH A SYSTEM OF THINKING?

The concepts of the Sense & Respond model have been discussed in classes offered to executives of IBM customers, by the IBM Advanced Business Institute, since 1993. Steve Haeckel introduced these concepts with the publication of "Managing by Wire", co-authored with Richard Nolan, in *Harvard Business Review* and in "Adaptive Enterprise Design" in *Planning Review*. I had attended a class on Sense & Respond at the IBM Advanced Business Institute in June 1997, with an IBM team interested in business modeling. In the months following the class, an informal study group -- composed of experienced researchers and consultants within IBM -- formed with an interest of understanding the Sense & Respond model in depth. The more we thought we understood about adaptive enterprise design, however, the more questions we had.

Steve Haeckel was generous with his time in helping this group with its learning. We were impressed at the depth of his understanding of the approaches and methods by which an enterprise should be designed. In fact, his complete conviction on certain fine

¹⁴IBM Advanced Business Institute, Palisades, New York, U.S.A. Internet:

points about the Sense & Respond model -- unwavering in the face of vigorous debates -- often left us puzzled. At the end of a day of discussion, it would not be uncommon for the group to scratch our heads and ask "How can he say that?"

Finally, after a particularly exasperating session, Steve proclaimed "Go read Russell Ackoff!"

This proved to be a turning point in our pursuit of understanding. In reading Russell Ackoff's work, we discovered that ...

... a system is a whole that cannot be divided into independent parts. (Ackoff 1994, p. 21)

Our primary effort had been to understand the Sense & Respond model itself, with a core concept that an enterprise should be designed and managed as a system. Less obvious, however, was the fact that Steve Haeckel had managed to form a complete system of ideas, such that anyone attempting merely to nibble at the parts of the system might miss interactions with other parts in the whole.

By leading us to read Russell Ackoff, Steve Haeckel presented us both with a gift and a curse. The gift was that Russell Ackoff has been extremely prolific, and thus, we were able to draw on a great wealth of publication that has helped to deepen our understanding of social systems concepts. The curse was that, once we started digging into Ackoff's work, we were faced with an even richer system of ideas -- generated over a fifty-year career -- which not only involved Ackoff's own work, but also those of other thinkers within his lifetime, such as West Churchman and Fred Emery. This expanded into readings associated with institutions such as the Society for General Systems Research (now the International Society for System Sciences) and the Tavistock Institute.

In the end, Haeckel had provided us with a remedy of the type of "the hair of the dog that bit you". To specify the Sense & Respond model at the rigorous depth that would satisfy us, we would need to learn about Russell Ackoff's perspective on systems.

3. S&R IS A STRATEGY FOR AN ERA OF DISCONTINUOUS CHANGE

For a more complete description of the Sense & Respond model, the interested reader may refer to a book published in 1999 -- *The Adaptive Enterprise: Creating and Leading Sense & Respond Organizations*. For the immediate purpose, however, an extremely brief description of the premise and promise of the Sense & Respond approach follows.

3.1 Strategy as planning is inappropriate if change is unpredictable

Today, most companies create strategy through a (yearly) procedure of (attempting to) predict the future, followed by development of a plan to reach the goal within a period.

Fewer and fewer companies now have a ten-year (or even a five-year) plan as a published document, because they have discovered that as the nature of change has become discontinuous, the relevance of such a work diminishes rapidly.

Thus, in an era of discontinuous change, the only appropriate strategy is a strategy to become adaptive.

A strategy to become adaptive means designing an organization that can systematically sense and respond to environmental change. More specifically, this strategy requires designing a purposeful, complex, adaptive social system.

3.2 Systematic adaptation must occur both in the enterprise as a whole, and in its parts

For an enterprise to be seen as a social system, adaptation must take place at least at two levels:

- > adaptation of the enterprise as a whole, as represented by the role of leadership; and
- > adaptation at the level of teams and/or workgroups, through individuals who play different roles to carry out various functions.

Haeckel refers to this conception of design as "Context and Coordination", which is an alternative to the traditional management orientation towards "Command and Control".

The cycle for organizational learning is depicted as an adaptive loop with four emphases: Sense, Interpret, Decide and Act. Successful adaptation requires that a system be capable of processing information about changes in the environment at a rate faster than that at which the information comes in. This type of loop can be applied to all types of systems -- including each of the individuals within an enterprise -- but the organizational challenge for systematic adaptiveness requires that teams of individuals and the organization as a whole both demonstrate this capability.

3.3 Leadership provides the organizational context for the enterprise as a whole

At the level of the enterprise as a whole, the purpose of the enterprise must be declared by its leadership, based upon an inquiry into attributes of value amongst its constituencies. The leadership of the enterprise is accountable for defining:

- > the purpose and bounds for behavior within the enterprise, as well as
- > a high-level business design of roles to be filled with capabilities, modularized so that responses by customers can be dispatched to the appropriate resources.

The purpose and bounds, combined with the high-level business design, comprise the organizational context within which individuals within the enterprise are empowered to make decisions. This is not leadership in the "we know, you do" tradition, but instead "we declare, you know, you do".

3.4 Coordination of teams occurs through a protocol of commitments with accountabilities

Business processes are based not only on sets of procedures (as means), but also on individuals who must accept accountability for an outcome (which is an end). Customer

requests are received by a person in a dispatching role, who directs the communication to an appropriate supplier.

> The protocol for conversations about commitments follows a formal protocol of speech acts, of: offer/request/counter-offer/counter-request; agree or withdraw; report completion; and assess outcome.¹⁵

> Commitments become coupled into chains, as each supplier becomes an internal customer to a subordinate supplier.

Commitments towards an outcome that are sufficiently important to impact the function of the system as a whole should be recorded in a database. Management of the commitments is not based on the content of the commitment, but on the maintenance of the integrity of accountabilities for outcomes within the system. An adaptive system requires that subsequent renegotiations of commitments should be supported, with consequences for those commitments that have not been successfully renegotiated.

3.5 An essential element of S&R is the design of an enterprise as an open system

Although the brief description above does not do justice to the depth of the Sense & Respond model, at its core is the fundamental idea of the enterprise as an open system. Openness in the system requires that the enterprise must adapt to changes in its environment. Internally, the enterprise is designed to function as a system as a whole, with appropriate subsystems. If it is possible to adapt while maintaining the integrity of the enterprise as a whole -- i.e., without changing the purpose and bounds defined by the leadership -- then adaptation can occur by the subsystems adjusting their designs to a more appropriate structure. If this is not possible, then adaptation must take place at higher levels -- either on the boundaries on behavior, or for the purpose of the enterprise as a whole.

Long-time systems thinkers might find many of these concepts supporting the Sense & Respond model to be familiar. However, to the average business reader (or even the best-trained MBA common in today's business community), the presentation of an organization and its purpose in this manner is in striking contrast to the approaches based on economics or sociology. How could the Sense & Respond model be validated as a logically coherent approach, as compared to large number of management fads that have emerged in the past decade of "fad surfing"? As a logical system, the answer could not be contained within the Sense & Respond model itself, but would have to come from an external reference point -- which turned out to be the books and articles of Russell Ackoff.

4. ACKOFF PROVIDED INSIGHT ON SOCIAL SYSTEMS, DESIGN & PURPOSE

An immediate parallelism between the writings of Steve Haeckel and those of Russell Ackoff is the specificity with which words are chosen. The quick scan of a chapter will

¹⁵Haeckel (1995) cites Winograd & Flores (1986) as the source for concepts about speech acts, and Scherr (1993) as the source for application in business

usually make sense to the reader, but a return to the text a few months later often produces a greater insight into a deeper idea. A word that would seem commonplace in "simple English" gains richness not only by its use in the context of systems thinking, but also in the context of other ideas by the same author.

The process of reading and re-reading Ackoff's writings produces insights, but not necessarily in the time expected. The sections that follow describe some insights gained about the Sense & Respond model through studying Ackoff's works -- gained possibly not even in the publication that explains it best, but instead at the point in time at which sufficient understanding had been accumulated to appreciate some aspect of the system of thinking. This is not a complete list of insights, but some which were particularly relevant to the Sense & Respond model.

4.1 *The Democratic Corporation* led to an understanding of social systems

In the Sense & Respond model, Steve Haeckel is insistent on the appropriateness of the "Context and Coordination" approach, whereby some decisions are set by the leadership, and others are determined by teams or individuals within the enterprise. This idea is consistent with the description in *The Democratic Corporation* of the decline of the organismic view of the enterprise, in favor of the social systemic view. This understanding was later amplified by Russell Ackoff and Jamshid Gharajedaghi in "Reflections on Systems and their Models", in which social systems are categorized as having choice both in their parts and the whole.

[Ackoff & Gharajedaghi] Table 1: Types of systems and models

Systems and models	Parts	Whole
Deterministic	Not purposeful	Not purposeful
Animated	Not purposeful	Purposeful
Social	Purposeful	Purposeful
Ecological	Purposeful	Not purposeful

Social systems -- for example, corporations, universities, and societies -- have purposes of their own, contain parts (other social systems or animated organisms) that have purpose of their own, and are usually parts of larger social systems that contain other social systems (for example, corporations and nations). [p. 14]

In addition, Steve Haeckel specifies the "high-level business design" as the "essential structure" for the enterprise. Through Ackoff's clear definitions of function as distinct from structure -- particularly important for social systems -- it is clear that the purpose of the enterprise in the Sense & Respond model should be the defining function for the system, and that the essential structure should be determined after the purpose had been defined.

In the section on Quality of Work Life in *The Democratic Corporation*, Ackoff reminds us of the legacy of management thinking from the Tavistock Institute, which unfortunately declined in popularity during the "downsizing" era of the 1980s. In many

respects, enterprises in the 1990s have taken a large step backwards, retreating not only to organismic conceptions of their systems, but also to mechanistic conceptions.

4.2 *Creating the Corporate Future* led to an understanding of design of systems

If *The Democratic Corporation* provided evidence that thinking about the enterprise as a system was a good idea, the function of *Creating the Corporate Future* was to suggest an approach by which the process of design could be made practical.

The Sense & Respond model requires the identification of a primary constituency, to which the enterprise owes its defining purpose -- called the Reason for Being -- as compared to subsidiary functions that can be satisfied as merely bounds or constraints. A key issue of understanding is centered on this Reason for Being, which challenges the popular business orientation towards "maximizing shareholder value". Which constituency of the enterprise should be considered the primary?

Ackoff provides a first step towards clarification, through the recognition that an enterprise produces outcomes other than just those which are economic. This discussion takes place under the context of the nature of ideals:

The ancient Greek philosophers identified four pursuits individually necessary and collectively sufficient for the development of man: *truth*, *plenty*, *good* and *beauty*.

1. The pursuit of *truth* is the *scientific* and *technological* function of society. [...]
2. The pursuit of *plenty* is the economic function of society. [...]
3. The pursuit of *good* is the *ethical-moral* function of society. [...]
4. The pursuit of *beauty* is the *aesthetic* function of society. (Ackoff 1981, pp. 38-39)

The concept that an enterprise has multiple constituencies is not difficult. The concept that some constituencies expect other than economic outcomes is not surprising. However, within a facilitated Sense & Respond session, the typical realization that an enterprise may produce economic returns in multiple ways always raises the issue about which enterprise function and which other constituency should then form the defining purpose.

The additional consideration of a horizon in time in the Sense & Respond model brings forth the idea that the Reason for Being should be expressed as more durable than any high-level business design, or any commitment made between any two individuals at any point in time. From Ackoff's section on ideal-seeking behavior, ...

There are three types of ends that people pursue:

1. *Goals*: those ends that we can expect to attain within the period covered by planning.
2. *Objectives*: those ends that we do not expect to attain within the period planned for but which we hope to attain later, and toward which we believe progress is possible within the period planned for.

3. *Ideals*: those ends that are believed to be unattainable but towards which we believe progress is possible during and after the period planned for.

Planning ought to involve all types of ends, but it seldom does. (Ackoff 1981, p. 63)

The Sense & Respond model does not require that the Reason for Being be expressed as an ideal. However, in facilitated sessions, the statement of the defining purpose as an ideal is usually encouraged. In the face of discontinuous change, commitments between individuals should be made only for periods over which there is certainty (rather than an arbitrary one-year horizon), and thus the period planned for may be as short as a few days or weeks. The structure of the high-level business design can be reorganized when the change is even greater.

While the techniques for design suggested by the Sense & Respond model are different from those suggested in Interactive Planning, the latter certainly provides a standard of completeness by which business models should be judged. In particular, the differentiation between Means Planning and Resource Planning provides an interesting distinction between the Sense & Respond model and the "Make-and-Sell" approach. In a traditional Make-and-Sell organization, means are committed and resources are allocated at the commencement of the planning period, based upon the expectation of customer demand, rather than the actual requests of customers. In a systematic Sense & Respond organization, the capabilities for a range of alternative responses may be established in advance, but modular capabilities are dispatched and assembled only after a commitment by a customer has been obtained.

4.3 *On Purposeful Systems* provides final definitions for purpose, function and structure

In the absence of personal communications with Russell Ackoff, *On Purposeful Systems* serves as the final word on his system of thinking. Not only is this work absolutely rigorous in its definitions, but some of the examples provided can result in a profound understanding. As an example, to gain a full appreciation for systems design, the distinction between producer-product and cause-and-effect is essential.

An acorn is insufficient for an oak because in a number of environments it cannot cause an oak -- for example, in a waterless sandy soil. [...]

Producer-product is ... a special case of cause-effect. [...] An acorn, which was shown to be necessary but insufficient for an oak, is thus a producer of an oak, its product. (Ackoff & Emery 1972, p. 22)

In the Sense & Respond model, Steve Haeckel emphasizes that "only human beings can be held accountable", which leads to questions as to whether the new technology of "intelligent software agents" should be considered as accountable for their outcomes. This can be resolved through an examination of the "Classes of Functional Individuals and Systems" (Ackoff & Emery 1972, p. 29), which determines that software agents may demonstrate either goal-seeking or multi-goal-seeking behavior, whereas only people are classified as purposeful. With the distinction of free will, human beings therefore have

choices for which they should be held accountable. The most intelligent software will only have the goals programmed into it by human beings.

As a more academic work, *On Purposeful Systems* also provides citations to the wealth of literature that has influenced his thinking. This reading produced a context in which the work of West Churchman, and other thinkers in the Society for General Systems Research could be appreciated.

5. ACKOFF'S SYSTEM OF THINKING IS RIGOROUS, BUT OPEN

At the beginning of 1998, I was appointed to a position within the Advanced Business Institute, where I have been conducting research associated with tools and techniques that might be applied with the Sense & Respond model. After I had conducted a few months of testing (or inquisition) of the Sense & Respond concepts on Steve Haeckel himself -- often about how the Sense & Respond model was similar to or different from Ackoff's approach -- Steve exclaimed: "I said that you should read Russell Ackoff, not become Russell Ackoff!"

At this point in time, I have come to appreciate the philosophical differences between techniques such as Sense & Respond and Idealized Design, but more importantly, have gained a greater respect for the works of both Steve Haeckel and Russell Ackoff. Although they have suggested slightly different means by which an end may be achieved, they are both interested in the same end -- the improvement of the practice of management, and the recognition that enterprises can provide multiple functions to society.

In the family tree of management thinking, there is at least an indirect relationship between Sense & Respond and Russell Ackoff. I nominate him as a honorary uncle of the Sense & Respond model. When he makes a suggestion, we may not always follow it, but if we ignore his contribution, we do so at our own peril.

ACKNOWLEDGEMENTS

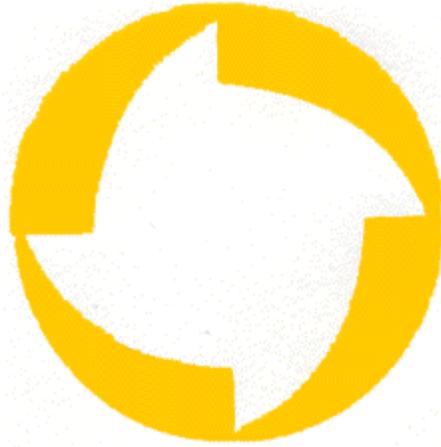
The author would like to thank Steve Haeckel, Ian Simmonds, Doug McDavid and Joe Arteaga for their participation in the learning process, and for their thoughtful review comments on this article.

REFERENCES

- Ackoff, Russell L. and Gharajedaghi, Jamshid 1996, "Reflections on Systems and their Models", *Systems Research*, Vol. 13, No. 1, 1996, pp. 13-23.
- Ackoff, Russell L. 1994, *The Democratic Corporation: A Radical Prescription for Recreating Corporate America and Rediscovering Success*, Oxford University Press.
- Ackoff, Russell L, 1981, *Creating the Corporate Future: Plan or be Planned For*, John Wiley & Sons.
- Ackoff, Russell L. and Emery, Fred E. 1972, *On Purposeful Systems*, Intersystems Publications.
- Haeckel, Stephan H. 1999, *The Adaptive Enterprise: Creating and Leading Sense & Respond Organizations*, Harvard Business School Press.
- Haeckel, Stephan H. 1995, "Adaptive Enterprise Design: The Sense-and-Respond Model", *Planning Review*, May-June 1995, Vol. 23, No. 3, 1995, pp. 6-13.
- Haeckel, Stephan H. and Nolan, Richard L 1993, "Managing by Wire", *Harvard Business Review*, September-October 1993, pp. 122-132, Reprint 93503.
- Scherr, Allan B. 1993., "A New Approach to Business Processes", *IBM Systems Journal*, Volume 32, Number 1, 1993, available as reprint G321-5504.
- Winograd, Terry and Flores, C. Fernando 1986, *Understanding Computers and Cognition: A New Foundation for Design*, Ablex.



*IBM Advanced Business Institute
at Palisades, New York*



PROCEEDINGS

RUSSELL L. ACKOFF and
THE ADVENT OF SYSTEMS
THINKING

A Conference to Celebrate the Work of
Russell L. Ackoff
on his
80th Birthday
and
Developments in Systems Theory and Practice

March 4-6, 1999

Sponsored by:

The College of Commerce and Finance
Villanova University
Villanova, PA 19085

Program Committee

Matthew J. Liberatore, Conference Chair

Proceedings Co-Editors

Matthew J. Liberatore

David N. Nawrocki

Track Chairs

Business Applications of systems

David N. Nawrocki

Systems Thinking and Information Systems Practice

Sasan Rahmatian

Idealized design

William Roth

Conference Coordinator

Helen A. Tursi