

FIGURE 37

THE MIABLE SYSTEM
 - Stafford Beer

APPENDIX

Readers who have made a first pass through the book making their own drawings have learned the hard way how tiresome it becomes to repeat the rather elaborate designs that reflect the structure of the Viable System. They have the advantage that the structure will have stuck in their minds.

Most readers, however, have probably noticed this Appendix in advance — and will proceed to rob themselves of a learning experience . . .

CERTIFICATE

The author of this book, Stafford Beer, and its publisher, John Wiley & Sons Ltd, hereby authorize the reproduction of all the Charts contained in this Appendix. This permission does NOT APPLY to the text itself, nor to the Figures 1 to 37 included in it.

All readers are in fact encouraged to photocopy the following Charts, and to make themselves a Do-It-Yourself Kit:

- make up pads, or tablets, of each chart, so that rough analyses can be made, torn up, and improved upon without fuss.

Note: you will need more copies of some charts than others. Give this some thought before proceeding.

- if you have access to enlargement facilities, by all means USE THEM.

Note: on a VSM chart 'blown up' to several feet high, it is often possible to give a succinct account of an organization, and its diagnosis, that would take a report several hundred pages long to 'explain'.

CHART ONE

This chart should be **named** for your System-in-focus — that is the total chart.

Then **annotate** the chart to show clearly what are the *included* viable systems (although only two of them are depicted). Make a few notes on these embedments, too, so that it is clear, for instance, what the tiny operational circles are supposed to be.

Next, **annotate** the chart in the area of the big square box, which is the management unit of the next higher recursion in which your viable System-in-focus is *embedded*..

Note: Although the topology of this diagram is quite correct, the visual presentation really calls for this box to be standing on one corner. There was no room for this: don't be misled.

It is more difficult than people imagine to keep the System-in-Focus *in focus*! Therefore a fair copy of an enlarged Chart One should go up on the project room wall, preferably in colour, to keep all concerned alert to the set of recursions that has been chosen.

A SPECIAL PLEA:

You will obviously be using Figure 37 as a guide to annotating your own Chart One, as well as earlier Figures. But please don't just copy down the generalized words I have been forced to use. Try to make your annotations specific to the organization you are modelling.

AND REMEMBER:

These boxes are not boxes on an organizational chart, into which you might expect to fit individuals or departments. In particular, senior managers all have dealings in Three, Four and Five.

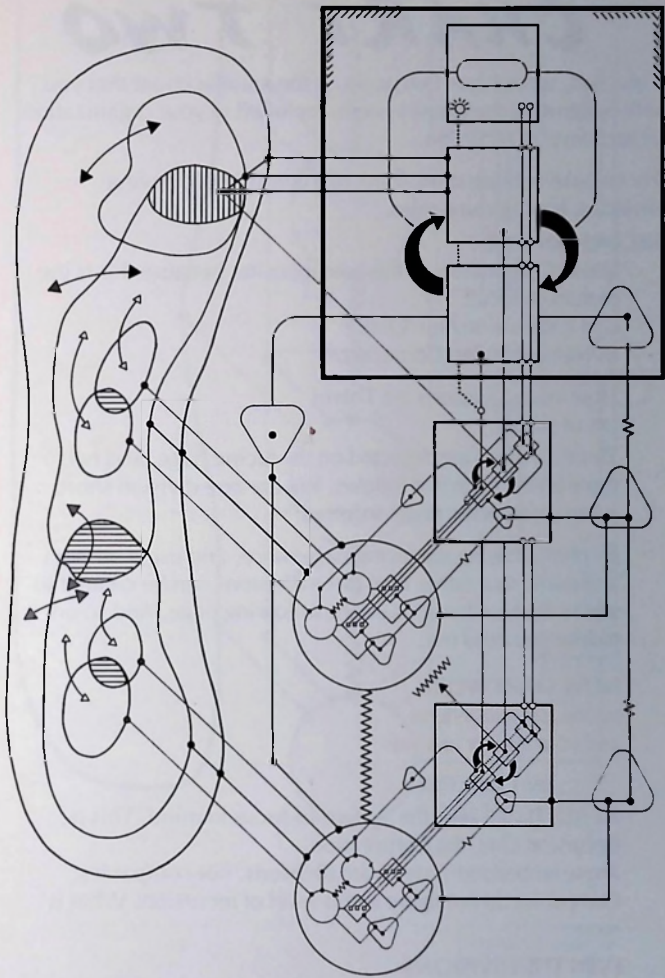


CHART ONE

NAME OF THE VIABLE SYSTEM IN FOCUS:

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CHART TWO

This chart, spread over two pages, is the main account that you will construct of the viable systems included in your organization at each level of recursion.

For the sake of illustration, think of a corporation, having divisions, having companies.

RECURSION ONE

Write 'Corporation' in the box opposite, because this is the System-in-focus.

Call it Recursion No: 'ONE'.

Its Name remains 'Corporation'.

How many Divisions are There?

Let us say six.

Three divisions are depicted on the facing page, and two more on the page that follows. We are one division short, when we stick the pages together.

By photocopying the facing page twice, and using scissors and paste, four rather than three divisions can be created to add to the two divisions on the following page. And so on: maybe you need ten.

NOW START WORK

on the five subsystems
and your variety analysis

see Chart Three.

AT ALL TIMES keep the System-in-focus in mind. This is Recursion One, the Corporation.

Those embedded systems are **divisions**, not companies.

Companies do not figure at this level of recursion. What is more:

EVEN THE DIVISIONS

are black boxes.

So any detail you write in the \bigcirc \square spaces will relate to CORPORATE management of those divisions, and not to DIVISIONAL management itself.

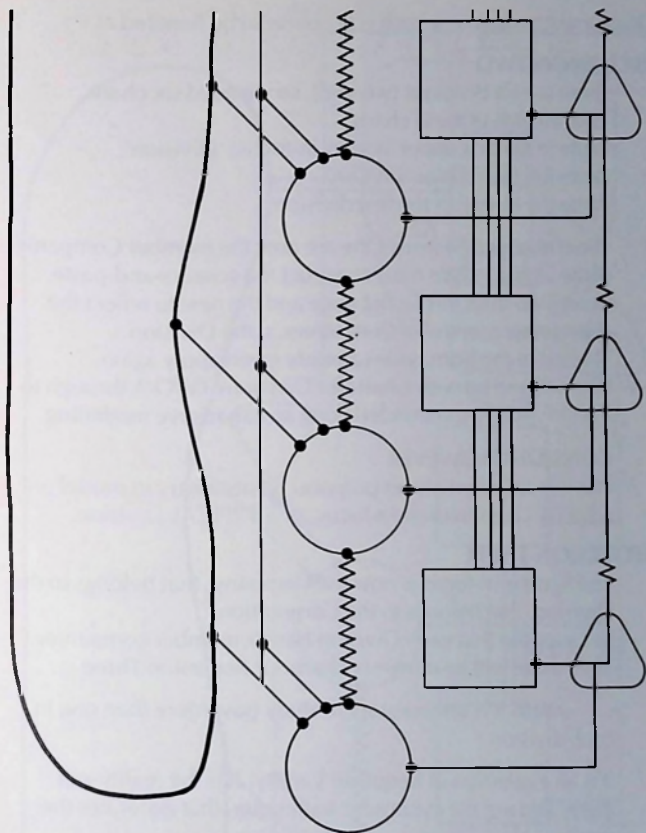


CHART TWO

DIAGNOSTIC CHART OF
SYSTEM IN FOCUS:

RECURSION NO:
NAME

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Divisional management itself is of course to be handled at

RECURSION TWO

There are six divisions (we said), so we need six charts.

Take the first of these charts.

Write in the box under System-in-focus, 'Division'.

Write Recursion No: 'TWO/A'

Write the NAME of the first division.

The embedded Systems One are now the member Companies of the Division. We must construct the scissors-and-paste Chart Two from this facing page and the next to reflect the appropriate number of Companies in the Division.

The rest of the instructions already given apply again.

You will end up with Charts for Divisions TWO/A through to TWO/F — if you are undertaking an exhaustive modelling.

CONSIDER HOWEVER

that it may (for whatever purpose) be necessary to model only a DIFFICULT Division-in-focus, or a TYPICAL Division.

RECURSION THREE

The System-in-focus is now the Company, that belongs to the Division, that belongs to the Corporation.

Just suppose that each Division has six member companies.

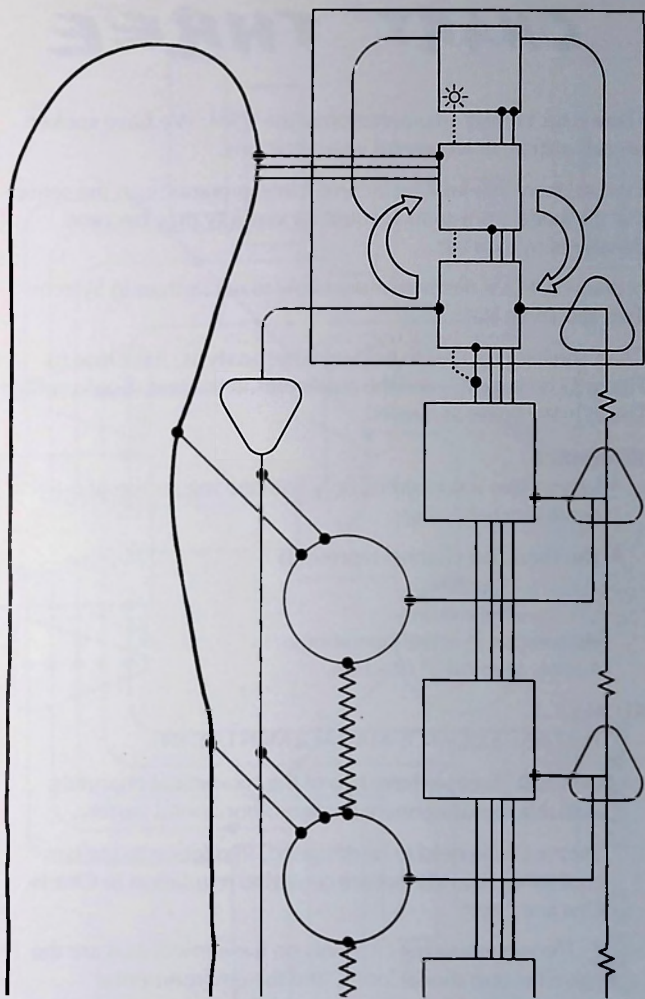
Then there will be thirty-six charts for Recursion Three . . .

. . . unless it is unnecessary to study (say) more than one in each division.

It is all a question of Requisite Variety. It is the reality-out-there, and not the cybernetic technique, that generates the work.

RECURSION NOUGHT

This is the name conveniently used for the Industry (say) in which the Corporation is embedded. It needs to be studied, as argued in the text; but not to call the Corporation itself Recursion One may be confusing.



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CHART THREE

There is no 'correct' interpretation of the VSM. We have spoken instead of more or less **useful** interpretations.

Even so, there may well be *incorrect* interpretations, in the sense that the model's power to account for viability may become **denatured** by their use.

In practice, this is nowhere more likely to occur than in Systems Two and Three Star.

Chart Three is provided to help with the analysis. It is close to Figure 23 on page 87, and the arguments in the text should suffice. Use as many boxes as needed.

REMEMBER

- System Two is concerned only with the regulation of oscillatory behaviour;
- The Three Star channel represents
 - sporadic
 - high-varietyintervention in actual operations.
Audit is a typical 3* function.

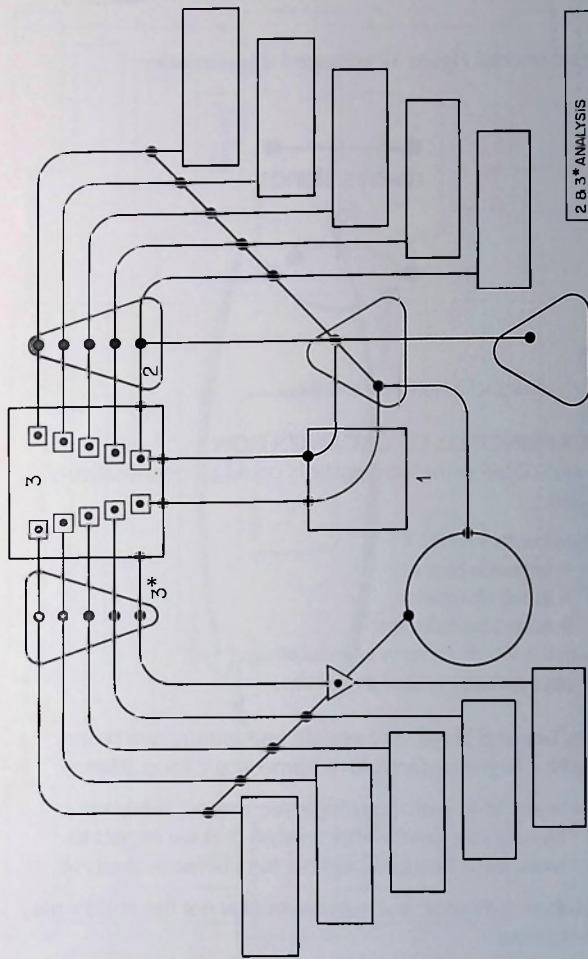
RECALL

The FIRST AXIOM OF MANAGEMENT (p. 84).

On Chart Three we have two of the six vertical channels available to management to absorb horizontal variety.

They really do need to be designed, in relation to the two command channels that are central to regulation in Charts One and Two.

NOTE: The two remaining channels on the vertical axis are the 'squiggly-line' operational loops, and the environmental connexions. Both of these require special design treatment, depending on the situation studied. That is why the environmental box in Chart Two has been left blank. It requires elucidation and proper linking (on the model of Figure 37).



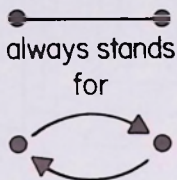
2.B.3* ANALYSIS
 SYSTEM IN FOCUS:
 RECURSION NO:
 NAME:

CHART THREE

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CHART FOUR

On the fundamental Figure 37 appeared this reminder:



— which is to depict a homeostatic loop.

THE FOUR PRINCIPLES OF ORGANIZATION

were enunciated so that homeostasis could be quantitatively evaluated.

They dealt with VARIETY

- between blocs
- along channels
- across transducers

and with the whole process as exhibiting

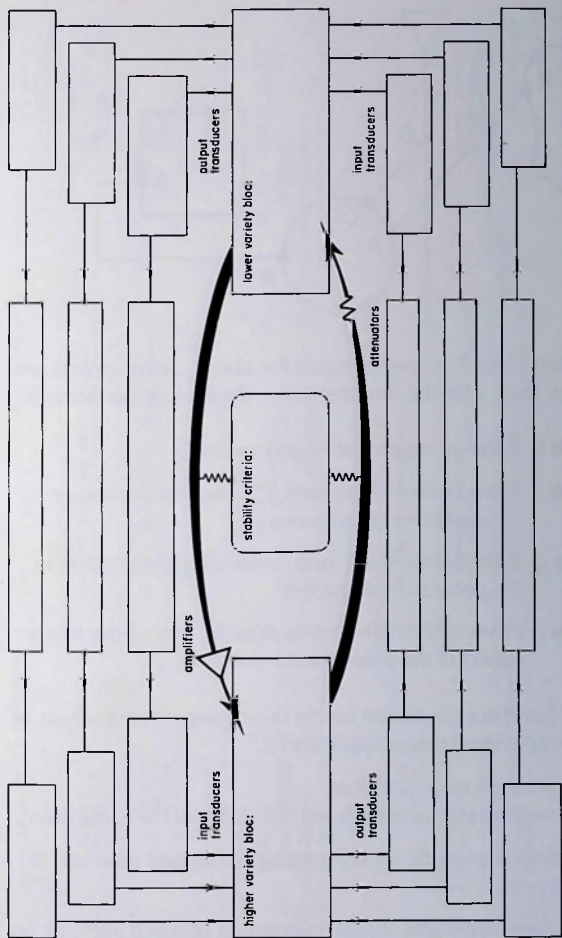
- appropriate cyclical dynamics.

On Charts Two and Three, any straight line joining two points marked with a large dot stands for a homeostatic loop. Hence

— in any VSM with its multiple recursions, there are literally *thousands* of homeostats that we expect to work, each being susceptible to cybernetic analysis.

This is a sobering thought: but management is not the child's play its critics suppose.

WHEN IN DOUBT about the effectiveness of a homeostatic loop, analyse it with the aid of the facing Chart, and check that the **FOUR PRINCIPLES** apply — and are actually effective.



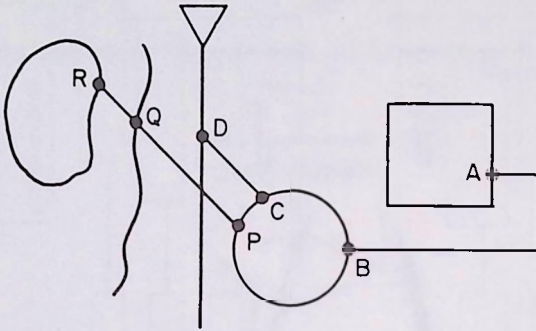
SYSTEM IN FOCUS:
 RECURSION NO:
 NAME:

CHART FOUR

HOMEOSTATIC LOOP ANALYSIS
 POINT TO POINT

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AN EXAMPLE OF CHART FOUR IN USE



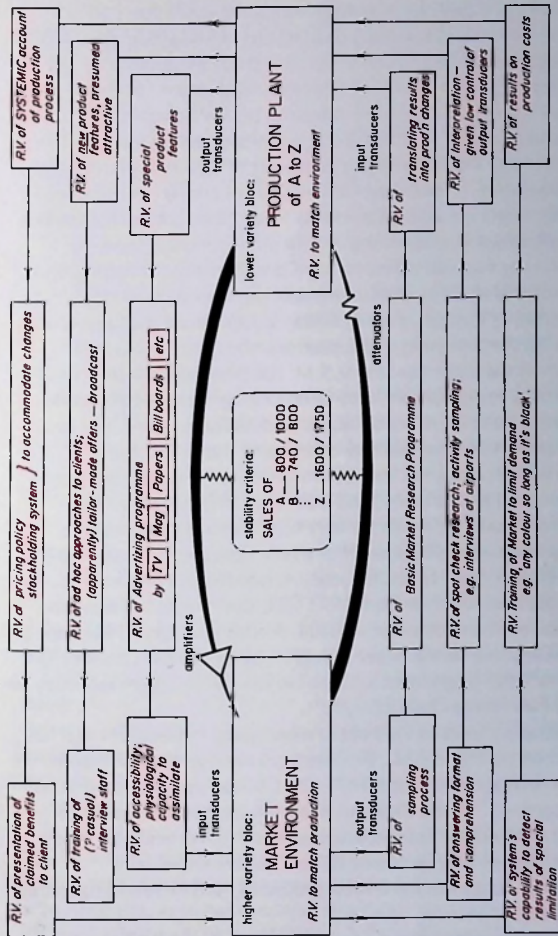
Suppose that Chart Two yields in part the above. Seven points are nominated; they, with the lines between, depict four homeostats.

- A ● — ● B is the management-to-process loop
- C ● — ● D is the System Three loop 3*, marking audit-style interventions in processes
- P ● — ● Q is the homeostatic loop connecting the process to the general environment
- P ● — ● R more specifically connects to (let us say) the *market* subset of the general environment.

Then the Chart Four tabulation on the facing page is an analysis of the homeostat connecting points P and R.

Follow each loop round, and note

- attenuators and amplifiers are 'two sides of the same coin';
- requisite variety (R.V.) is the quantifiable unit involved at all times.
- the three (arbitrarily three) rings will in practice impinge on *each other* — therefore
- 'causality' is a concept of little use in systems theory or cybernetics.



SYSTEM IN FOCUS:
CORPORATION ALPHA
RECURSION NO: TWO/B
NAME: DIVISION GREEN

CHART FOUR

HOMEOSTATIC LOOP ANALYSIS
POINT P TO POINT R

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NOTE TO THE APPENDIX

*Some Applications of the Viable System Model**

Applications of the V.S.M. by its author during the evolution and verification of the model have been so many and so widespread as to defy a proper listing. For the record, however, the range of amenable organizations ought to be indicated, leaving case histories to the published papers and books. Small industrial businesses in both production and retailing, such as an engineering concern and a bakery, come to mind; large industrial organizations such as the steel industry, textile manufacturers, shipbuilders, the makers of consumer durables, paper manufacturers are also represented. Then there are the businesses that deal in information: publishing in general, insurance, banking. Transportation has figured: railways, ports and harbours, shipping lines. Education, and health (in several countries), the operation of cities, belong to studies of services. Finally comes government at all levels — from the city, to the province, to the state and the nation-state itself — and the international agencies: the V.S.M. has been applied to several.

In this opening paragraph we have been talking of one man's work. Obviously then, these were not all major undertakings, nor is 'success' claimed for massive change. On the other hand, none of these applications was an academic exercise. In every case we are talking about remunerated consultancy, and that is not a light matter. The activities did not necessarily last for very long either, since speedy diagnosis is a major contribution of the whole approach. On the other hand, some of them have lasted for years. Undoubtedly the major use of this work to date was in Chile from 1971–73: five chapters ending the second edition of *Brain*³ describe it in full. As this is written, however, a new undertaking on a similar scale is beginning in another country. On the question of what constitutes 'success' in consulting; reference may be made to Part Four, Note One of *Heart*.⁴

Of other people's work in the field of managerial cybernetics that has made application of the V.S.M., first mention must go to Raúl Espejo. He has given his own account of the 1971–73 Chilean application that we undertook together.¹⁵ Since then, his teaching and research at Aston University in England has been centred on the V.S.M., and outcomes have been published in several articles and papers (especially Espejo^{16,17}). His diagnoses have been profound, and he is adding to the corpus of theory.

The number of senior degrees, including doctorates, that have employed the V.S.M. under Espejo's direction is already in double figures. Professor David Mitchell's teaching has generated a similar

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number of postgraduate theses using the V.S.M. at Concordia University in Quebec. Several more have emerged from Brunel University, under the direction of Professor Frank George. In the United States, Professors Richard Ericson and Stuart Umpleby (at George Washington University), Professor Barry Clemson (at the Universities of Maryland and of Maine), and Professor William Reckmeyer (at San José State University) have all made extensive use of this teaching, and others from Australia to India have reported similarly.

At Manchester University in the Business School, Geoffrey Lockett (directing the doctoral programme) has sponsored whole-week 'experiences' of the V.S.M.; and Professor Roger Collcutt has invented a unique pedagogic framework whereby M.B.S. students undertake projects to apply the V.S.M. to functional management, subsequently to merge the insights gained into a general management picture. Another novel development has been made by Ronald H. Anderton in the Systems Department of Lancaster University: practical applications of the V.S.M. in the form of project work have for some years been an important part of his *undergraduate* teaching.

In the development of the technology that goes with the V.S.M. — the operations room, the computer programs, the financial regulatory systems, and so forth — the most outstanding progress since the work of the Chilean team more than a decade ago has been made by Robert Bittlestone, now the head of Metapraxix Ltd in England.

A veritable kaleidoscope of applications of the V.S.M. has been presented by Dr Paul Rubinyi in Canada. From penological systems to health services in the public sector, from oil companies to wheat cooperatives in the private sector, and from provincial planning to air transportation in federal government: every kind of organization has been mapped, in virtually continuous work over the last 13 years.

Other separate applications in Canada include the work of Walter Baker, Raoul Elias and David Griggs¹⁸ on the Fisheries and Marine Service, which took unique advantage of managerial involvement, and that of Raoul Elias for Gaz Metropolitan. David Beatty has used the model for educational planning in Ontario, and I believe that it has been in independent action on the West Coast as well.

In Latin America, Professor Jorge Chapiro is a leading exponent of the V.S.M. who consults over the whole spectrum of industrial and governmental management in several countries.

In Australia, applications in an insurance company have been made by J. Donald de Raadt; in Switzerland Dr Peter Gomez¹⁹ has used the V.S.M. in a publishing company, making an interesting experiment in melding this methodology with the 'root definitions' of Professor Peter

Checkland. In wider fields still we find a useful V.S.M. application in Finland by Dr S. Korolainen²⁰ to ekistics; and David Noor has published "A viable system model of scientific rationality" as a working paper from the University of Western Ontario.

On the strictly biological side, but not from the original neurophysiological perspective, Dr Richard Foss in England has made many mappings: for example, on the Eukaryote cell, the annual plant and the honeybee colony. He has found the V.S.M. to hold in such diverse systems; and he is extending the work to the slime mould *Dictyolaelium*, to lichens and to vertebrates, considering both the evolution and ontogeny of each system.

It does appear that the V.S.M. has sufficient generality to justify its origin as an attempt to discover *how systems are viable*; and that it also generates considerable power to describe and predict, diagnose and prescribe. No systematic archive of applications has been kept: perhaps it would be helpful to start one. These notes are compiled from such recollections and records as happen to be to hand.

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