Volume 2.

BIBLIOGRAPHIC REFERENCES and NOTES

by

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Two volumes:
Volume 1: The Role of Intervention in Strategic Change.
Volume 2: This Volume

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ANNEX 5

BIBLIOGRAPHIC REFERENCES and NOTES

Note 2
Outline: I. OBJECTIVES OF STUDY
Subject: RESEARCH STATEMENT

TITLE: The Role of Intervention in Strategic Change.

RELATIONSHIPS between INTERVENTION and PROGRAMME RISK in STRATEGIC PLANNING for European Space Development programmes.
Source:

59) Meaker T. Thoughts in Oct. 1990

Note 3
Outline: II. STRATEGIC DEFINITION
Subject: Definition of Strategy

Strategy is the set of basic characteristics of the match an organisation achieves with its environment. Strategy is the means for coping with both external & internal changes; the path charted for the organisation is linked to the organisational goals and objectives which are to be achieved.
Source:

11) Hofer & Schendel; "Strategy formulation: analytical concepts"; west publ.co,st.paul,Minn. Chap.1.1978.

Note 4
Outline: II. STRATEGIC DEFINITION
Subject: Hierarchy of Strategies

Three levels; CORPORATE(what business should we be in; scope & resource deployments), BUSINESS(how to compete in the particular industry or product/market segment), & FUNCTIONAL (maximisation of resource productivity; synergy of great importance but less so at business, & even less at corporate, levels).
Source:

11) Hofer & Schendel; "Strategy formulation: analytical concepts"; west publ.co,st.paul,Minn. Chap.1.1978.

Note 5
Outline: II. STRATEGIC DEFINITION
Subject: Organisational Structure.

Structure in an organisation refers to information flow and to the hierarchy of decision making.The design of an organisational structure must consider: centralisation and decentralisation; line and staff function; organisation by product and geographic area etc.
Source:

12) Dessler;"Organisation & Management";prentice hall inc;Englewood cliffs,NJ. 1976.

Note 6
Outline: II. STRATEGIC DEFINITION
Subject: Organisations Definition.

Organisations are purposeful social units which consist of people who carry out differentiated tasks which are coordinated to contribute to the goals of the organisation.
Source:

12) Dessler;"Organisation & Management";prentice hall inc;Englewood cliffs,NJ. 1976.

Note 7
Outline: II. STRATEGIC DEFINITION
Subject: Definitionss

1) Chandler(1962)."The determination of the basic long term goals & the objectives of an enterprise, and the adoption of courses of action & the allocation of resources necessary for carrying out those goals.(from "strategy & structure:chapters in the history of Industrial Enterprise").

2) Andrews(1971)."Corporate strategy is the pattern of major objectives, purposes or goals and essential policies or plans for achieving those goals, stated in such a way as to define what business the company is in or is to be in and the kind of company it is or is to be.(from" the concept of corporate policy")
Source:

224) Andrews(1962); Chandler(1971)

Note 8
Outline: III. STRATEGIC PLANNING
Subject: Using Scenarios to Develop Strategies

Ideally, a scenario should be a description of a possible future in which social, political, economic & technological developments evolve in an internally consisent order. They cannot be constructed as an aid to thinking about the future without our first gaining a proper understanding of how these interactions have taken place in the past. A scenario is not a forecast. They are descriptions of possible future worlds; worlds in which the consequences of alternative strategic choices made today must be examined.(see photocopy notes in file).
Three planning horizons:
1) CYCLICAL(5yrs. business cycle scene;
2) ARCHITYPE (10-15 yrs.describing alternative developments of socio-political & economic structures..architype refers to a fundamnetal change in the dev. going in distinctly different directions;
3) EXPLORATORY (very long periods).

Scenarios can be defined as ways to achieve specific goal.

Significant questions:
- do the scenarios describe all possible futures as seen by the decision makers/
- what are the probabilities of the various scenarios as PERCEIVED by the decision makers?
- what is the trade-off between criteria?
- what is the risk-taking attitude of the decision makers?

STRATEGIC DECISION METHOD:

UNCERTAINTY--scenarios, competitor analysis--key variables--Expected
+ income model--expected income ranges(A)
+
RISK
+
+
LONG TERM GOAL--strategies--criteria -- Required income model--required
income to meet criteria(B)

Comparison of A and B gives quantified RISK & hence DECISION definition.

UNCERTAINTY refers to the company business envirnment.
Top down proposals (from company top man.) are qualitative; bottom up ideas/ proposals are quantitative. Strategic decisons are made at the interface between top down & bottom up where proper communication takes place where risk & reward should play a central role.
We tend to ignore the uncertainties in the world which we have defined around the project.

Source:

39) Leemhuis; Manager corporate planning, Shell NL. Long Range Planning, vol.18,no.2, pp30 to 37, 1985.

"Using Scenarios to develop Strategies".

Note 9
Outline: III. STRATEGIC PLANNING
Subject: Step by Step Strategic Management

Step 1: Present company position...where are we now? how are we performing?

step 2: trends analysis;
organisations environment..where are we going/what is happening in
our environment?

step 3: options analysis: where do we want to go? how do we change from
where we are going to where we want to go?

step 4: strategic framework & statements: preferred future aims,
objectives & policies: markets and products; financial;
technological; manpower; social.

(It seems to me (TM) that the environment IS the market.)

See BUSINESS ATTRACTIVENESS/ COMPETITIVE CAPABILITY matrix.

This paper is about an INTERVENTION by a management consultancy in a company.(paper on file).
Source:

40) Green & Jones: "Strategig management step by step"; Long range planning,vol15, no.3, pp61 to 70, 1982. pergamon press.

Note 10
Outline: III. STRATEGIC PLANNING
Subject: Defining Strategic Problems: subjective criteria...

Information gathering in problem formulation also relates to the political nature of the organisation and to the credibility & commitmnet of individual stakeholders (Narayanan & Fahey 1982; Dutton, fahey, & Naryanan 1983; Lyles & Mintroff 1985).

The individual or group who has credibility, diplomatic skills, & commitment to a particular view can successfully impact the process of information gathering during problem formulation (Lyles & Mintroff 1985).

Strategic problem formulation(SPF) frequently centres on its sociopolitical nature.(Pfeffer,Salacik & Leblebici 1976; Hickson et al 1986).

The role of the executives in SPF depends on their abilities to manage the sociopolitical processes & on their own personal frames of reference.

The process of definig the nature of a problem is dependent upon the histories & backgrounds of those responsible for defining the problem (Bruner & Kresch 1950; Hayes & Simon 1977; Herden & Lyles 1981; Ramaprasad & Mitroff 1984; Taylor 1975).

Hedberg(1974:19) suggests that an "organisational decision makers choice of strategy is determined by the perceived problem, the available degrees of freedom(the ACTION SPACE), & a perceived function."
Starbuck & Hedberg(1977) expand this concept further by suggesting that organisations will invent the environment to which they will respond by deciding which aspects of the environment are important or unimportant.

"Politicality" is a term developed by Hickson et al(1986) to describe the process of negotiation among competing coalitions within an organisation. Lyles refers to this as "diplomacy" & describes its two components as:
"Scanning is the process of assessing what people with power think about the nature of the problem & of weighing the implications of political support for each view.
Solicitation is the phase of gathering political support for a view & strengthening the confidence in the person or group presenting the view (1918).

Subjective criteria.
A semantic differential scale with 12 items(bad/good;
- worthless/valuable;
- unimportant/important;
- stable/ dynamic;
- unpleasant/ pleasant;
- ineffective/ effective;
- mysterious/ understandable;
- confusing/ clear;

- tense/ relaxed;
- political/ unpolitical;
- simple/ complex;
- unemotional/ emotional;

was developed to reflect composite scores representing CLARITY, POLITICALITY, & COMPLEXITY (a 12 by 3 matrix). Based on Osgood et al ("Measurement of Meaning",1975) extensive development of the semantic differential with regard to the evaluative factor, the potency factor & the oriented activity factor which they suggest are the scales that show the largest reduction in variance.

Ideas from this study:
-managements do value & recognise the complexity of the SPF process;
-the SPF process utilizes more complex enquiry methods which are perceived by the managers to be clearer than more simple enquiry methods;
-it is up to the upper level managers to interpret & assign meaning to the unanticipated environmental events that occur, & to generate support for a problem area as an issue.
Source:

42) Lyles Marjorie; Defining Strategic Problems: Subjective Criteria of Executives. (Organisation studies 1987, 8/3; 263-280)

Note 11
Outline: III. STRATEGIC PLANNING
Subject: Definitions

STRATEGY: is the array of options & priorities with which one elects to compete (offer superior value to the customer) & to survive(sustain a level of financial performance that will continue to attract capital & to retain the autonomy of a business- in other words protect it from financial attack.)

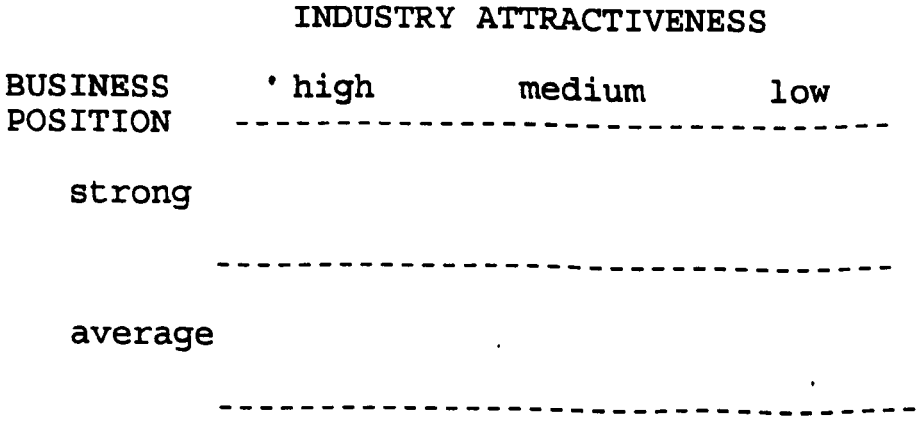
STRATEGIC PLANNING: addresses the continued viability of strategy; it probes the need for change. Is change necessary? In what direction? At what rate?

STRATEGIC MANAGEMENT:is the implementation of modifications in the fundamentals of how one competes & survives. It controls the actions & behaviour required to implement change.

Michael Porter: "business success rests on satisfying customer needs."

Strategic planning is a journey and not a destination; the landscape will therefore change. Four different components;

- portfolio optimization
- resource strategy
- sources of long term growth
- management staffing, organisation & culture.



Industry attractiveness & business position matrix.

Source:

58) Steele:Managing Technology. Mcgraw hill,1988.

Note 12
Outline: III. STRATEGIC PLANNING
Subject: Swiss Un. etc.World Survey of Future Market Leaders

From TV interview with Dr. Gaill on superchannel at 11:00hrs. 20 June; predicted that Japeneses will contiue to lead because they have cultural characteristcs that WERE present in Euro/US at time of their industrial revolution eg tenacity, loyalty, the best product is yet to be made(striving for better performance and quality). They are also building a very good education base+ they have technology flexibility. US + Euro may suffer from having to accomodate large migrant workforce (Mexicans, E.Germans etc.) whereas Japan is depending on an increasingly educated workforce. The change time for management/company direction, technology direction, and education direction was given as 3/5 yrs., 7/10 yrs. and 15/20 yrs. respectively.

Source:

59) Meaker T. Thoughts in Oct. 1990

Note 13
Outline: III. STRATEGIC PLANNING
Subject: Forecasting

Forecasting has three main functions;
1) the identification of strategic & operational business objectives ,
2) the translation of objectives into facilities rtequirement projections,
3) the development of facilities strategies and alternative solutions.
Source:

77) Ryburg & Wodka; forecasting is vital in long & short term planning. facities design & management v9n2 feb. 1990

Note 14
Outline: III. STRATEGIC PLANNING
Subject: Strategic Goal Setting.

Strategic goal setting makes sense because:

1) it provides a mechanism for reducing risk while interfacing with the political environment;

2) it provides a means for reducing environmental turbulence & increasing internal planning stability;

3) it enables elceted leaders to achieve concensus on tough & controversial policy issues.

Common constraints inc. lack of perceived neeeds for small group sizes, & great expectations that do not mesh with reality.
Source:

78) Gabris. Educating elected officials in strategic goal setting.
Public prod. & Management review. v13n2. 1989.

Note 15
Outline: III. STRATEGIC PLANNING
Subject: Strategic Planning

A necessary prelude to effective strat. planning is a clear articulation,by senior management,of the companies organisational mission.

An effective strategic plan should contain:

1) a prioritized outline of the broad objectives of the organisation as a whole, as well as objectives for pertinent segments of the organisation,
2) a study of factors such as population trends, demographics, availability of human resources, capital needs, & sources of funding,
3)a breakdown of the total risk management plan into regional subsets,
4) an audit of available resources,
5)a systematic analysis of constraints,
6) a timetable,
7) a description of the review process,
8) a prioritised listof action items,
9) a consideration of alternatives,
10) a clear set of strategies,
11) task assignments,
12) administration.

Source:

80) Kakis. Applying Strategic Planing.
Bus.Ins. v24n29 1990

Note 16
Outline: III. STRATEGIC PLANNING
Subject: Strategic Thinking with Computers

SWOT: analytical
technique:"Strengths,Weaknesses,Opportunities, & Threats.

The method is designed to place emphasis on individuals & individuality; it seems likely that the sense of involvement & the sense that ides were being listened to was the result of this element method. Not only did the mergng of ideas expressed at the interview contribute to this sense o ownership, but also the intention & ability of thhe mapping technique combined with the software tool to update so quickly was significant. This meant that the crucial ideas that occurred during discussion were captured, and peoples construction retained, in real time.
Source:

147) Eden C; Strategic thinking with computers.Long range Planning.v23,n6,1990.

Note 17
Outline: III. STRATEGIC PLANNING
Subject: Strategic Planning.

Strategic change still apears to happen largely as a result of crisis or from the impact of a key individual.
Source:

148) Denning R. Report on the Paris Conf. on Making Strategy Work. Soc.for Long range Planning Newsletter. Jan.1984.

Note 18
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Decision Making in High Velocity Envirnments.

Proposal 1: In high velocity environments effective firms use rational decision making processes.

Hypothesis 1: In high vel.env.(hve)the more analytic the strat. dec. makingprocess,the better the performance of the firm.

Hyp.2: In hve the more comprehensive the search for strategic alternatives,the better the perf. of the firm.

Prop.2; In hve, effective firme try new things.

Hyp.3: In hve,the more innovative & risky the set of strategic alternatives examined & chosen, the better the perf. of the firm.

Prop.3:In hve,effective firms make strategic decisions quickly.

Hyp.4: In hve,the shorter the time frame in which strategic decisions are made, the better the perf. of the firm.

Prop.4: In hve, effective firms build in decision execution triggers.

Hyp.5: In hve,the greater the articulation of IMPLEMENTATION triggers at the time a strategic decision is taken the better the perf. of the firm.

Prop.5: In hve effective firms vest power to implement strategy in the top man. team.

Hyp.6: In hve, the greater the DELEGATION of EXECUTION triggers the top management team, the better the perf. of the firm (BPF).

Hyp.7: In hve, the more the power to make functional strategy decisions is delegated to functional executives, the BPF.

Hyp.8: In hve, the greater the power centralisation in the CEO, the greater the level of political behaviour among the top management team.

Hyp.9: In hve,the greater the political behaviour among the top man. team, the poorer the perf. of the team.

Bibliographic Notes and References

Source:

1) Bourgeois & Eisenhard; Manaagement Science; vol 34,no. 7 july 1988. Strategic decision processes in high velocity environments:four cases in the microcomputer industry.

Note 19
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Integration of Environment and Departmental Powe...

Specific approaches to data collection are necessary. because the model depicts a process, longitudinal research is necessary eg first hand observations of the strategy formulation process over a period of time, interviews with key persons involved, the collection of objective & perceptual organisational data at multiple points in time as the strategy process unfolds.

Mintzberg(1983) proposed that an organisations external coalition(usually represented by its board of directors) may either be dominated(dept. power influence small since CEO dominates), divided(internal dceision making will become politicised as rival groups side with different factions of the external coalition..dept. power will have a modest impact but power of depts. that choose winning side will increase), or passive(dept. power will dominate if the CEO is not dominating..a power vacuum is created thus leading to attempts by depts. to influence strategies so that their own perspective is dominant.). The above ALL RELATES TO INTERVENTION.

CONCLUSIONS:

1) Reaffirmation of work of Hambrick(1981); MacMillan & Jones(19860; Mintzberg(1983); Narayanan & Farey(1982) etc. regarding how the use of power can have a significant effect on both the formulation & implementation of major strategic level decisions. because depts. are the primary way in which functionally differentiated organisations and the strategic business units of divisionalized firms divide up their main activities, depts. or coalitions of depts. are seen here as the critical unit of analysis for understanding how strategies are influenced. Top decision makers must respond to political realities within theirrganisation if major strategies are to be IMPLEMENTED successfully. Consistent with strategic contingency theory, dept. power itself is considered as a function of the subunits capacity to cope with uncertainty, its centrality in the organisations flow of work, & its non-substitutability.

2) The impact of the external environment on strategy is seldom direct & the cause-effect relationship between the two is not always clear. Although top decision makers often interpret their environment as it is perceived to exist, they also may create or enact an environment that is different from the one they have been experiencing & perceiving.
Source:

41) Provan: "Environment, dept. power & strategic decision making in organisations: A Proposed Integration. Journal of management vol 15, no1, 21-34. 1989.

Note 20
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Subjective Judgement.

Source:

45) von Holstein, "Manual for encoding probability distributions". SRI International, Menlo park, CA 1979)

Note 21
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Techniques.

MAUM (multi attribute utility measurement):
a rating scale approach attempting to identify the values of each participant in the "management through decision by consensus" approach; showing how much they differ from each other with the objective of reducing such differences.
DeGreene(see ref. 50) sets out 10 basic steps:
-identify the decision making persons & organisations;
-identify specific & relevent decisions;
-identify consequences;
-identify value dimensions through face to face meetings;
-rank the dimensions in order of importance;
-derive their weighted average;
-measure the location of each action on ascale of 0-100;
-calculate outcome(consequence) of possible decisions via the weighted average;
decide on the basis of max. aggregate utility.

Japanese penetration of world markets has been based on Jap. innovative improvements on scientific discoveries made by others; this model apparently cannot be transplanted. The reasons are clear when we consider that the major factors that brought success are claimed to be:
-Japan is a homogeneous country;
-economic growth & external competion are seen as national goals;
-there is a combination of Chinese invention & Jap. discipline;
-Gov't. policies encourage inter-company co-operation;
-there is generally better quality & rel., with high productivity.

In the West, making a decision involves finding an answer to the question with which one is confronted. For the Japs. decision making consists of defining the question.

Drucker sets out the decision making process as follows;
- define the question: what is the decision all about?
- discuss dissenting opinions & the approaches suggested.
- focus on alternatives rather than on the "right" solutions.
- determine who finally takes the decision & at what level.

The Japanese seem to disregard what is believed to be a golden rule in decison making:the creation of discussion as a consequence of dissent. This should be a forerunner of the consensus decision.

The right decision is more likely to be developed if there is disagreement. Dissent is said to help by:
-safeguarding the decision maker against becoming the prisoner of his own concepts;
-providing alternatives, & thus min. the risk taken;
-stimulating the imagination in matters where there is uncertainty;

- protecting the decision maker against plausible but false information.

Problem solving groups do not make decisions but provide a basis for decisons making..by consensus.

The Delphi method: Designed to develop creative solutions to problems by using groups of experts, structuring group communications in such a way as to make it effective. There are 4 phases:
- exploration;
- understanding;
- reconciliation;
- evaluation.

Lateral Thinking:
right hand part of brain: intuitive, imaginative & creative(lateral) functions.
Lat. Thinking credited to Edward de Bono(see ref. 10 & 51): Non verbal sense images for management situations..."the drawings do not have to be accurate or descriptive, but they do have to be simple enough to lodge in the memory. They should not have to be examined in detail the way a diagram is examined, because they are not diagrams. They are intended to display the flavour rather than the substance of the situation being described."

Source:

48) Kharbanda & Stallworthy;Managerial Decision Making, Management Decision; MCB vol.28 nos. 3&4 1990.

Note 22
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Strategy, Managers Job, Organisational Configura...

Some important points, a pragmatic approach.
Folklore* myths(*) compared with facts(a), b), etc.):

1)* Manager is reflective , systematic planner.

a) study after study has shown that managers work at an unrelenting pace, that their activities are characterised by brevity, variety & discontinuity; & that they are strongly oriented to action & dislike reflective activities.

2)* the effective manager has no regular duties to perform.

b) In addition to handling exceptions, managerial work involves performing a number of regular duties, inc.ritual & ceremony,negotiations, & processing of SOFT information that links the organisation with its environment.

3)* the senior manager needs aggregated information, which a formal MIS best provides.

c) Managers strongly favour the oral media- namely telephone calls & meetings.

4)* Management is, or at least is quickly becoming, a science & a profession.

d) The managers programmes-to schedule time, process information, make decisions etc.- remain locked deep inside their brains.

Studies have shown that managers spend as much time with peers & other people outside their units as they do with their own subordinates &, surprisingly little time with with their own superiors (45, 45, & 10% resp.).
The manager cultivates such contacts largely to find information. In efect the liason role is devoted to building up the managers own external information system-informal, private, oral but nevertheless effective.
By virtue of interpersonal contacts, both with subordinates & with the network of contacts, the manager emerges as the nerve centre of his or her organisation.

There are two interesting features about development projects at CEO level. First, these projects do not involve single decisions or even unified clusters of decisions. Rahter they emerge as a series of small decisions & actions sequenced over time. Apparantly CEOs prolong each project so that they can gradually come to compreheend the issue, if it is a complex one.
Second, the CEOs study many, maybe 50, projects at the same time.They seem to keep a no. of projects in the air (juggling); one comes down periodically, is given a new

burst of energy & returns to orbit.

The"entrepreneur role" describes the manager as the voluntary initiator of change; the "disturbance handler" role shows the manager involutarily responding to pressures...change is beyond the managers control. "Resource allocators" role .inc. the managers own time. Ensures all decisions are interelated-all pass through the same brain.
The "negotiator role"; considerable time spent in this role.

Strategy making refers to how the collective system caled organisation establishes, & when necessary changes its basic orientation; it also takes up the complex issue of collective intention-how an organisation composed of many people makes up its mind.

Emergent strategies..strats. without clear intentions.

Strategies can form as well as be formulated.

To manage strategy is to craft thought & action, control & learning, stability & change.
Source:

57) Mintzberg, Mintzberg on Management.1989.

Note 23
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Technology in Total Business Context

Programme selection system: focusses on two sets of factors; leverage, or attractiveness, & probability of success.

A) LEVERAGE FACTORS:

1) size of potential market or of cost reduction. the size of themarket was estimated by analogy to existing businesses in the company, for which a typical dollar range could be determined.

2) likely market sharel; takes account of competitive situation.

3)sensitivity of the market to technical considerations.

B) PROBABILITY FACTORS :

1) nature of technical barriers to be overcome

2) technical competition

3) fit with organisational skills & resources

4) difficulty of transitioning to operations

The system worked as follows:

M = market size in millions of $

G = market growth:
- well above company average
- above company average
- equal to company average
- below company average

K = market share:
- dominant position
- one of two or three leaders
- one of the pack
- a minor player

S = sensitivity to technology:
- dominant factor in success
- one of several important considerations
- other factors more important

IMPACT = M * G * K * S

C) PROBABILITY OF SUCCESS:

B = technical barriers:
- no problem, just a matter of applying resources
- some uncertainty over the path, but little doubt of

goal
- a tough challenge, but we believe we can do it
- may be possible

C = technical competition;
- we lead the world
- one of two or three leaders
- one of the pack-no credible advantage
- a dark horse

F = fit with resources:
- we have the skills & facilities
- stretching, but we believe we can handle it
- calls for new skills outside our experience

T = transition difficulty
- an operating component wants it & can handle it
- not clear who should get it
- faces hostility in operations
- no aparent home-dont know what we'll do with it.

PROBABILITY of SUCCESS = B * C * F * T

Step definitions for all factors except market size were on a semilog scale from 1.0 to 0.01 (or less), but no arbritary no. of steps was imposed.

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Risk(R) in a technological programme = P * E

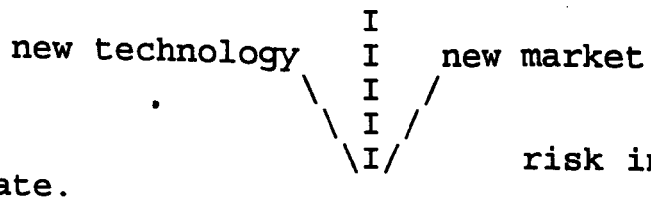
where P = prob. of failure or partial success & E expenditure on the programme(or magnitude of consequences.).

Spectrum of technological risk:

Application of state of art technology	evolutionary improvement	external technology	new
low risk			high risk

Risk can be thought of as resulting from movement away from the existing state of affairs in any of three dimensions: technology, product & market, with the first being separated into product & process and the last being subdivided into customers & channels of distribution. the further along each dimension that a development is situated the greater the risk; movement on two dimensions greatly increases risk. The point at greatest distance on all dimensions (think of a cube) is the suicide square.

new product



risk increases along each ordinate.
Source:

58) Steele:Managing Technology. Mcgraw hill,1988.

Note 24
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Horizontal Organisation

In the effective horizontal organisation, results flow from the actions that are based on decisions, & these decisions are effected by 3 important attributes of the horizontal organanistion:

1) lateral decision processes;

2) the horizontal network;

3) shared decision premises.

These attributes are themselves interralated.
Inherent in this organisational approach is the view of strategy that is more incremental, but also more flexible, more responsive, & better able to obtain maximum advantage from the full set of opportunities available to the multinational corporartion worldwide.
Source:

79) White & Poynter. Achieving worldwide advantage with the horizontal organisation.
Bus. Qrtly.(canada).v54n2. 1989.

Note 25
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Multiple Criteria Decision Making

Although the multiplicity of objectives in many areas of human decision making & judgement can be readily recognised & accepted, multiple goal behaviour of men & organisations has traditionally been approximated by single, unchanging, & technically manageable criteria. The results of psychologists & other social scientists, that individuals & groups do have multiple goals, none of which can be pursued to the complete detriment or sacrifice of others, have BEEN IGNORED. Even further, these goals often change not only in the course of time but also in the course of their pursuit. finally these goals are certainly not independent of the means used to pursue them. The traditional utility approach, suggesting that the alternatives with the highest utility will be chosen, is not much help under such conditions. About the only property this simple idea has is transivity. Transivity, however, is not the behaviour people manifest when facing situations characterised by multi-attribute consequences.

Attempts to translate nonmonetary criteria into monetary terms has been considerably overdone. Qualitative measurement is inappropriate where purely quantitative approach fails. dealing with such "incommensurables' as quality of life, polution impact, educational level etc. can no longer be avoided.

Rejuvenation of the role of human judgement seems to be one of the main aspects of the literature on multiple criteria decision making but many participants seem to be sceptical about mans ability to choose among multi-attributed alternatives-, suggesting an INTERACTION.

Source:

82) Cochrane & Zeleny. Multiple Criteria Decision Making.Un.of S.Carolina Press 1973.

Note 26
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Multiple Criteria Decision Making

Paper by K.R.MaCrimmon. Un.of British Columbia. (contained in above ref.)

Source:

82) Cochrane & Zeleny. Multiple Criteria Decision Making.Un.of S.Carolina Press 1973.

Note 27
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Decision Making at Increasingly Senior Levels

Managers at increasing levels rely on the hard references (in the ref.frame), specs., organisational rules & directives etc., as having been taken care of, compliantly, by their subordinates. This is the point at which they start. The higher the manager, the more he relies on this hard reference frame; this enables him to bridge his knowledge/ memory/ mental capacity gap.
Source:

85) Meaker. Thoughts. Arville.Dec.1990

Note 28
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Decision Making; Analysis.

This paper reports from a field study of a single organisation to evaluate the D-M concept; six decisions were studied over a 3 month period. The organisation was situated in the US and its main business was supplying computer equipment and professional services to commercial, government & educational institutes for scientific & business use.

Analysis of top-level plannning decisions in the framework of Cyert & Marches A Behavioural Theory of the Firm; they treatedthe organisation as a coalition of individuals and analysed the decision process of the organisation. They presented three major components of the decision process;
- goals,
- expectations, &
- choice,

and four relational concepts,
- organisational learning,
- conflict resolution,
- problemistic search, and
- uncertainty avoidance.

Conflict among members of a coalition is never fully resolved but only kept to a manageable level.
Choice is a response to a perceived problem, affected by standard operating rules for coping with an uncertain environment. Choice involves the selection of an acceptable alternative & is influenced by organisational slack.
Organisatons do not seek a maximum expected value or a minimum level of operations for the future but focus on short-run feedback as a response
to immediate problems. in addition they seek a negotiated environment, in which standard pricing policies for members of the industry, normal business practices, & other suuch phenomena alow the organisation to reduce the uncertainty in iits competiive environment.
C & M considered the coaliton the body that formulated & acted upon expectation. In the research reported here, expectations were based on the repeated interaction of two people or two groups in the time between initiation & final acceptance of a project.

In strategic decisions it seems likely that:
1) more levels of the organisation, as well as
2) more people of varying backgrounds,
must be alerted both to the need for a type of project aand also the desireability of a particular alternative.

HYPOTHESIS 1: Coalition participants tend to contribute projects that are likely to be accepted & to withhold projects which have little chance of approval;where possible, projects are adapted to fit the goals.
HYPOTHESIS 2: The bias added to an obbjective appraiisal of a project

by a sales subordinate is directly related to;
a) the degree to which the success of the product depends upon external acceptance;
b) the uncertainty in other informationn sought for appraisal;
c) the relative ignorance of the superior compared to the subordinates;
d) the superiors own perception of the uncertainty and the dependence on external representationn, and
e) the lack of the subordinates knowledge off the difference between appraisal & external representations of proposed projects.
HYPOTHESIS 3. the bias added to a objective proposal of aa project by a technical subordinate is directly related to:
a) the degree of dependence of the success of the product upon technical reliability, or sophistication;
b) the uncertainy in other information sought for appraisal;
c) the relative ignorance of the superior compared to the subordinate;
d) the superiors perception of the uncertainty & the relative importance of the technical factors, &
CONT'D ON NOTE 29

Major additional criteria suggested as an extended C & M apprroach are:
- the impact of multiple organisational levels on decisions,
- the bilateral bargaining between project proponents & those managers responsile for review of proposals,
- the influence of technology and general uncertainty in the environment upon criteria for project evaluation,
- the nature of an active stimulus for search induced by corporate strategy rather than the more passive, crisis induced stimulus suggested by C & M,
- the concept of a threshhold-level system by which projects quickly are rated or evaluated on multiple attributes,
- the Pollyanna-Neitzsche effect, by which ex post uncertainty absorption can be used by firms membbers to induce a positive-thinking approach to subsequent performance.
Source:

144) Carter;The behavioural theory of the firm & top level corporate decisions.Admin.science quarterly.

Note 29
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Continuation of NOTE 28.

e) the desire of the subordinate to exploit his expertise in the evaluative portion of the decision. thuss a conscious desire by the technicians to have a dominant voice will tend to increase substantially the influence of te technical factors.
HYPOTHESIS 4. The variables which influence the amount of data provided by a staff for evaluatve information aree:
a) the data perceived as desired by the higher level for decisions;
b) the amount of data necessary in order to gain a favourable decision;
c) the ease of developing data, and
d) the extent by which the dept. or individual participants will be held 'accountable for later performance related to the data.
HYPOTHESIS 5. The effort made by a member or a dept. to gain acceptance for its project forecasts depends upon:
a) the importance of the decision to the member or group;
b) the assessed probability of gaining approval for the view;
c) the accuracy of the underlying or supporting evidence.
HYPOTHESIS 6. The greater the uncertainty of outcome in the total environment of the organisation, the greater the number of criteria, that is goals, which wil be sought o guide he strategic process.
HYPOTHEIS 7. The number of criteria, that is goals,considered in appraising a project is directly related to the degree of uncertainty, where the hierarchy of criteria is determined by mapping of uncertainty versus uncertainty.
HYPOTHESIS 8. Individuals, depts. & organisations will each seek & provide projects that meet the accepted goals & are related to existing projects.

The company evaluated its proposals on the basis of various criteria & threshhold levels.(see paper in Dec. Making file).
Source:

144) Carter;The behavioural theory of the firm & top level corporate decisions.Admin.science quarterly.

Note 30
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Social Theory and Social Structure

Public definitions of a situation become an integral part of the situation and thus affect subsequent developments.

If men define situations as real they are real in their consequences.
Source:

145) Merton R; Social theory & social struture;NY, Free press.1968.

Note 31
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Conflict, Decision and Dissonance.

One explanation of a reordering of goals and expectations is COGNITIVE DISSONANCE in which dissonance after the decision is a direct function of the number of items the person knows are inconsistent with the decision.
Source:

146) Festinger 1; Conflict, Decision, and Dissonance. Stanford Un.. Press.1964.

Note 32
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: The effect of perceived risk in decsion making.

When financial risk was introduced, egoists and act-type respondents indicated that they would be more likely to change their decisions than rule types. Only egoists changed their decisions when social risk was incorporated into the situations. When looking at actual decision change, it was recorded that act utilitarians and egoists would change their decisions if some form of financial risk existed, whereas act utilitarians drop out when social risk is introduced.
Source:

155) Fraedrich J.P.and Ferrell O.C.: The Impact of Perceived Risk and moral Philosophy Type on Ethical Decision Making in Busines organisations.

Note 33
Outline: IV. DECISION MAKING PROCESSES-EXPERT JUDGEMENT
Subject: Critical Path Ananlysis

In highly uncertain areas it may be better to use a "bracket" of times, giving an estimate of the "best" and "worse" and "most likely". This is the situation for which PERT was originally designed.
PERT operates by assuming that the three-time estimates form part of a population obeying a beta-distribution.
The chioce of the B-distribution is not justified on experimental grounds, but it is computationally easy to handle, and its users state that it gives significantly useful answers.
It is the authors(Lockyer) experience that three-time estimates are very occasionally useful to derive a single time estimate, but that the effort of carrying out the probability calculations is not repaid in any way by the value obtained from the resultant probabilities.
Source:

157) Lockyer K. & Gordon J;Critical Path Analysis.Pitman,1991.

Note 34
Outline: V. ORGANISATION- growth- r & d
Subject: Research and Development Classification

Research and Development can be classified into:

a) academic;

b) governmental;

c) independent laboratory; and,

d) industrial,

research.

It could also be classified as offensive or defensive depending on the intent of the work with regard to the actions & products of competitors.

The OECD classification is as follows(OECD report on "the measurement of scientific & tech. activities";Freeman, 1974.):

a) basic R.
b) applied R.
c) experimental dev.

(Management of High Tech. Research * Development. John Dumbleton.Elsevier.1986).
Source:

2) Dumbleton J:Management of high technology R & D; Elsevier;1986.

Note 35
Outline: V. ORGANISATION- growth- r & d
Subject: Research and Development Models

Innovation can be demand-induced or supply-induced; the former is carried out in response to external stimulus, the latter arises within R & D as a development of the areas of expertise which grow with time. Similar to Schumpeters A-phase & B-phase rsep.(Kingston 1977."Innovation".publ. john calder). Supply pushed is far riskier than demand pulled.
Thompson (1967 Organisation in Action,mcgraw hill,NY) shows input. output & feedback relationships.

According to Twiss ("Managing Technological Innovation", Longman, London, 1980) the most critical factors for successful innovation are:
1) market orientation
2) relevance to the organisations corporate objectives
3) an effective selection & evaluation system
4) effective project management & control
5) a source of creative ideas
6) an organisation receptive to innovation
7) commitment by one or a few individuals.

R & D Output can be evaluated using three key factors:
1) the economic value of the tech. produced as opposed to the cost of the research which produced it
2) the amount of tech. output per unit of scientific effort expended(productivity)
3) the degree to which the programs technology supports company goals.

(Quinn,"R & D management, HBR reprints March/april 1963/68, 63/74)

Opportunity criterion(GEE,"the opportunity criterion-a new approach to the evaluation of R & D" Res.Mna.XV,part 3,64-71) depend on the calculation of the value-in-use for a new product in a specified end use.the extent by which this v-i-u is greater than the projected project price is a measure of the driving force for adoption of the product in the marketplace.

Whelan(1976,Project profile reports measure R & D effectiveness, Res.Man.XIX,part 5,14-16) PPR approach looks at different criteria inc. the type & nature of the project, the prob. of success, the cost & the estimated income. the calculation of the ratio of defensive to offensiveresearch is suggested to give an indication of the overall posture of R & D.

(Man. of High tech. R & D, John Dumbleton,elsevier, 1986).
Source:

2) Dumbleton J:Management of high technology R & D; Elsevier;1986.

Note 36
Outline: V. ORGANISATION- growth- r & d
Subject: Organisational Growth Models.

Metamorphosis models: growth is not smooth but involves discontinuities when the degree of change is too large for the organisationto handle it within the existing structure. Age, size,complexity regarded as driving force for metamorphological change. Considered to be oversimplified; complexity considerd important.
Source:

15) Griener;"Patterns of organisational change"; HBR;july/aug.; 121-138; 1972.

Note 37
Outline: V. ORGANISATION- growth- r & d
Subject: Organisational Growth Models.

Work of Chandler extended by Scott;(complexity models).
Scott envisaged 3 stages of growth:
1) simple functional organisation with single product line;
2) growth of 1) with vertical integration but still with single product line;
3) diversification into multiple product lines with introduction of multi-divisional structure in which each div.is a functional organisation with a single product line.

Salter (ref.18) suggested stage 3) should be split into geograhic form & product form. galbraith & Nathanson disagree with the geographic product cente being a distinct stage.
Stopford (ref.19) advocated adding an international aspect to stage 3 & then an additional stage as the international aspects broke away from the parent and formed global operations.
Galbraith & Nathanson model has 5 types of organisation: 1) simple 2) functional 3) holding 4) multi-divisional 5) global.(see fig 10, ref.2)

Thompson(ref.20) considers the organisation as a domain which exists in an environment which is described in terms of two dimensions, STABILITY & HOMOGENITY. Organ. are assumed to act in rational manner & the goal of the organisation is to reduce uncertainty. This approach emphasizes the power aspects of organisational strategies. Internal & external dependencies are considered. functions involving high efficiency are placed within a technological core for protection from uncertainty; boudary spanning units are used to interact with the envirnment. Units will require more autonomy/ decentralisation in dynamic env. conditions; specific rules can govern in a stable environment.

Miles & Snow(ref.21) extended Thompsons work to specify four types of organisation based on adaptive strategy:
1) DEFENDER (narrow product domains/ do not search for new opportunities/ seek to improve efficiency in existing ops);
2) REACTOR (cannot respond effectively to the change & uncertainty of the environment/ no consistent strategy-structure/adjustments made only when forced by env. pressures);
3) ANALYSER (operate in stable or turbulent types of market/ rapidly adopt competitors most promising ideas) &
4) PROSPECTOR (continually search for market opportunities/ respond to emerging env. trends/ create change & uncertainty/ concentrate on product & marketing innovation/ not completely efficient)); a contingency model in that the strategy may be/chosen from a range of options.
ALL the above assumes (Thompson) that RATIONAL LOGICAL DECISIONS are the basis for ORGANISATIONAL GROWTH; but other things must considerd e.g. many social' cultural effects within organ.etc.

Earlier work indicated two polar types of organisation:
1) MECHANISTIC(governed by rules) &
2) ORGANIC (adaptable to fluid env.).

Tripartite set of commitments in firm:
1)to the firm itself
2) to political groups
3) career prospects of individual.

Weick (ref.22) states:
1) difficult to SEPARATE ORGANISATION FROM ENV.
2) ORGAN. DETERMINE THE ENV. much more than generally known(organ. often does NOT KNOW it is doing it);
3) organ must cont. EXPERIMENT with the env.;
4) the only REALITY which exists is THE ENVIR. as PERCEIVED by the organisation.

The intrusion of power & career structure into an organisation & its influence on organisational behaviour may modify the conclusion of the strategy-structure models.

Source:

19) Thompson; "Organisation in action"; Mcgraw-Hill,NY.1967

Note 38
Outline: V. ORGANISATION- growth- r & d
Subject: Research and Development versus Corporate Strategy.

To be efective company must decide how to divide resources between current & future needs.(see fig. 17,ref.2 from Twiss/ref.32.); threats, opportunitiesand internal/ external ideas can be 'Interventions.

R & D faces two conflicting attitudes from management:

1) due to declining profit;

2) due to growing social conscience.(ref.33).

A Gruber et al(ref.34) survey "has indicated that a major reason for R & D failure is the isolation of R & D from other corporate functions & the lack of top management involvement in the direction of the R & D effort".

Decision making depends on the organ. structure(ref.35).
Resource allocation has three levels:
1) definition,
2) impetus,
3) approval;
& 3 levels of hierarchy:
a) dept.,
b) divisional., c) corporate.

Decision making will be pushed down the organ. where there is diversity & uncertainty but that very important decisions will be made centrally.

Duncan(ref.15) provides a decision tree analysis to choose the "right" organisation.

Analysis of FIT of an organ. leads to the study of strategy, structure & process aspects of the firm

Berhman & Fischer(ref.36) looks at multi-national corps.
Five different management styles indicated:
1) absolute central'n.;
2) participative central'n.;
3) cooperati'on;
4) supervised freedom;
5) total freedom.
All applied to a parent and subsidiary company.

Source:

35) Behrman & Fischer: "Overseas R & D activities of transnational companies"; Oelgeschlager, gunn & hain inc.cambridge mass. 1980.

Note 39
Outline: V. ORGANISATION- growth- r & d
Subject: Routes to Growth

Source:

51) Page & Jones; Business Growth. Man.Decision, MCB vol.28/4 1990.

Note 40
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Technology Change in Strategic Planning.

Invention is defined as the discovery & development of technology; this is further defined as a continuous process in which incremental changes are made in a body of tech. Periodically this process is punctuated by radical changes which introduce discontinuities & change the basic tech. Rosenberg(1978) argues that the cutting edge in any particular tech. represents the accumulation of incremental improvements.
The incremental changes are more or less systematic & progressive since they are guided by the needs of users as well as by the inherent logic of the tech. Abernathy argues that product changes are stabilised as dominant designs emerge & become the basis for both incremental changes in the product & for process improvements.Sahals work documents this in several places.

Innovation: the adoption & use of inventions.
Miller & Friesen(1983)argued that the link between environment & strategy is poorly developed & that the nature of strategy must fit the environment.The key decision makers must understand the nature of the technological environment & the level of dev. of the technological infrastructure.

Technology is PART of the OVERALL STRATEGY:
As the infrastructure becomes more highly developed, nontechnical aspects of strategy become more critical in overall effectiveness. While at the early stages of development, technology can provide dramatic returns on investments & shifts in market share, its robustness decreases as the tech. progress in the sector becomes more routine & systematic.

The essence of technological strategy is institution building. To effectively use technology a firm has two concerns. One is to link into the infrastructure, & the other is to push the development of the infrastructure to ensure a continual stream of technological progress down the road.

Technological strategy is INSTITUTION BUILDING:
To effectively make strategic use of tech. & to systematically link business plans to programs of tech. change, an organisation must build the institutional links necessary.
The organisations decision makers must be aware of where in the organisation they are located...marginal or central.

Technological strategy is POLITICAL:
Any tech. strat.involves a political dimension.
The direction & control of the infrastructure is a critical factor in the firms tech. dev. The process of invention reflects many choices about the directions that will be taken, the projects that will be funded, & the needs that will be most directly served. Especially in the early stages

of dev., these choices are necessarily political; there can be no basis for formal evaluation or optimality in choosing among such ambiguous paths. The decisions will reflect the attempts at influence & bargaining among the various organisations. Those firms that actively participate in the political process will have a better chance of benefitting than those that trust the impersonal mechanics of the market.

Technological strategy is POSITIONING.
Viewing technology
change as a series of discrete choices or decisions obscures its strat. nature. Tech. can only be an effective aspect of a firms strategy if the firms leaders have decided how tech. will be positioned in its general strategy;the firm must position itself to participate in & benefit from the process of tech.change supported by the infrastructure.
Source:

52) Weiss & Birnbaum: Technological Infrastructure & the Implementation of technological strategies.
Management science vol 35 no.8 Aug.'89.

Note 41
Outline: VI. 'INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Feedback Change; Intervention Point

1) " Intervention is necessary when positive feedback, from the market place to the input of the company to provide even more output/ growth etc.in THAT DIRECTION, looks as if it will result in instability to the company resulting in increase in risk. The failure of the positive feedback to continue to provide a positive output of the company is presumed to be due to a mismatch between the company and its environment resulting in the predicted strategic plan being incorrect. Hence a strategic change has occurred & intervention is necessary in order to apply NEGATIVE FEEDBACK to the situation in order to establish stability, or to stop & reverse the (tendancy to..) instability."

2) " Consider the companies as the MINDS OF THE DECSION MAKERS.
Also, consider the preconditioning of memory based on the experience of the MINDS to date. Also, consider each SET of minds (companies) as functioning to a certain set of rules. The rules will be different for different companies (mind/ memory sets) & hence reception/ perception/ processing of input data will be different. Therefore the RULES which each company uses must be known in order to predict strategically how input data will be processed by them. The same general theory applies to the users; the public etc. Their memories & minds will process data accoding to certain rules & they will then make related decisions.
Similarly, RISK will have a different meaning for minds/ memories being controlled according to different sets of rules."

2) Incrementalism will be used to monitor the positive v. negative feedback performance and the effect of the existing strategic plan to maintain the correct balance between the two. Perhaps a negative feedback system will always have to present as small pilot activity in series/ parallel with the mainstream activity to be used as a sort of "caution & warning" system."

Source:

53) Bono: The Mechanism of Mind. Pelican. 1986

Note 42
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Increment Definition

Each parameter that is being used to define the increment must have its own "micro - increment" definition, traceability, etc. & intervention points. The interactive effect of all such "micro-increment" intervention points will have to be established & then the programme intrevention points established. Maybe the micro intervention points should be prioritised & ranked.

Each increment must have the same risk.

Since every increment must have the same risk exposure it means that risk control must be carefully exercised for the next increment in the crrent increment.
Source:

59) Meaker T. Thoughts in Oct. 1990

Note 43
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Traceability Aspects.

Traceability to an "original known & controlled' state will have to be used with caution since, with the advancemnet of time , other influences come to bear and the relative importance of certain aspects will change. for example, profit was the most impriotant "success indicator" but is now falling into disrepute due to the impact of business ethics...which questions the "ethics" of making profit an objective for resource deployment/ spend.
Source:

60) Meaker T.More Thoughts; Oct.1990

Note 44
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Enzymes and Feedback

Each enzyme is able to promote only one type of chemical reaction. They are an important group of proteins that make possible the chemical reactions that constitute metabolism.they act as biological catalysts or accelerators. They are controlled by accelerators & inhibitors that initiate or block reactions.

Induced fit theory explains the way an enzyme binds to a substrate in the same way a glove "fits" the hand that enters it.

Allosteric sites are regulatory sites able to activate or inhibit enzymatic activity by influencing the shape of the enzyme. When the activator or inhibitor dissociates from the enzyme it returns to its normal shape.. Thus the flexibility of the protein structure allows the operation of a simple , reversible control system similar to a thermostat.Allosteric control can operate in several ways eg. A pathway consisting of ten enzymes is involved in the synthesis of amino acid histidine. When a cell contains enough histidine, synthesis stops- an appropriate economy move by the cell. Synthesis is stopped by the inhibition of the first enzyme in the pathway by the product, histidine. The inhibition of an enzyme by a product is called feedback inhibition i.e. a product many steps removed from an initial enzyme blocks its action; this occurs in all living things.

Source:

64) Encyc.Brit.6/896 et al

Note 45
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Increments and Measurement

The measuremnet increments by the potential intervener must be smaller than the incremnet being monitored.

Define the incremental approach etc. as a number of hypotheses; then test from field data & conclude.

How do managers decide the risk involved, define it, measure it. For a car company the no. of cars sold is an indicator but the relationship of the indicator to the cause of risk must be obtained.

Often there is an internal & external point (customer/ budget release committee/ govt./ corporate management) to make a decision (establish a certain status/ degree of confidence in some presented facts) by a certain DATE...or programme phase interface.
How can one judge risk from project progress reports.

With no strategic change intervention is unnecessary!!??
Source:

70) Meaker. Thoughts, Arville, nov. 1990

Note 46
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Incrementalism;

After exploring the history of a large and complex software project the author, who was also the project manager, concluded that the main elements that distinguished successful from unsuccessful projects are:

- that something relating to the current work had been done before n(this supports the incremental approach).

- procedurs shoud primarily designed NOT to CHECK that thhe right things are done but to facilitate the doing of the right things.

- build into the management & technical organisations mechanisms for monitoring and feedback (supports TM theories).
Source:

110) Malcolm R; A Large Embedded System Project Case Study. Malcolm Associates ltd. Dec. 1989.

Note 47
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Business Boundaries

12,000 world managers responded to a survey. The survey results were then commented by various well known/ highly positioned persons.

Charles Hampden-Turner: survey tell us nothing about the most important boundaries in business today: the often subtle but all pervasive differences in cultural perspectives that shape how managers from different societies conceive of their roles & their work.

Tom Peters: companies are not even sharing with their own employees.
27% never involve customers & 17% never involve suppliers.
The borderless company has not yet arrived but may be on its way. However since this is a single snapshot its impossible to judge trends.
We are moving from a "pre-copernican" business world where the individual company is at the centre of the universe, to a far more fluid "post-Copernican" environment where each company is but one point in an extended network of equals.

Jay Jaikumar: the survey shows that technology has revolutionised the work that managers must do; managers must understand the deeper "revolution in technology" that has precipitated work force changes. Managers tend to react to the surface disturbances that have been created by the underlying technological shifts.
Managers report higher levels of satisfaction with their jobs but less loyalty to their companies.
Hierarchy stills rules industrial oorgannisations & the split between the upper level manager and the work force is as large as ever because companies are reluctant to embrace the logic of the technology & dismantle the walls that separate levels of management.

Source:

115) Harvard Business Review: May-June, July-august, Sept.-Oct. Nov-Dec. 1991. The Boundaries of Business: World Leadership Survey.

Note 48
Outline: VI. INTERVENTIONS-INCREMENT- FEEDBACK- TRACEBILITY
Subject: Performance Measurement

Dissatisfaction with using financial measures to evaluate business performance is nothing new. Ralph Cordiner, in 1951, CEO of General Electric commissioned a high level task force to identify key corporate performance measures. The task force came up with a list which included:
(in addition to profitability):
- market share
- productivity
- employee attitudes
- public responsibility
- balance between short- & long term goals.

Formulas that tie incentives to performance look objective and rarely work. If simple it leaves out many variables. Eccles prefers to LINK INCENTIVES STONGLY TO PERFORMANCE BUT LEAVING MANNAGERS FREE TO DETERMINE THEIR SUBORDINATES REWARDS on the basis of all relevant information, qualitative as well as quantitative.
Source:

149) Eccles R;The Performance Measurement Manifesto. Har.Bus.Rev.Jan/Feb.1991

Note 49
Outline: VII. RISK-RISK INDICATORS
Subject: Risk Definition: General.

Risk is a function of the probability of the occurance of a hazard times the severity of the consequences of the hazard.

Source:

37) Meaker.T.Thoughts:July;1990. Arville.

Note 50
Outline: VII. RISK-RISK INDICATORS
Subject: Real World Risk Management

See also von Holstein work on subjective judgement (ref.27). Hertz has applied decision analysis to problems of capital. expenditure.

Assign decisions to those who can make them most effectively; eg tech. to scientists, financial to business grads. etc.

management must appreciate the subjective assessment of probability. ,

The simulation process, by which the subjective judgements of the probabilities of important uncertainties is utilized, is based on exactly the same understandings & relationships that a deterministic, conventional, financial analysis would be based on.
First, we construct the uncertainty profile for each key input factor (price, field size,, & cost). Next, we select a value from the profile of each input factor; the key function of the sim. process is to ensure that the probability of selecting any particular value is proportional to the probability of occurance of that value of the factor, as determined from the uncertainty profile. Then, we combine each of these individual values for each input factor, by substituting them in the same formula we would use for a determistic process; then repeat 100's of times.
A portfolio is a mix of individual prospects that makes up a point on the efficient frontier.

Risk measures:
1) prob. of missing the target.
2) prob. of not breaking even.
3) expected loss(if loss occurs).
4) loss potential(prob. of loss* expected size of loss).

Management must understand the relationship between the measurements & their concerns.

Source:

44) Ball B.C. Risk Management in the real world. MIT Energy Lab. European Journ. of OP.Research.14 (1983).Elsevier Science Pubs.

Note 51
Outline: VII. RISK-RISK INDICATORS
Subject: Off-line Quality Control: Taguchi.

Taguchi style exercises should start with a brainstorm...must make full use of facts & experience already available to the planners of experiments.

Quality, in Taguchi terms, is the characteristic that avoids loss to society from the time the product is shipped, measured in cash.
The concept of "conformance to spec. within permitted tolerances" is replaced by the philosophy of continual improvement in the achievement of target values for critical parameters that represent the customer requirement.
The voice of the customer flows through all activities & QC becomes design led rather than a production-process led.
Engineering for quality relies on the engineer grasping all aspects of the product cycle from dev. of the spec. through series production & beyond into the hands of the customer.
By focussing on the needs & expectations of the customers, the Jap.manufacturers have evolved a style of management that drives the entire prod. process in the interest of achieving customer satisfaction.
Much higher levels of component & feature carry-over result from this approach , which is more A PROCESS OF EVOLUTION & CONTINUAL IMPROVEMENT than A SERIES OF IRREGULAR QUANTUM JUMPS in technology with each new model introduction.
Quality management creates the environment & organisation that breaks down barriers between departments & fosters the sharing of quality improvement goals & the understanding of the causes of variability.

Snee proposed that total quality be divided into 3 elements:
-Philosophy;
-policies & procedures;
-tools.
Taguchi uses a "loss function'- a quadratic function (Taylors expansion) is normally used if no other is available. By the use of this any deviation from the desired performance values (functional specs. functional characteristics) causes loss, & not just values outside a tolerance zone. The use of the concept of CPk is useful, where

CPk = Functional spec./ 6 standard dev.

Minimize noise factors on the product or process. Noise performance statistics(NPS) are meassures of process variability used to identify "control" factors & the combined optimal levels which minimize variability. Having done this by the use on signal/ noise ratios then proceed to analyse Target performance statistics(TPS) using process means to identify the design factors, other than the control factors , which can be used to bring the mean response to the target level without at the same time raising the variability; these are known as the "signal factors".

Inner noise- the type of variation from spec.controlled by standard process control methods..eg voltage etc.
Outer noise-is variation imposed by circumstances which occur after the product leaves the producer, temp., humidity, wear-& tear etc.
Signal factors affect the level of response.
control factors affect variability of response.

The Technology of process control is now replacing SPC & zero-defect principles.
Taguchi approaches the design of tolerances from the standpoint of "permisseable" costs using a parameter cost relationship.

A new method providing for the translation of the assessed customer needs into technical requirements for each stage of the production process is known as quality function deployment(QFD).
There are 4 stages in the QFD process:
-customer requirement planning translates cust. expectations in the form of market research, competitor analysis etc. into the desired & specific product characteristics.
-product specs. convert the cust. rqts. plan for the finished product into its components & characteristics demanded.
-Process & QC plans idnetify design & process parameters critical to the achievement of the rqt.
- process sheets, derived from the process & QC plans, are the instructions to the operator.
Customer requirements/ product requirements matrix is used.

Source:

46) Pridmore W."Taguchi methods: Applications in World Industry."

Note 52
Outline: VII. RISK-RISK INDICATORS
Subject: Uncertainty

Risk is the probability * severity or Known unknowns; uncertainty is about "unknown unknowns".
For every project objective or spec. established the underlying information base must be examined & then a confidence level assigned to it. Then, the question must be asked, does this objective or spec. have to be frozen at this point or can it be delayed until later in the sequence. Nothing should be frozen until a decision on that particular element is required in order to proceed with the work. All questions should be "should we do this or that" rather than "can we do this or that".
Source:

58) Steele:Managing Technology. Mcgraw hill,1988.

Note 53
Outline: VII. RISK-RISK INDICATORS
Subject: Uncertainty Avoidance Index

From Hofstede,G. Culture's consequences.Sage Publns. London(1980).

Four main elements analysed:
1) Individualism v. Collectivism;
2) Large or small power distance;
3) Strong or weak uncertainty avoidance;
4) Masculine versus feminine.
Each "dimension" represented per country by an index; this relates to cross cultural differences. Time goes one way only; past, present, future; we therefore have to live with uncertainty because the future is unknown. Some societies condition their members to accept this uncertainty & not be upset by it; called "weak uncertainty avoidance societies".other societies try to beat/predict/control/limit the future which generates anxiety; "strong uncertainty avoidance societies".
Low UAI produces: managers more involved in strategy, more oriented to interpersonal relations, & more willing to take individual/risky decisions.
High UAI produces managers more involved in detail, more task oriented & consistent in style, & less willing to take indiv./risky decisions.

From "The appropriate use of contract types in development contracts" W.Peeters(1987).
The lower the UAI, the more readily incentive provisions are accepted.

Source:

225). Hofsteade G. Cultures Consequences. sage Publications. London.1980.

Note 54
Outline: VII. RISK-RISK INDICATORS
Subject: Organisational Failure Contribution to Accident ...

See annotated notes under "reference 75".

Causal maps(influence diagrams) used to express the way in which different pressures exerted at the organisational level interact with one another. this allows the identifcation of those variables with a pivotal role in determining the extent to which, & the manner in which, an organisation attends to safety issues, & thus the points at which intervention may be most beneficial.

Techniques of analysis, for organisations, have to be compatible with the level at which they are applied. The application of HW techniques or human performance techniques may not be useful/ compatible with organisational problems.

The likelihood of a sociotechnical system failure is a function of the number of "resident pathogens" which exist within it. The problem is defining a pathogen; we seem to differentiate between normal & abnormal behaviour at the organisational level.
Source:

75) Cannell W. Organisational failure & its contribution to accident Risk. 1989. Dir.of Op. Research. CAA.

Note 55
Outline: VII. RISK-RISK INDICATORS
Subject: Organisational Factors and the Practise of Risk ...

Organisations tend to be blind to the importance of events which could signal disaster, if to recognise them as such woyld clash with existing norms & beliefs.

to avoid misinterpretation of the results of risk analysis, this means that systems- comprising physical components & their human & organisational underpinnings - need to be conceptually "partitioned" into those elements which CAN be subjected to rigorous analysis & those that cannot.

No credible method has yet emerged for analysing the reliability of SW based systems.

the level of safety in a complex tech. system is usually not directly observable except when accidents occur, raising the possibility that lataent failures can exist, which have not been addressed in risk analysis. It can be made more visible by monitoring the occurance of operational errors or potential precursors to accidents.

Less concern for for completeness of the analysis & more for precise documentation of the system model, so that any deviations from the assumptions in the model which are observed in practice can readily be identified & acted upon.

Ideally, feedback mechanisms should be based on indicators which are "tightly coupled" to safety, but which do not themselves reflect an immediate hazard.This ensures that lessons from risk analysis will be learnt before, rather than following, the occurance of major accidents.

Structure & institutional characteristics strongly efect extent by which RA can be carried out. Institutional qualities are those reflecting the social & historical context of an organisation.

More integration between tasks of human controllers & computers vastly complicates the problems of designing & analysing safety critcal systems.

Source:

76) Cannell W. Organisational factors & the practice of Risk Assessment. 1988. soc. for Risk Anaysis 1st euro. conf. Laxenburg, Austria Nov.10-11 1988.

Note 56
Outline: VII. RISK-RISK INDICATORS
Subject: Project Failure

A study was conducted of 97 projects identified as failures by the projects managers or parent organisations. Using the project implementation profile(PIP), a set of managerially controllable factors were identified as associated with project failure. The factors differed according to three contingency variables:
1) the precise way in which failure was defined;
2) the type of project;
3) the stage of the project in its life cycle.

Critical factor definitions:
1) project mission- initial clearly defined & general directions;
2) top managemenmt support-willingness of top management to provide the necessary resources & authority/power for project success;
3) project schedule /plan-a detailed spec. of the individual action steps for project implementation;
4) client consultation- communication, consultation,& active listening to all impacted parties;
5) Personnel-recruitment, selection and training of the necessary personnel for the project team;
6) technical tasks- availability of the required technology & expertise to accomplish the specific technical action steps;
7) client acceptance- the act of "selling" the final project to its ultimate intended users;
8) monitoring & feedback- timely provision of comprehensive control information at each stage in the implementation process;
9) communication-the provision of an appropriate network & necessary data to all key actors in the project implementation;
10) trouble shooting- ability handle unexpected crises & dev from plan.

Project failure measure factor Matrix(F = factor);

Item		F1 Client satisfaction	F2 Perceived quality	F3 Implementation process
-The project(P) "works"	eg	.70		
-The P will be used				
-the P will benefit its users			.50	
-Important clients will use the P				
-start up problems will be minimal				
-this P solves the problems for which it was created				
-this P will lead to improved performance				
-this P will have a positive impact				

-this P is a definite improvement
-the P is on schedule
.76
-the P is on budget
-satisfaction with the development process

Source:

81) Pinto & Mantel. The Causes of project Failure.
IEEE trans.on Eng. Man. v37n4 Nov.1990

Note 57
Outline: VII. RISK-RISK INDICATORS
Subject: Causes of Project Failure: Intervention Aspects ...

This research restricts itself to "factors which are controllable by the project" and hence does not consider the environment which it says "it is aware of in determining project success or failure".....but that is all that is said on this aspect.
The strength or mere presence of the following ten factors is assumed to account for a significant part of the variance in project implementation success:
1) PROJECT MISSION: initially clearly defined goals & GENERAL DIRECTIONS;
2) TOP MANAGEMENT SUPPORT: willingness of top management to provide the necessary resources & authority/power foor project success.
3) PROJECT SCHEDULE/ PLAN: a detailed spec. of the individual action steps for project implementation;
4) CLIENT CONSULTATION: communiction, consultation, & active listening to all impacted parties;
5) PERSONNEL: rcruitment, selection, traning of thee nnecessary personnnel for the project team;
6) TECHNICAL TASKS; availability of the require technology & expertise to accomplish the specific action steps;
7) CLIENT ACCEPTANNCE: the act of selling the final project to its ultimate intended users ;
8) MONITORING & FEEDBACK; timely provision of comprehensive control information at each stage in the implementation process;
9) COMMUNICATION: the provision an apppropriate network & necessary data to all key actors in the project implementation;
10) TROUBLE SHOOTING: abbilit to andle unexpected crises & deviations from plan.

The above is called the Project Implementattion Profile(PIP).
(97 projects involved).
Three additional research variables were added to the above ten as a result of factor analysis performed on the aggregate success measure(seenoote 40) viz:
11) IMPLEMENTATION PROCESS;
12) PERCEIVED QUALITY;
13) CLIENT SATISFACTION.
Two factors appear to play predominant roles in determining failure for construction projects:
- lack of technical support expertise & support(technical tasks), and
- lack of adequate trouble shooting mechanisms.

Apparently many project managers question whether or not their project is potentially valuable to the inteded uer and/or to their own organisation. If the answer is "no" the project tends to be seen as a failure early in its life cycle. As a further support of this view,(& in the rare case of conceptual neatness) consider that the predictor of project failure is measured in terms of perceived value. In

addition when success is perceived in terms of cient dissatisfaction, the client acceptance factor is a strong predictor of project failure.
The authors feel that research should examiine the relative proportion of projects failing due to unforeseen circumstances versus those which fail due to management error.
The fact that the critical factors associated with failure depended on the wa in which failure was defined suggests that we need to know considerably more about how project managers define failure(& success) and, indeed how the paarent organisation makes judgements on the matter.
Source:

81) Pinto & Mantel. The Causes of project Failure. IEEE trans.on Eng. Man. v37n4 Nov.1990

Note 58
Outline: VII., RISK-RISK INDICATORS
Subject: Viable System Model

Continuation of note 59.
...because attention was concentrayed on operational control often 2 or 3 levels below.The control information flowing up was noisy & unfiltered, so that it could not perform its proper task of pointing to where high level attention was needed (e.g. through detailed investigation).This could only be done in one or two areas at a particular time: the information system needed to indicate where these should be-it did nt.Beers models make the distinctions clear. At one level there are a number of separate operational systems,each interacting with their particular local environments. That is their concern. At the highest level(the metalevel) the concern is sharply different: it is with the relations BETWEEN these operational systems; & it is whether the op. systems CONSIDERED TOGETHER will meet & cont. to meet some higher purpose.

The difficuties with the model inc.;
- how do you measure variety/
- what is significance difference?
- how can you anticipate what will be significant?
- how is the decision made on an appropriate decomposition of a total task into lower level systems?
- is that decision made externally by a system designer, or is it made continuously inside the system?
- if a decision to change is made how is it implemented; how does the metasystem induce discrete structural change?

In the sixties there was great interest in machine & orgasmic metaphors & in particular in schemes of auto. control. The contribution of the cyberneticists, led by Beer, was to make it clear that the control of human organisations involved constraining variety of totally different orders of magnitude to those dealt with in the most complex pieces of engineering. The central issue was, how could this immense amount of variety be coped with? Later, in the seventies, other perspectives were often taken (by Checkland, e.g.). behaviour in organisations was seen as following from human intentions & only to be understood in terms of the perceptions & meanings that corresponded to them. An organisation was not seen as a unified organism integrated as an identifiable whole. A situation could be, & was interpretable in many different ways. some of these could be part orchestrated: where this had not been done "issues" arose, the resolution of which constituted much of the significant activity in the situation. The interest of the invetstigators or INTERVENORS was in the phenomenology of the situation, less in the cybernetics of control.

Perhaps the main theme of VSM work as it has developed is distinct from either the above & is concerned with the conditions under which autonomy can be exhibited within certain environmental constraints.

What is important is that the model is distinct from the modelled (the map is not the territory). The model can & should be completely defined: the reality it may correspond to, cannot.
Source:

84) Anderton R. Un.of Lancaster."The Need for Formal Development of the VSM";(paper inc. in book entitled "The Viable System Model: Interpretations & Applications of Stafford Beer's VSM"; by Espejo R. & Harnden R. J.Wiley.1989.).

Note 59
Outline: VII. RISK-RISK INDICATORS
Subject: Viable System Model; formalisation of...

Refers to paper by R.Anderton(Lancs.Un.) in book in above ref.
Continued in Note 54.(VSM of Beer)

Right at the centre (of the VSM) is a consideration of the conditions under which the creation & maintenance of recognizable ORDER is possible. Anything interacting in the world is subject to disturbances tending to upset its recognisable features. They can only be disturbed if a compensating response can be generated for each disturbance nullifying the change that would otherwise result. Hence the Law of requisite Variety proposed by Ron Ashby in his theory of regulation: "only variety can absorb variety". The variety of the controller must match the variety of the controlled.
In Beers interpretation & development of Ashby's work applied to the field of complex human activity, the central question becomes: "How is it possible for multiple control elements, human or mechanical, each one possessing only limited powers of perception, computation & action, to achieve the enormous tasks of regulation needed to achieve complex purposes, or even any kind of identified continuity(that is to say,stability)in turbulent, noisy & sometimes aggressively competetive environments? The general answer is by making them subject to appropriately organised systems of constraints. How to determine what is appropriate is, on this view, the topic of the theory of organisation. How can low variety elements be connected together to form a high variety co-ordinate whole? Only if this is done can purposes be efficiently achieved in high variety environments.

Beers main result is that a viable system structure is one that can be broken down into a number of component structures which also have the form of a viable system, together with a system for controlling relations between these component systems.
If an organisation is to be viable then the system of constraints must continue to provide effective regulation even though its environment may change.

A consequence of this restructuring is that at each level there are two types of activity. the first, done by what we call the collection of viable subsystems, is that of actually doing the operational work of producing whatever it is which constitutesthe identity of the whole. the second can be described as meta-systemic to the collection. It does not take part directly in the production activities of the lower-level collection. It is to be understood as acontroller of both the internal relations between the viable subsystems & the relation of the whole to the environment.

The (VSM) model can be interpreted as two types of discourse

carried on in correspondingly distinct languages. The first type asks separately, for each of the lower level "viable subsystems": Given the current state of the environment, what operational action needs to be taken by the subsystem using present constraints, structures and rules? The second type asks four meta questions about the whole collection of subsystems:

1) are they co-ordinated to aviod internal intercation(oscillation)?
2) is each constrained in such a way that syergy & effective resource usage is generated?
3) is the particular decomposition one which will continue to be viable in anticipated future environments?
4) is the whole satisfying constraints which may be being passed down from higher recursion levels?

The whole structure is seen as an organised set of interlocking controllers. Viability requires each controllers criterion to be satisfied. It follows, taking this control perspective, that each controller, if it is to achieve balance in time with the rate of corresponding change in its environment, must have a model of that environment to guide its search.

In an example given in the paper Anderton comments as follows:
Each level was preoccupied with the scrutiny of the ops. below it, particularly so as to detect deviations from te budgetary plan. the proper tasks at each level(formulating adaptive strategies & identifying synergistic opportunities for the level below)were being neglected,
(cont.note 58)
Source:

84) Anderton R. Un.of Lancaster."The Need for Formal Development of the VSM";(paper inc. in book entitled "The Viable System Model: Interpretations & Applications of Stafford Beer's VSM"; by Espejo R. & Harnden R. J.Wiley.1989.).

Note 60
Outline: VII. RISK-RISK INDICATORS
Subject: Risk & Ambiguity

This study..found that when two functions were learned under different conditions, subjects erred in the direction of allocating more resources to the subject learned under less uncertain conditions.

The only conditions in which large random error in allocations was detected were those in which both functions were learned under highly uncertain conditions (i.e both functions with high risk & high ambiguity, or function A with 55 learning trials paired with function B with risk or risk + ambiguity).

Subjects who learn the function forms under high risk-low ambiguity & high risk-high ambiguity judged the function form relating the act to the product as being far more linear than the actual data.

Subjects appear to reconstruct the meaning of inconsistent labels so that they fit the learned relations(Sniezek,1986).

To predict resource allocations successfully we must account for reactions to uncertainty.

Future research must be directed at understanding how individuals manifest their uncertainty. One possibility is in the variability of their allocations.(Brehmer & Lindberg;1973).

In a group setting other members uncertainty affects individual allocations.

In most organisations the act-to-outcome contingencies are very uncertain. Partly thisis due to problems in specifying & measuring behaviour & performance. How can these organisations enginer the environment to maximise organisationally relevaent performance when employees fail to allocate their time & effort in rationaly optimanl ways? Clearly allocation decisions are NOT RANDOM.
Source:

98) Sawyer.J:Effects of Risk & Ambguity on judgements of contingency relations & behaviuoral resource allocation decisions

Note 61
Outline: VII. RISK-RISK INDICATORS
Subject: Risk Constrained Information Choice

This is a behavioural decision-making assessment paper.

The underlying motivation for these models is to employ a measure of risk that is consistent with how decision makers(DMs) actually perceive risk in the real world. Generally, this perception corresponds closely to the idea that risk is associated with the possibility of loss or the failure to reach a certain target. This view was supported by Payne, Laughhunn & Crum in their empirical analysis of the Fishburn model & is generally consistent with the studies examined by Libby & Fishburn in their review of the risk-taking liturature ("behavioral models of risk taking in business decisions: a survey & evaluation" journal of Accounting Research 1977,15(2),272-292.)

"Expected payoff" is plotted against "expected risk" based on a 3-action/3-state problem showing payoffs & prior state probabilities. Each of the information alternatives is defined as a row-stochastic matrix with rows & columns corresponding to states & signals resp.

Refers to convex and non-convex trade-offs.
Paper is in RISK file.

Source:

99) Marshall M.& Narasimhan R: Risk contained Information choice

Note 62
Outline: VII. RISK-RISK INDICATORS
Subject: Customer/Contractor Role Optimisation for Min.Ri...

ESA & Industry(directors and lower representing the Euro-scientific sat. manufacturing industry) mmet for 2 days in March 1991 with the following main points:
1) Summary of General Statements

- (I) stabilise tech. early in project
- (I) balanced & timely r & d in prep. for project.
- (I) new demonstrated by the end of #B
- (E) because science missions at state of the art therefore tech. should be commensurate.
- (E+I) complexity for its own sake must not be pursued!!!!!!!
- (I) against ue of mandatory SW tools
- (I) reporting too heavy and detracts from technical effort
- (I) management by exception
- (I) concentrate on Reviews.
- (I) size of ESA teams ok
- (I) more & morre control sought by ESA but ESA doing good work!!!??
- (I) industry ready to manage large programmes, more authority needed from ESA.
  (E) visibilty & frequent responsible innteraction provided better cost control & project discipline by all
- (I) contradictions between E interests and business practises; concern ref. continuity of work.
- (E) commercially orientated projects more suitable for increased industry delegated resposibilities due to their clearly defined scope (TM comment: this implies Sc.proj. are not clearly defined..!?)

2) Organisation & Scope

- (I) would feel more knowledgeable with #A studies more extensive with increased funding.
- (E) #A objectives are to explore tech. feasibility of proposed mission within a defined cost envelope . Industries output was a cost estimate NOT a commercially committing cost proposal.#A is an important pre-appproval stage and the Sc.payload adopted represented only a model.
- (I) #B should be competive with BILATERALLY agreed evaluation criteria.
- (I) for subs; less industry involvement.
- (I) until industry can demonstrate its ability to form geographically correct 7 efficient teams ESA would do it (TM comment: how can induustry do it if it never gets the chance??).
- (E) to achieve scientific rqts(objectives??..TM), imposed cost limits, proper respoonsivenes to political factors, & a commercial approach to the many ESA underakings, asignificant degree of agency interaction is required.

3) Information Management
_(I) pproliferation of omnipotent support tools(proj. control), inconsistent deployment,conflict fromdifferences

between I internal policies & E rqts...high cost.
- (I) E monitored foor the sake of monitoring; I wants monitornig by excetion (TM: this would need risk indicators).
- (E) proper monitoring to enable E to understand isssues/problems & details oof cchange of scope hannges in contracts... must be beneficial to everyone.!!
- (I) duplication of efforts particulrly in PA
- (E) co-ordinated test facilities mmay be discontinued; in future contractors may have to get individual commercial bids themselves.(Quality aspets...!)
- (I) agree with above; some cos. may use their own.

4) Global observations.

2 major issue in wkshop:
1) lack of responsiveness of ESA to the changing environment

2) the question of I maturity & desire for increased autonomy.
(how to do this without relinquishing E resp. to member states for execution of Sc.proj. within long term plan, horizon 2000 etc.)

E stated that its role was co-ordination, funding and the responsible bodyduring all mission #.

At the workshop:Alenia(Viriglio,Bevilacqua);Aerospatiale(Dechezelles,Herbert); BAE(Hunt,Carr); Contraves(Scheiter); Dornier(Gluitz, Ege); ETCA(Poncin, Lacroix); Fokker(Groen,Rouppevan-van-der-Voort); Laben(Beretta,Pascucci); Matra(Guionnet,Elissalde); MBB(Kutzer,debkert,); SAAB(Lundh); Sener(Azcarraga); MSSL(prof.Culhane,Kosegarten); ESA(Bonnet,Walker,Thoma,Dale,Duran,Jagtman,Deak,Eaton,Linssen).
Source:

111) ESA/SPC(91)27; Report on the ESA/Industry workshop for the Management of the Scientific Projects.

Note 63
Outline: VII. RISK-RISK INDICATORS
Subject: Factors Causing Organisations to Fail

Critical of mathematical models that purport to predict financial health of organisations due to: basis, currency, relevence of data, and inability of models to determine time frame of predicted failures.

Three approaches to analysing corporate collapse noted: management or Trajectory models; financial predicton models; & case study approach.
Financial model originated by Altman("Corporate Bankruptcy in America", Lexington Heath,Mass,1971.) produced multple regression model:

$$Z = 0.012v + 0.014w + 0.033x + 0.006y + 0.01z$$

where; v = working capital/total assets(indicates how efficiently firm generates working capital from use of total assets.
w = retained earnings/total assets(indicates "fat" thta firm has to live on in hard times).
x = earnings before interest & taxes/total assets(indicates ability of firm to use its assets to generate earnings & hence profits.)
y = market value of equity/the book value of the total debt(in good times it pays a firm to use dept due to the fixed interest and the increased earnings; in bad times the converse is true & debt should be minimal.)
z = sales/total assets(indicates how good is the marketing effort of the firm.).
If Z<1.8 firm is heading for collapse; if Z>3 then firm is relatively secure.

Reviews work originated by Argenti("Corporate collapse: the cause & symptoms", Wily, NY 1976) relating to COLLAPSE TRAJECTORIES; considers there are three types of trajectories:
1) relates to small, single owner co's. with high gearing and large project launch early in its history. Overestimation of revenue + underestimation of costs + adverse environmental effect = failure.
2) relates to co's. which survived trajectory 1) but which still hve the same problems AND, instead, a charismatic(salesman type) proprietor. Previuos excellent performance may provide fast expasion without management capability growing with it...failure.(turnover may ccontinue to grow but not profits0.
3) relates to mature organisations: one man rule by chief exec,non-participating board,lack of management depth & poor financial control, weak financial function, combined chairman/chief exec

Audit committees recommended and majority of nnon-executive directors on public boards.

Source:

123) Buttery E. & Shadur M.;Understanding Corporate Collapse;manaement decision v29,n5,1991.

Note 64
Outline: VII. RISK-RISK INDICATORS
Subject: Risk in Foreign Trade;an empirical investigation.

Two hundred German firms sent questionaires with 157 responses. The objectives were to to investigate:
1) the extent to which political risk analysis plays a part in investment decisions;
2) the criteria that are used;
3) the methods used to predict future political developments.

70.5% of respondents stated that they believed it was not possible to predict reliably the political future of a country.
In summary, enterprises generally prefer methods of evaluation that are unstructured & often unsystematic. modern scientific management methods which are frequently used to assess other business risks are not popular in the context of foreign investment.

Two methods used to overcome political risk:
1) a strategy of adaptation: the two most significant factors were considered to be a) a heightened sensitivity to conitions in the foreign ccountry, & 2) the securing of support from such institutions as suppliers & banks as well a from connsumers themselves.
2) active counter-strategy:avoidance o trade in the high risk country obviously caame first, diversification second andthe establishment of global markets third.
Source:

124) Bloch,Koepplinger & Wolfrum:Risk in Foreign Trade:an empirical investigation.Euro. Bus.Review,v90,n2,1990.

Note 65
Outline: VII. RISK-RISK INDICATORS
Subject: Company Codes of Behaviour.

In 1988 41% of six hundred European companies had a written code; a similar survey in the US two years later gave 75%. Carmichael and Drummonds contenion that "a weak (corporate) culture contains the seeds of ethical success" iis not generally accepted; and is disproved by Johnson & Johnsons experience in the US where this strong culture firm immediately openly admitted the arsenic laced Tylenol problem. The companies excellent public image remained intact.
Companies are being forced, by scandals that have rocked the business world(e.g. P&O ferry accident resulting in a corporate manslaughter charge; pollution of Alaskan waters by Exxon etc), to seriously consider the necessity for a code of behaviour for them and their employees in the interests of wealth & reputation.
Source:

125) Lorenz c. the Principle of the Thing.Man.Today,sept.1990.

Note 66
Outline: VII. RISK-RISK INDICATORS
Subject: Survey of Top UK Private Companies.

Top performers have technology on tap but arre not obsessed with it; less IT mean simpler production lines etc.
Use experience and commitments to max. advantage.
Benchmarking of competition used to define and mmodify strat.plans.
All the leaders were implementing continuous improvement.
All the top companies provided quality, delivery accuracy, lowest costs & wwere working on achieving more flexibility.
Source:

126) Kay h.Private Parade.Man.Today.Nov.1990.

Note 67
Outline: VII. RISK-RISK INDICATORS
Subject: The Analysis of Actual versus Perceived RISK.

Papers presented & discussed at Society of Risk Analysis meeting.

Paper on "The Public Perception of Risk"; by Litai,Lanning,Rasmussen(MIT).

-50,000 auto fatalities & 200 commercial airline fatalities in the US/yr.

To define RISK CONVERSION FACTORS the following was done.
-Factors that effect peoples willingness to accept risk are:
- volition.....voluntary/involuntary
- severity.....ordinary/catasrophic
- origin.....natural/man-made
- effect manifestation.....immediate/delayed
- exposure pattern.....continuous/occasional
- controllability.....controllable/uncontrollable
- familiiarity.....old/new
- benefit.....clear/unclear
- necessity.....necessary/luxury

There are thus 2exp9 = 512 possible boxes in the complete table.
The analysis only deals with the consequences of death.
Study the tables in this paper particularly table 7(mean values for Risk accepted by US society for Major Risk Categories.

RCF values:

natural/man-made.....20 - 10
ordinary/catast.....30 - 50
volun/involunty.....100
delayed/immedi'e.....30 - 20%/yr(must be compounded by no.of yrs.of delay
control/uncont'e.....5/10 - 100
old/new.....10
necessary/lux.....1
regular/occas.....1

The above ranges show the different values obtained by Rowe(second value).
These RCFs do not include cost or benefit data but only risk comparisons.

Main points from Panel Discussions.
Actual risk is scientifically or objectively defined; perceived risk is sujectively defined.
Perceived risk of nuclear power to coal is 9000:1.(Rasmussen).
There has been very little attempt to measure perceptions; perhaps such measuremnet is not possible.Realistically the perception of risk may be of the most consequence in many instances.

Source:

129) Covello,Flamm,Rodricks & Tardiff; The Analysis of Actual versus Perceived Risks. Plenum Press;1983.

Note 68
Outline: VII. RISK-RISK INDICATORS
Subject: Use of Expert Judgement in Risk Assessment.

Basically compares three models:

- the CLASSICAL, developed by Cooke, which is recommended for the short term future. Needs more work, particularly for the case where the calibration variables are different for each expert. t s unique among oopinion pools in addressing issues of calibration & informativeness.

- the BAYESIAN, recommended as more powerful in the long term. In principle it can be developed too take account of all aspects of expert juudgement. It is sensitive to decisions of the analyst and requuires much data. Turning the models theoretical strength into a practical advantage is a challenge for the future.

- the PAIRED COMPARISON are more user friendly than the above but are based on strong psychometric assumptions and the transformation of their estimated values to an absolute scale of probability remains problematical. They require a different type of judgement from the expert
- ranking information.
Source:

130) French,Cooke;The use of Expert Judgement in Risk Assessment.Report prepared under ESTEC contract no.8051/88/NL/RE;march,1989.

Note 69
Outline: VII. RISK-RISK INDICATORS
Subject: Experts are only Human & Data is often Inadequate

For a factor of safety to be effective, the means of failure must be known and the cause of the failure determinable by experiiment. .
Engineering is an art rather than a science and as such depends heavily on judgement. Widespread use in engineering of heuristics or "rule of thumb", require judgement to be used properly.
Prof.Vaugn Koen(Mec.Eng./Un.of Texas) defines a heuristic device as "anything that provides a plausible aid or direction in the solution of a problem but is in the final analysis unjustified, incapable of justification aand fallible."
The "O-ring" leakage on Challenger became the "new normality" thus increasing the risk.....but there were 300 such "special hazards" on Challenger at launchand to clear them all would have meant "no launch".
Source:

131) Beder S. The fallible Engineer.New Scientist,2 Nov.1991.

Note 70
Outline: VII. RISK-RISK INDICATORS
Subject: Information Strategies.

Porter("Competitive Strategy,Free Press, NY 1980.) argues that the information revolution is affecting competiton in three vital ways:
1) it changes industry struucture and, in so doing, alters the rules of competition,
2) it creates competitive advantage by giving companies new ways to outperform their rivals
3)it spawns whole new businesses, often from within a company's existing operations.

Anthony("Planning & Control systems: a framework forr analysis"; harvard un. press.1965.) distinguishes between levels off information & control. Operational data is more concerned with measuring interrnal performance and has predominantly a cost control function. Tactical and strategic data begin to look outwards towards markets & how the organisation is going to position itself in those markets.
Source:

142) Roberts, Brown,Pirani:Information Strategies.Management Decision,28,7.

Note 71
Outline: VIII. CULTURE
Subject: Culture Definition

To counteract tendencies of reification & accomodate the fact that ethnographic accounts often give a confusing & fragmented picture of daily life in organisations, we propose to expand the sphere of culture:

FROM: its traditional sphere as the underlying, often subconscious, foundation for peoples thinking & acting;

TO: the surface & manifestations of such thinking & acting in organisations.

(Kristian Kreiner-Copenhagen Business Un. Man.Research News Vol 12,No.4/5 1989 MCB)
Source:

225). Hofsteade G. Cultures Consequences. sage Publications. London.1980.

Note 72
Outline: IX. PERCEPTION
Subject: Departmental power in strategic decision making

This paper focusses on subunit or departmental power. The STRATEGIC CONTINGENCIES THEORY of Hickson et al (1971) is built on. The basis of Strat. Cont. theory is that power is a function of a departments capacity to cope with uncertainty, its non-substitutibility, & its centrality in the organisations flow of work... the ability to cope with uncertainty is the most important ref. dept. power. A power perspective resolves much of the conflict between the three competing environment-strategy approoaches: 1) the predominant rational-economic view (NOT supported by Ansoff); 2) strat. dec. are based NOT on the envir. itself but on PERCEPTIONS of environmental realities (Anderson & Paine,1975; downey, Hellreigel, & Slocum,1975); 3) Interpretive or Enacted view: organisations create or enact their environment by the decisions they make...hence they create their own opportunities & threats,(Smircich & Stubbart,1985).
("TM comment: the depts. WILL be awrae of the external environment or at least to the reaction they get from something external to their own group. One can question whether there is an external/ internal relationship...are there boundaries in diffusions? Every exec., in fact everyone, will view everything with his perception; this can be biased by recent events/ knowledge, experience etc. the results of research on fragmented parts of organisations are probably correct..for each little bit...but they may NOT be true for the overall company.").

EQUIFINALITY: a system that can reach the same state in more than one way.

Provans thesis is that strategies develop as a result of internal political realities that are affected by but also affect the organisations external environment; dept. power viewed as a key to understanding how organisations perceive, adapt to, & enact their environments, & hence how strategic decisions are made.
Past decisions & past procedures & preferences of top management establish traditions in organisations that provide important guidelines, often implicit, for decision makers.

The interpretive view holds that strategies are formulated based not on an objective assessment of envirnmental realities, but on a socially constructed or enacted environment (Smircich & Stubbart,1985).

According to Mintzberg & Waters(1984) many strategies develop not through any formal strategy formulation process but through the emergence of a pattern, often unintended, in a stream of decisions made by an organisation. Thus emergent strategies are essentailly bundles of interrelated decisions, many of which may not be related intentionally, that seem to work for an organisation....will be more

heavily influenced by those depts. or coalitions of depts. that are most capable of dealing with external opportunities or threats thta are currently critical to the organisation as a whole in ways that are effective.

Measures of the components of the proposed Power-Strategy MODEL:

A) External Environment:
1.Porters(1980) 5 forces.
2.regulatory pressures
3.emergent techn.
4.economic conditions.
B) Dept. Capabilities.
1.No. employed
2.Qualifications & abilities of top staff.
3.budget
C) Organ. Traditions.
consensus among organ. members ref. norms, values, & ideology.
D) Oper. Proced.
Consensus on how things are done ref. several generic strategic decisions.
E) Dept. Power.
Adapt Hinings et al (1974) measures for coping, non-substitutability & centrality.
F) Man. Perceptions of Environment.
Top man. percet. of env. uncertainty(Downey et al 1975; Anderson & Paine 1975.)
G) Personal Pref.
Top managements expressed preferences of strategic direction(from docs. & personal statements).
H) Strategy Formulation & Implem'n.
The strategic intent of the organ. expressed as a specific functional orientation) form public statements, docs., & top man. views.)
I)Realized Strategy.
the strat. actually accomplished, whether successful or not, expressed as a specific functional orientation9 from docs. & key informants both inside & outside the organisation).
J)Emergent Strat.
Cf.realized strat. with orig. intention.

Source:

41) Provan: "Environment, dept. power & strategic decision making in organisations: A Proposed Integration. Journal of management vol 15, no1, 21-34. 1989.

Note 73
Outline: IX. PERCEPTION
Subject: Mind,philosophy of

Ludwig Wittgenstein showed that a number of things could come under a particular heading not by virtue of having certain features in common but by virtue of having a "family resemblance", just as members of a family might have a typical appearance even though there was no set of features possessed by all of the members; the possibility must be left open that this is the case with the various instances of mental phenomena.

Criteria of the mentallity (difference between what is mental & what is not; the difference between animate & inanimate objects.):

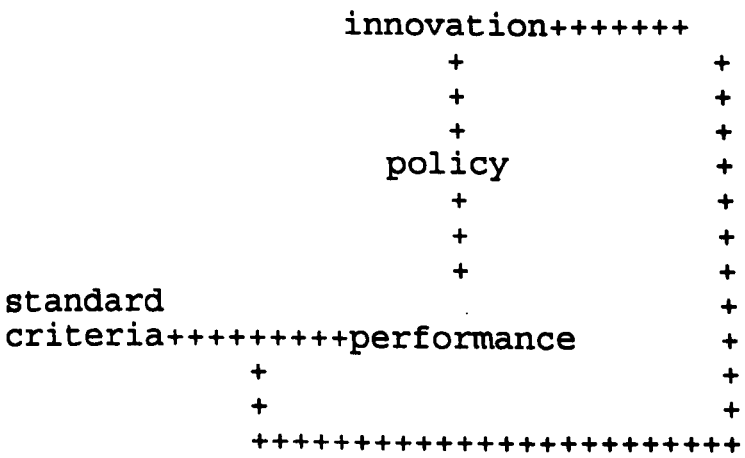
"PURPOSEFUL BEHAVIOUR": does a heat seeking missile have PB & therefore mentality??.....most contempory philosophers say NO.

"INTENTIONALITY": thinking, believeing, desiring are thought to resemble one another in that they may be said to take an object, or to be directed upon an objcet, in a way quite unlike anything to be found in what is purely physical. "I" is the term for this way of being directed upon an object. Existence & truth are irrelevant to intentionality; one can look for something that does not exist etc. Not every description of the object of the "I" will be appropriate; assuming that his pen is the millionth pen produced this year, for example,a man may be in the intentional state of searching for it as his pen but not in a state of searching for the millionth pen produced this year; similarly he may believe this is his pen & yet not believe that this is the millionth pen produced this year. This second feature of intentionality, often called "referential opacity",is such that a true sentence asserting an intentional state will become false when some alternative description of the object of that state is substituted for it (it is false that he is searching for the millionth pen).Another way of defining "I"is that the intentionality consists not not in the relationship of a subject to an "essence" (that of the millionth pen) but in its relation to a "sentence"(this is the millionth pen..)that has that alleged essence as its meaning.
Source:

67) Encycl.Brit.12/226

Note 74
Outline: IX. PERCEPTION
Subject: Perception

The following model is submitted:



Financial risk is very often definded as liquidity.

Law of uniformity(Kant,Hume): a general uniformity of nature is both necessary & sufficient to justufy inductive reasoni

ng.

When I look, or believe myself to look, at a table, what I primarily see is not the table at all but something else, which has the impermanence & perhaps also the subjectivity of a mental image.

Perception is affected by the presense of a distorting medium. We learn to account for such factors as perspective eg. a round coin appears elliptical when viewed obliquely.

Perception is processed by something which has certain limited capabilities. We can count as REAL properties of physical objects only those properties that they possess independently of our percieving them.
Source:

68) Ayer A.J.; The Central Questions of Philosophy. Pelican.1986

Note 75
Outline: IX. PERCEPTION
Subject: Morality in Planning & Management

There are three definitions of morality;

1) The "exploitive definition":

The idea is first to define co-operative behaviour by comparing the effectiveness of my best action when your behaviour is present in my environment ("state of the world") with the effectiveness of my best action when your behaviour is absent from my envirnment.(effectiveness is given a precise meaning within a causal-probability calculus). If the difference is positive then you are co-operating with me; if negative, you are in conflict with me.

2) Morality consists of applying Kant's "moral law".i.e. "the ultimate justification of a principle for assigning benefits & costs is that it must be capable of becoming a general law, or we would say, an overall policy."
Kant suggested one very interesting line of investigation, anmely, to picture the world of values as consisting of two worlds worlds, the prudential world of teleology ("view that developments are due to purpose or design that is served by them; study of final causes."), and the moral world of ateleology. If either world destroys the other, then all value is destroyed. but, more optimistically, one can model the world of values in a history of mankind in which the opposition between the two worlds dimineshes towards zero. today it is often impossible to act without acting immorally in one of the two senses given above.

3) It is immoral to treat people like machines(negative mood form)/ joyous morality consists of loving each individual for him(her) self. People should not be categorised', classified, evaluated along scales. It attacks as immoral our cultural desire to reward & punish by comparisons & scales.
Source:

83) Churchman C."Morality as a Value Criterion". Un.of California.(paper in "Multiple Criteria Decision Making"by Cochrane & Zeleny.)

Note 76
Outline: IX. PERCEPTION
Subject: Observation, Perception and Reference Frames.

That which is observed is filtered/ polarised by various filters etc. which may be considered as relating to hard & soft aspects of a persons information/ knowledge.
The actual subset of the total reality, that is avaliable TO BE OBSERVED, is limited by the: visibility, scan rate, view angle, focus & depth of field.

The observed subset is then modified by the filtering process mentioned above which reconfigures the observed data into a form which the preson considers, via his OWN REFERENCE FRAME, is more suitable to solve his particular problems. The filters involved are:

1) HARD: company rules
international/ national rules
project rules
engineering/ science rules
contract rules
These all have defineable penalties if violated; all eventually concern loss of finance/ resource.

2) SOFT: religious beliefs
intelligence
education
culture
ego
psychological balance
health
knowledge
time to be allocated to this particular type of data.

Depending on the type of organisation within which the person is functioning, & the level, & position, of the person in the organisation the hard or soft references will have a greater or lesser impact.

The higher the priority of the hard references the PREDICTABLE is the outcome of the decision process.

For example, in the military at increasingly LOWER levels in the hierarchy the more dominating are the rules of the military until at the level of the infantryman the hard references ONLY are applicable. The infantryman will perceive his observations almost entirely in terms of his military training...even to the extent of killing his own family, babies etc. when ordered to do so!!

Source:

86) Meaker. Thoughts; Arville, Dec.1990

Note 77
Outline: IX. PERCEPTION
Subject: Actual versus Perceived Risk

This book is a collection of papers(proceedings) from the Society for Risk Analysis workshop at national Academy of Sciences Auditorium, Wsahington DC, June 1 - 3, 1981.

The following notes are from the paper entitled "The public perception of risk" by Litai, Lanning & Rasmussen(p.213 - 224) which talks about RCF(Risk Conversion factors) and the Panel Discussion chaired by Dr. Norton Nelson(who made some very interesting comments.
Both the above are on file.

- No agreement that risk decisions will have a major role in shaping our societies future(p236)

- RCFS provided that relate differnet types of risk e.g. car fatalities with aviation fatalities.

- society, the public etc. generally classified under TECHNOCENTRISM or ECOCENTRICISM. The former further divides to CORNUCOPIANS(who believe in the infinite ingenuity of mankind to solve problems/ get them out of trouble) and ACCOMODATORS(who believe the structure of beaucracies will not fundamnetally change but mankind will always adjust to change.)

- Quote from T.S.Elliott;

" Where is the wisdom we lost in knowledge; where is the knowledge we have lost in information"....can be corrupted to read:

"where is the wisdom we have lost in data; where is the lost data."

- is the world viewed by the publicetc. through COGNITIVE or INTUITIVE MODES? (yaksick, p347)

- Acceptability of risk is wholly non=technical in which human values & concerns dominate issues. (p349, Nelson.)

Source:

88) Analysis of Actual v. Perceived Risk: Covello et al: Plenum Press; 1983.

Note 78
Outline: IX. PERCEPTION
Subject: Brain/ Perception/ Chaotic Collective Activity.

Studies, on the olefactory(smell) systems of animals, have led to the discovery in the brain of CHAOS-COMPLEX behaviour that seems random but actually has some hidden order. The chaos is evident in the tendancy of vast collections of neurons to shift abruptly & simultaneously from one complex activity pattern to another in response to the smallest of inputs.
EEG tracings from electrodes in the brain give the mean excitation of pools of neurons; a common waveform or carrier wave can be identified in the tracings.It is not the shape of the carrier wave that reveals the identity of an odour but the bulbwide (olefactory bulb) spatial pattern of the carrier wave amplitude. Amplitude patterns become especially clear when the average amplitude of the individual versions of the carrier wave are plotted on the surface of the bulb. The resulting "maps" resemble contour diagrams that indicate the elevations of mountains & valleys. the amplitude map changes strikingly when we alter the reinforcement associated with a scent. If the bulb did not bring EXPERIENCE to bear on perception, the map would remain constant even after the conditioned association had been changed.
For a burst to occur in response to some odourant, the neurons of the assembly and the bulb as a whole must firts be "PRIMED" to respond strongly to input. One primer is general arousal;e.g. hunger, thirst, sex. The other primer is input itself; excited cortical neurons naturally increase their output(gain increase).

(n.b. MASS HYSTERIA is RANDOM; but the activities of commuters rushing through a train station at rush hour resembles CHAOS...ORDER underlies the surface complexity..they are all trying to catch a train somewhere).

The chaotic behaviour is a DYNAMIC aspect.

It is susoected that chaos in the brain arises when two or more areas of the brain meet at least two conditions;

- they excite one another strongly enough to prevent any single part settling down, &, at the same time ,

- they are unable to agree on a common frequency of oscillation.

Chaotic systems produce novel activity patterns.

IT IS BELIEVED THAT OTHER SENSORY SYSTEMS BEHAVE IN THE SAME MANNER AS OLFACTORY.

The brain seeks information, mainly by directing the individual to look, listen & sniff. The search results from self organising activity in the limbic system (a part of the brain that includes the entorhinal cortex & is thought to be

involved in EMOTION & MEMORY), which funnels a search command to the motor systems. As the motor command is transmitted, the limbic system issues what is called a "reafference message", alerting all the sensory systems to prepare to respond to new information.

Consciousness may well be the subjectiveexperience of this recursive process of motor command, reafference & perception. If so, it enables the brain to plan & prepare for each subsequent action on the BASIS OF PAST ACTION, SENSORY INPUT & PERCEPTUAL SYNTHESIS. In short,an act of PERCEPTION is not the copying of an incoming stimulus. IT IS the STEP in a TRAJECTORY by which BRAINS GROW, RECOGNISE THEMSELVES & reach into THEIR ENVIRONMENT to CHANGE IT to THEIR OWN ADVANTAGE.
Source:

91) Freeman W.J. The Physiology of Perception. Scientific American Feb.1991.

Note 79
Outline: X. DYNAMIC ENVIRONMENT
Subject: The Environment.

Early work listed FOUR classes of environment:

1) placid/ randomized;

2) placid /clustered;

3) disturbed/ reactive;

4) turbulent field...uncertainty increases in moving towards the turbulent field, which involves continuous change.

Later work identified TWO dimensions to the environment:

1) simple or complex; &

2) static or dynamic.

Prior to Duncans work an uncertainty scale was constructed to measure env. uncert. & presented in the form of a questionaire.

Attempts to correlate all the above work have been disappointing. At this time (quote from ref.2) env. COMPLEXITY & DYNAMISM appear to be valid dimensions of environment but their relationship to uncertainty is unclear. A SATISFACTORY SCALE for evaluating the ENVIRONMENT IS AS YET TO BE DEMONSTRATED.

Source:

14) Duncan; "Characteristics of organisation environments & perceived env. uncertainty"; Admin.Sci.Qtly. 1972.

Note 80
Outline: X. DYNAMIC ENVIRONMENT
Subject: Technology Influence

Hofer & Schendel(ref.23): 1) overall rate of change & 2) variations that occur at different stages of the product market evolution are most important (see table 10; ref.2).Major challenge facing firms in industries with intermediate rates of technological change is the problem of changing from a product to a process focus in the engineering & R & D activities.

Ansoff & Stewart(ref.24): Company tech. profile has 5 factors:
1) balance between R & D;
2) the product life cycle;
3) the coupling between R & D & other company units;
4) the proximity to the state of the art;
5) the R & D investment ratio.

Abell(ref.25)' defines business along 3 coordinate axes labelled:
1) customer groups,
2) customer functions,
3) alternative technologies.
For example, in diversification companies have often to move away from their present business; the 3 dimensions indicate the distance from the present business & hence gives a measure of risk.

Source:

29) Nystrom: "Creativity & Innovation"; J.Wiley .Chichester,uk.1979.

Note 81
Outline: X. DYNAMIC ENVIRONMENT
Subject: 1990's Means Managing Surprise.

Source:

38) Horton,chairman BP, BIM conference,london,june,1099. Key words for 1990's are Rapid Response, Imagination & Change;6 tends foreseen: advance of democracy will continue; economic performance will the measure of success, rather than military; the global pond will get smaller;economic interdependence will increase; the environment will be the main issue; immigration will become a major issue in Europe. 70 of worlds 170 countries are domocracies. We have to manage surprise.

Note 82
Outline: X. DYNAMIC ENVIRONMENT
Subject: Strategic Change Dynamics

See reference and annotation notes under above reference(55).

A design architype is defined as: a particular composition of ideas, beliefs & values connected to structures & systems.

company structures have:
a) a prescribed framework of activity eg a structure of roles & authorities, vertically & horizontally, decision systems, human resource systems;

& b) a pattern of emergent interactions, eg a structure of roles & authorities, decision systems & human resource systems.

The crucial ingredient of the architype is that structures & systems "hang together" to form a coherent design. The pattern or orientation of a composition of structures & systems is provided by the set of ideas & values-ie the "interpretive scheme"(Ranson et al 1980)- embodied within them. Structures & systems, from this perspective, are not neutral instruments but embody intentions, aspirations & purposes.

Hackman 1984 "Study of People Express Airline": "foresaw a gradual transfer of power to other, than central, senior managers.

Tolbert & Zucker,1983, "Institutionalism means the process through which components of formal structure become widely accepted, as both appropriate & necessary, & to serve legitimate organisations.

The idea of structures & systems developing a coherent orientation is defensible because of a limited amount of available empirical work (eg. Miles & Snow, 1978; Mintzberg, 1979; hood & Dunsire,1982; Miller & Friesen, 1984).

British civil Service: "arriving at optimal or correct decisions appeared secondary to the goals of minimizing & containing disruptive behaviours."

Interpretive schemes set "frames" for a) the APPPROPRIATE DOMAIN OF OPERATIONS ie. the broad nature organisational purposes or mission, b) the appropriate PRINCIPLES OF ORGANIZING, & c) the CRITERIA OF EVALUATION to be used within the organisation for assessment of organisational performance.(. from Worthys study of Sear, Roebuck 1985)

Miller & Freisen(1984): research into archetypes: observed considerable change, but in most cases change was the adjustment of structures & systems to secure consistency & coherence WITHIN an architype. Their research showed that

MOMENTUM (ie.the gravitation towards & consolodation within an archetype) was dominant whereas reversals in the direction of change were rare. Essentially, organisations operate within the contoured mould of existing design orientations.

3 reasons are put forward in the literature for the failure of organisations to appreciate & alter pervasive & prevailing assumptions:

1st: (Hedberg 1981; Starbuck 1976, 1983; Meyer 1982; Weick 1979.) structures & processes are often designed to monitor selectively, thus missing critical information; even where relevant information is detected, interpretation is in terms of prevailing references & orientations: "because the search for solutions to new problems does not extend much beyond already known solutions, the organisation is motivated to transform ill-defined problems into a form that can be handled with existing routines(Miles & Snow, 1978).

2nd.(Miller & Freisen 1980,1984) assumes that though the need for change may be recognised it is subject to a calculus of costs & benefits: "potentially disrutive changes must be delayed until the costs of not restructuring become high enough to justify the widespread structual modifications that may be required to re-establish harmony among strucual elements".

3rd.(Cyert & March 1963; Greenwood et al 1977; Pfeffer 1981; walsh et al 1981) stems from a view of an organisation as a political system composed of constituencies of interests seeking to advance & sustain claims upon scarce & valued resources. From this perspective organisations are not hierarchically ordered machines smoothly orchestrated to achieve task ends & purposes but shot through with Daltons "internal combustics" as a consequence of structural differentiation. Struggles for resources connect to structural arrangements by providing some actors preferential access to key decision processes.

Source:

55) Hinings & Greenwood: The Dynamics of Strategic Change

Note 83
Outline: X. DYNAMIC ENVIRONMENT
Subject: Technology Change; Roles of Man.,TUs & workforce.

(Ref. Child 1972): The forms of technology., work & management control within an organisation were seen as the result of choices made by a power-holding group, a "dominant coalition" of managers in accordance with their particular assumptions & values. These strategic choices could be modified by other organisational actors, particularly lower levels of management resp. for implementing decisions & through collective action by the workforce.The idea of strategic choice derives from the social action approach in organ. theory which regards forms of work & organisation structure as emerging from political decisions made by organisational actors rather than being determined by technical, commercial or capitalist imperatives.

The point in the process of change at which the temporal(wordly) stages of change intersect with particular issues raised by the intrduction of new technology provide critical junctures at which managers, TUs & workforce can seek to INTERVENE in order to INFLUENCE OUTCOMES.

Managers pursued a diverse range of objectives when new tech. was introduced reflecting both their level & functional position within the organisation.

Labour process writers argue that the characteristics & capabilities are dependent upon & explained by the objectives of capatalistic management.
Action theory approach writers argue that technology is the product of prior strategic choices.

ref. Buchanan: for many middle managers, personal aspirations have a more powerful influence over decisions concerning tech. change than organisational objectives.

An indicator could be that using a word processor gives 20% more lines of text per minute than a typewriter but 'these measurable aspects of performance..may be emphasised at the expense of other equally important but less measurable factors such as the quality at the end product (Boddy 7 Buchanan).
Source:

56) Mcloughlin & Clarke: Technology Change at Work. 1988. Open Un. Press.

Note 84
Outline: X. DYNAMIC ENVIRONMENT
Subject: Dynamic Environment

The DYNAMIC environment is a static env. MADE dynamic by the INTERVENTION by someone, somewhere for their perceived reasons of opportunity etc. or by the "natural" INTERACTION" OF one firm against another.
I think it is more likely to be smaller interferences/ interactions which locally effect some one who has the power/ authority/ position (eg trade union convenor or small critically positioned service group.power) to execute/ implement following his interpretation of whether that event is likely to significantly effect his static or flowing (dynamically stable?) work activities....or provide him an opportunity.(TM thoughts).
Source:

60) Meaker T.More Thoughts; Oct.1990

Note 85
Outline: X. DYNAMIC ENVIRONMENT
Subject: Data(Analogue to Digital....Taguchi

Data changes from digital at the base of an organisation ie where it is generated, to increasingly analogue form as it progresses up. It is joined in its upward movement by "other" analogue/ digital data.
At certain levels the data is combined into A form & then becomes another D piece of data to be joined by other A/D'd data as it progresses upward.

Problems can occur at the A/D & D/A conversions eg corruption etc.

Degrees of freedom: no. of independently variable parameters ie parameters which can be varied without effecting each other.

Taguchi principle of reducing sensitivity in those parts that are high tech./ difficult to manufacture etc.,& adjusting for the consequent loss of sensitivity in a low tech./ easily accessible part could be applied to organisations.

Everybody must be educated for failure free performance vis-a-vis the strategic plan. In the air traffic services, the environment(airspace structures, new equipment & comms. systems) are separate, & independent from ATC(aircraft operations). The only direct coupling between the two is the pilot/ pilot error.
Accidents in high technology areas are accidents of sociotechnical systems (combination of HW, Humans, & organisations)

Consider the following:

Regulation of hazards.

Error mode & effects analysis

Risk trees with a) time b) resources.

Risk trends.

Identify all risks that can be based on historical data.
Source:

73) Meaker. Arville Nov. 1990

Note 86
Outline: X. DYNAMIC ENVIRONMENT
Subject: Managing High Technology Programs & Projects

On page 189 of this text book the following statements appear:

"The more correct, concrete, quantified, and specific planning methods described in this book apply most appropriately to the later phases of a project when more specific information is available and the uncertainties have been reduced.
When dealing with the rapid changes in todays world, managers have learned that the old, highly quantified methods of planning are no longer effective, and have adopted a planning logic that is more intuitive."

These statements endorse the need for this thesis.
Source:

156) Archibald R. Managing High-Technology Programs and Projects.
John Wiley; 1990.

Note 87
Outline: XI. SYSTEMS(definition/ approach)
Subject: Life Cycle Concepts.

A firm which stays in the same business has a finite life span(ref.2 p71).
Corporate level life cycle portrayed by BCG matrix: axis are "relative competition position" & "growth rate of the industry".(see fig.14 ref.2).
Criticism of the BCG matrix led to dev. of the General Electric Business Screen,(GE), matrix: competitive position is ranked as strong, medium or weak; industry attractiveness as high, medium or low.A modified GE matrix has 5 dimensions of product/market evolution:
1) development
2)growth
3) shake-out
4)maturity
5) decline.

Adizes(ref.31) states that an organ'n. must do 4 things:
1) Produce
2) Administer
3) be Entepreneurial
4) Integrate; (PAEI).

A different weighting of the roles depending on the position of the company in the life cycle.(see table 12,ref.2). After maturity the natural resistance to change means that effective change can only come from without.
Work NEEDS TO BE DONE TO DETERMINE:
1) the EXTERNAL FIT OF R & D to the ENVIRONMENT, &
2) the INTERNAL FIT to the STRATEGIES OF THE ORGANISATION.

From Thompsons work R & D must lie at the edge of the organisation domain(boundary spanning function). R & D is in a powerful position if it can demonstrate that it can reduce uncertainty....since organ. attempts to remove uncertainty; however R & D may introduce/ generat uncertainty.
Emery & Trist(ref.26);In a turbulent environment there will be reliance on R & D to meet competitive challenge.

Lawrence & Lorsch(ref.27) divided organ. into 3 main s'systems of: 1)marketing,
2) economic-technical,
3) scientific;
each s/s structure varies acording to the predictability of the env.

Anshoff & Stewart(ref.24) related tech. profile to rate of change of environment & distance of tech. from state of the art.

Steele(ref.28) applies a matrix to the role of R & D in business strategy & identifies bus.strats. as:
1) hold/harvest,
2) grow present business,

3)extend present bus.
Technological inputs are to:
a) apply the state of the art,
b) extend the state of the art,
c) use competing tech.,d)use alt. tech. to supplant the old.(see fig.15,ref.2).

Moore & Tushman(ref.29) "product class" life cycle considerd rather than the "product form" or "brand" life cycle; hence emphasis was on SIGNIFICANT INCREMENTS OF INNOVATION in the market place.

Nystrom(ref.30) considered companies to be POSITIONAL(defenders) or INNOVATIVE(prospectors/ see ref. 21). A distinction made between intended & realised R & D strategies. From empirical analysis of 11 swedish co's. 3 POLICY DIMENSIONS evolved:
1) concentrated v. diversified R & D,
2) tech. or market orientation,
3) offensive v. defensive.

REALISED R & D strategies have 3 dimensions:
1) internal v. external orientation;
2) isolated or synergistic use of technology;
3) fixed v. responsive organisation (3 aspects:
a) organ. of co's. external information & contact network("wide" or "narrow" depending on how extensively the organ searches in its environ. for new ideas/ cooperation etc.);
b) idea & project evaluation(central./decent.);
c) flexible or fixed project groups. external orientation was associated with a higher level of tech. innovation than internal orientation. A high level of tech. innovation correlated with synergistic use of technology.

The Nystrom approach is within the strategy-structure sphere, shows effect of strategy on R & D and should permit prediction. NEED TO MOVE FROM EMPIRICAL to GENERAL TO REALISE more benefit.

Source:

29) Nystrom: "Creativity & Innovation"; J.Wiley .Chichester,uk.1979.

Note 88
Outline: XI. SYSTEMS(definition/ approach)
Subject: System Definition

A system is an assembly of components, connected together in a certain way.
The components are affected by being in the system and the behaviour of the system is changed if they leave.
This organised set of components does something.
This assembly has been identified as of particular interest.r
Systems can grow by more & more of the world coming into their environment & then into the system itself. At each stage of growth the newcomers must be absorbed and integrated & in some cases this build up can overload what is already there.

4 KEY TESTS of a system: organised connectedness; essentiality; interest; & behaviour.

Systems Approach: 1) AWARENESS....of some activity but not in system terms.
2) COMMITMENT..positive answer to question "why am I doing this?".
3) DETECTION..trying above def.of system to see system attributes.
4) SEPARATION..putting trial boundaries, giving titles to , systems.eg rescue systems.
5) SELECTION..stating what kind of system the system is eg conflict resolution system, managed refuge system.
6) DESCRIPTION..describing in systems terms the components, subsystems & environments, their states & the connections between them & so on.
Source:

36) Bignell & Fortune::Understanding system failures";Man. Un.Press.1984.

Note 89
Outline: XI. SYSTEMS(definition/ approach)
Subject: Failures in Many Industries Examined

A SYSTEM has the following characteristics:

1) an assembly of components, connected together in an organised way;

2) The components are effected by being in the system & the behaviour of the system is changed if they leave it;

3) This organised assembly of components does something;

4) This assembly has been identified as of particular interest.

Systems can grow by more and more of the world coming into their environment & then into the system itself. At each stage of growth the newcomers must be absorbed & integrated & in some cases this build up can overload what is already there.

Summary of 1st steps in a systems approach:

1) **AWARENESS**:, being aware of some activity; it is described, but not in systems terms.

2) **COMMITMENT**: having reasons for staying with the study, e.g. to describe, understand, repair or maybe redesign. Answering the question, "why am I doing this?".

3) **DETECTION**: trying the 4 part definitionof system to see systems attribute(see above).

4) **SEPARATION**: separating some systems of interest; putting trial boundaries on them; giving titles of systems, e.g a rescue system.

5) **SELECTION**: selecting & stating the kind of system that the systen is, e.g. "conflict resolution system","managed refuge system".

6) **DESCRIPTION**: describing in systems terms the components, subsystems & environments, their states & the connections between them & so on.

Failures need to be understood & this is best achieved by exploring the system background of the failures. In a complex system, failures are never due to a single cause, so by taking this kind of view of the failure & its setting, that is , by seeking systems in the situation, the layers of the causes become clearer & more ordered in the mind.

Once the pattern which enable us to trace causes become clearer we can then attempt to predict potential failures from lessons learned to shape what will happen in the future.

Perhaps one of the most useful ways of describing failure using systems terminolgy is as the production of undesireable outputs of the system. System performance can be measured in two ways:
1) compare inputs with outputs & hence get efficiency.
2) compare the outputs with the objectives of the system & hence get effectiveness.

4 key tests of a system:
1) organised connectedness;
2) essentiality;
3) interest;
4) behaviour.

Source:

54) Bignell & Fortune; Understanding systems failures. manchester Un.Press. 1984.

Note 90
Outline: XI. SYSTEMS(definition/ approach)
Subject: Cybernetics and Modelling

One of the most typical forms of the relationship between different parts of an organisation is expressed by a sentence such as:

" When organ A shifts from state m1 to state m2, and organ B shifts from state n1 to state n2 after k days (weeks,etc.), organ C will change its state from q1 to q2 with prob. p."

The application of the above to all organs in the system will enable the entire system to be modelled.
Source:

66) Encycl.Brit.13/636

Note 91
Outline: XII. LIVING SYSTEMS
Subject: Company Functioning

Think of making an analogy betweeen "man" & a "company" from conception to death with offspring to keep things going. Look at territorial, infant mortality, how man proceeds in life(incrementally!), survival, predatorial, herding/ tribal aspects and compare. Man has certain critical functions, blood pressure, air conversion, etc & has to ensure that verything will progress satisfactorily.
Source:

61) Meaker T.company functioning thoughts.

Note 92
Outline: XII. LIVING SYSTEMS
Subject: Human Analogy

What do humans do when attempting something complex, themselves. Which parameters/ risk indicators do they use? think of oneself.

Consider modelling a company on the human model...with the interfaces likewise modelled.

Human analogy: ref. what also happens to companies....
wounded.....shares bought up, partially
hijacked....take-overs
killed.....taken voer & absobed/ dissolved/ fragmented

- survival
- growth
- law of jungle
- infant mortality
- education

Consider STRESS/ STRENGTH DISTRIBUTIONS wrt companies & human; overlap = risk.

Organic organisations/ human analogies.
Source:

72) Meaker. Thoughts . Arville. Nov.1990

Note 93
Outline: XII. LIVING SYSTEMS
Subject: Living systems

Life is a phenomenon almost impossible to define or to explain in all of its varying aspects.
Source:

150) Encyclo.Britannica;micropaedia,page212, 10:893 etc.

Note 94
Outline: XII. LIVING SYSTEMS
Subject: Living systems-Phenomenology

Phenomenology tries to achieve three objectives:

1) to show how the world of theory & science originates from the life world, wwhich includes a revelation of how everyday perceptions of the world are tainted by the world of science;

2) it strives to discover the mundane phenomena of the life-world itself;

3) to show how the experience of the life-world is possible by analysing time, space, body, and the very givenness or presentation of experience

Source:

151) Encyclopaedia Britannica; micropaedia;page 214.

Note 95
Outline: XIV.. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Knowledge and Fuzzy Statistics based Systems; Co...

Any assemblage of things forming a regular & connected whole is a system.
The knowledge kept in a knowledge base is procedural. Pieces of knowledge in the form of rules can be chained in an inference process. In other words, from some premises one can obtain a conclusion. If the internalised premises(the rules) match the external premises(facts furnished by users), the inference process is started & the machine exhibits intelligence.

The impact of knowledge engineering upon simulation is illustrated by qualitative analysis, which led to verbal modes whose variables are words rather than numbers. Not only can the values of variables be linguistic rather than numeric, but causal relationships between variables can be formulated verbally rather than mathematically. The moral is that linguistic models,which dominate the soft sciences & heuristic knowledge in general, can be handled now by computers if the meaning of the words(models of the world) is internalised in a knowledge base.
A theory of evidence in terms of probabilities is lesss than ideal if the probabilities invoked are impossible or difficult to determine.With the advet of fuzzy stats. it became clear that fuzzy variable could be handled rigorously.

The theorem of Representation: a fuzzy set can be represented by a family of crisp sets, which we call level sets; and any subjective evaluation defined on any support is equivalent to a family of intervals.

The translation by an analyst of words into numbers is termed the SEMANTIC approach.
The whole feedback loop, input-system-output-controller, has a very special behaviour; it manifests PURRPOSE.
Cybernetics: thee interdisciplinary science of communication & control.
Dialectic: critical analysis of mental processes.
Identity is something to be achieved.
Aristotelian logic: based on the law of the excluded middle(x cannot be A and non-A at the same time.) has to be replaced by a dialectical logic, assumingthat A and non-A do not exclude each other as the predicates of x.
The intelligent behaviour of a knowledge based system can be explained as the result of INTERNALISING a knowledge base, and, therefore the structure of facts and, therefore, the properties of the structure.

The idea of a controller is based on observability. The system is observable whenever two distinct states yield observably different responses; i.e. for two states there is at least one input to which they react differently.
Observability is a vague predicate.
Vague can be given a precise meaning:

vague input: input-(0,1)
vague output: output-(0,1).
An essential charcteristic of any word is that the boundaries of its application are not tied.
Complexity is is property of a system arising from interactions of the system with its observer/ regulatorr rather than being an intrinsic property of the system itself.
We can use linguistic models to avoid complexity.
A structurally stable system is a system whose behaviour is not drastically altered by a slight hange in its structure.
Endogenous descrides activities within a system;
Exoggenous describes activities in the environment that effect the system. A system for which there is no exogenous activity is said to bee closed, in contrast to an open system, which does have external influence.
Most managers have decided to use heuristics, rather than math. models; i.e.. methods of solving problems by inductive reasoning, valuating past experiece and proceeding by trial & error.
Four basic approaches to scientiific truth:
1) Liebnitzian-based on the premise that truth is analytic; therefore a system can be defined completely by a formal or symbolic proocedure.
2) Lockean-based on the asssumption that truth is experimental e.g. the Delphi method.
3) Kantian-based on the assumption that truth is synthetici.e. experimenta data & a theoretical base are inseparable.
4) Hegelian-based on the assumption that truth is conflictual; the dialectcal approach. Recognises that data is not information & that information results from an interpretation of data.
This note continued in NOTE 6.
Source:

116) Negoita & Ralescu: Simulation,Knowledge-based computing, & Fuzzy statistics.van Nostrand Reinhold,1987.

Note 96
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Knowledge and Fuzzy Logic.Cont'n. of NOTE 90.

Language is not only for representing ideas but is equally a means for expressing beliefs. we must focus also on what people do with language.
Formalisation errs on the side of sameness and seeks to exorise vagueness, & functionlism errs on the side of difference and encourages us to us to look at the uses of vagueness. Silence may communicate what is beneath words or beyond them.
Recent developments in global sim. models have questioned the assumption that quantitative models can repreent complex systems.
To grasp the whole the modeler must PULL BACK & reduce the world to maneageable proportions.
System theory is reaching the responsive frontier where the new skills of handling vagueness become critical.
many IF-THEN rules can serve as the structure of a decision-making process.
Because linguistic values like HIGH can havedifferent connotations, they are CONTEXT-DEPENDENT.
INFERENCE is the act of conclluding from premises or evidence.
previous attempts to solve fuzzy decision problems have produced numerical rankings of the alternatives. This is believed to be unnecessary because in situations where fuzzy sets are a suitable way of representing imprecision the final choice could be fuzzy. Therefore in order to choose from among a set of alternatives, it is enough to have fuzzy information about the suitability of each of them.
Suitability is interrpreted as a measurs of the ability of an alterntive to meet decision criteria. The concept is the fuzzification of the idea of a rating.
ABDUCTION requires we find pertinent facts & apply them to infer a new fact AND also the ablity to be able to decide which answer to accept.
Prob. theory studies statistical inexactness(due to the occurance of random events) & fuzzy set theory studies innexactness due to human judgement.
Source:

116) Negoita & Ralescu: Simulation,Knowledge-based computing, & Fuzzy statistics.van Nostrand Reinhold,1987.

Note 97
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Neural Network Architectures.

An introduction to artificial neural networks emphasizing that although the utilization of the biological term is meaningful we are still many orders of magnitude removed from emulating the brain.
The multi-layered networks are described consisting of slabs of processing units that are interconnected with adjacent layers.
The two layer perceptron is discussed & the breakthrogh by Hopkins in 1982 when he introduced the network architecture; whereby computational capability can be built from networks of neuron like components. Each processing unit in the network is FULLY INTERCONNECTED to every other unit.
Back error propagation is discussed as follows: when the network is given an input, the updating of activation values propagates forward from the input layer of processing units, through each internal layer, to the output layer of processing units. The output units then provide the networks response. When the network corrects its internal parameters, the correction mechanism starts with the output units & back propagates backward through each internal layer to the input layer.

The brain organises itself dynamically during a dev. period, and can permanently fix its wiring based on EXPERIENCES during certain critical periods of development(Hubel & Wiesel 1979).

Aan important feature of sensory & motor systems is the existence topological maps in the brain.
Topological maps tend to dedicate greater area to activity that is utilised more.
Source:

117) Dayhoff J:Neural Network Architectures; van Nostrand Reinhold,1990.

Note 98
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Expert Systems

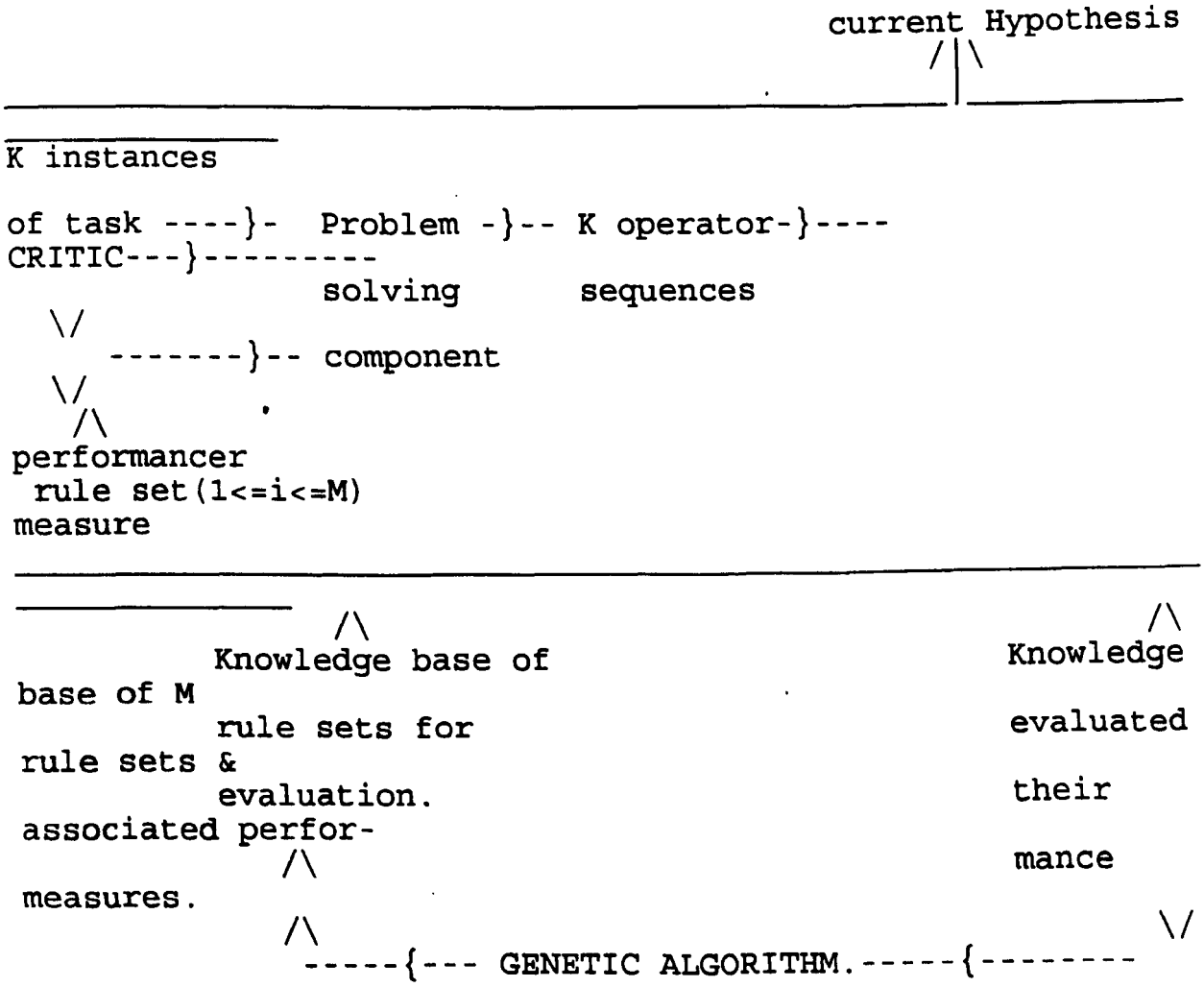
Source:

118) Forsyth R:Expert Systems:Chapman & Hall Computing,1984.

Note 99
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Expert Systems

Knowledge + Inference = system (similar to:Data + Algorithm = Program..the software tradition).

THE LS-1 LEARNING PARADIGM.



Functionally the above paradigm is composed of three interacting components:
1) the problem solving component- an inference engine for applying alternative sets of control heuristics to instances of the task under consideration.
2) the critic - a mechanism for evaluating the performance of a given set of heuristics in solving instances of the task.
3) the learning comonent - a genetic search strategy responsible for generating new sets of heuristics in response to the performance assesssments provided by the critic.

****
Source:

118) Forsyth R:Expert Systems:Chapman & Hall Computing,1984.

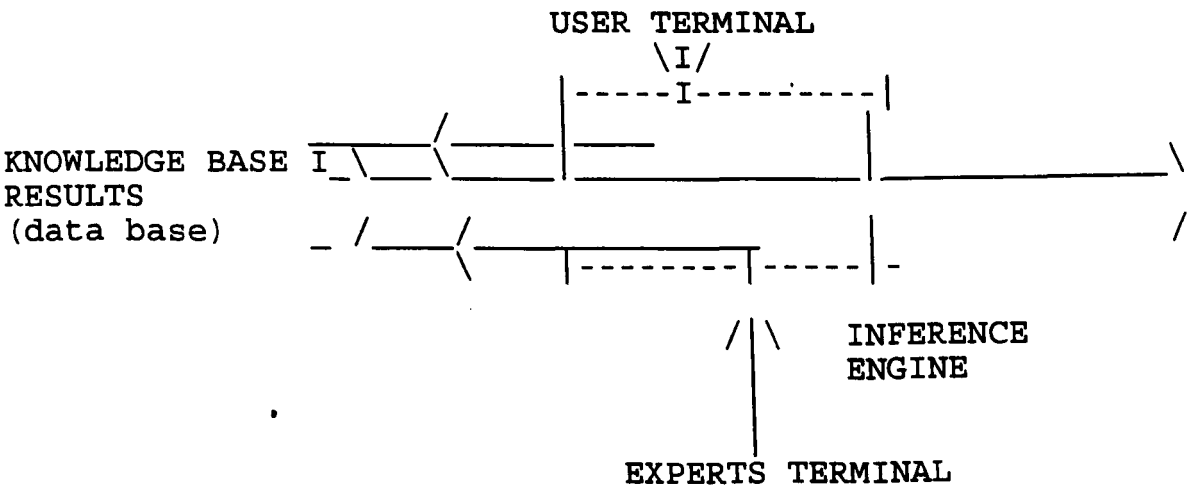
Note 100
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Expert Systems.

An inference network describes the wayin which the rules describing knowledge are inter-related so that inferences can be made.
In crisp logic a statement is either true or false.
Fuzzy logic allows a statement to have a degree of truth between true(1) & false(0).
Source:

119) Hart.A; Expert Systems;Kogaan Page Ld. 1988.

Note 101
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Artificial Intelligence

Basic elements of an Expert System:



Source:

120) Bernold T. & Albers G;Artificial Intelligene;Elsevier Science Publishers bv;1991.

Note 102
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Knowledge Based Management Systems

The following chart shows those aspects that AI(artificial intelligence) & DB(data bases) will, and will not, give up:

	AI	DB
we wont access	partial descriptions	concurrent
give up	specialised inference techniques controlled search	security persistence frequent updates
	inferences	large data
we want	large data	inferences
we will be glad to give up.	security frequent updates	specialised infer.rules controlled search.

Source:

121) Brodie M & Mylopoulos J;On Knowledge Base Management Systems.Springer-verlag,1984.

Note 103
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: Expert Systems for Spacecraft Management.

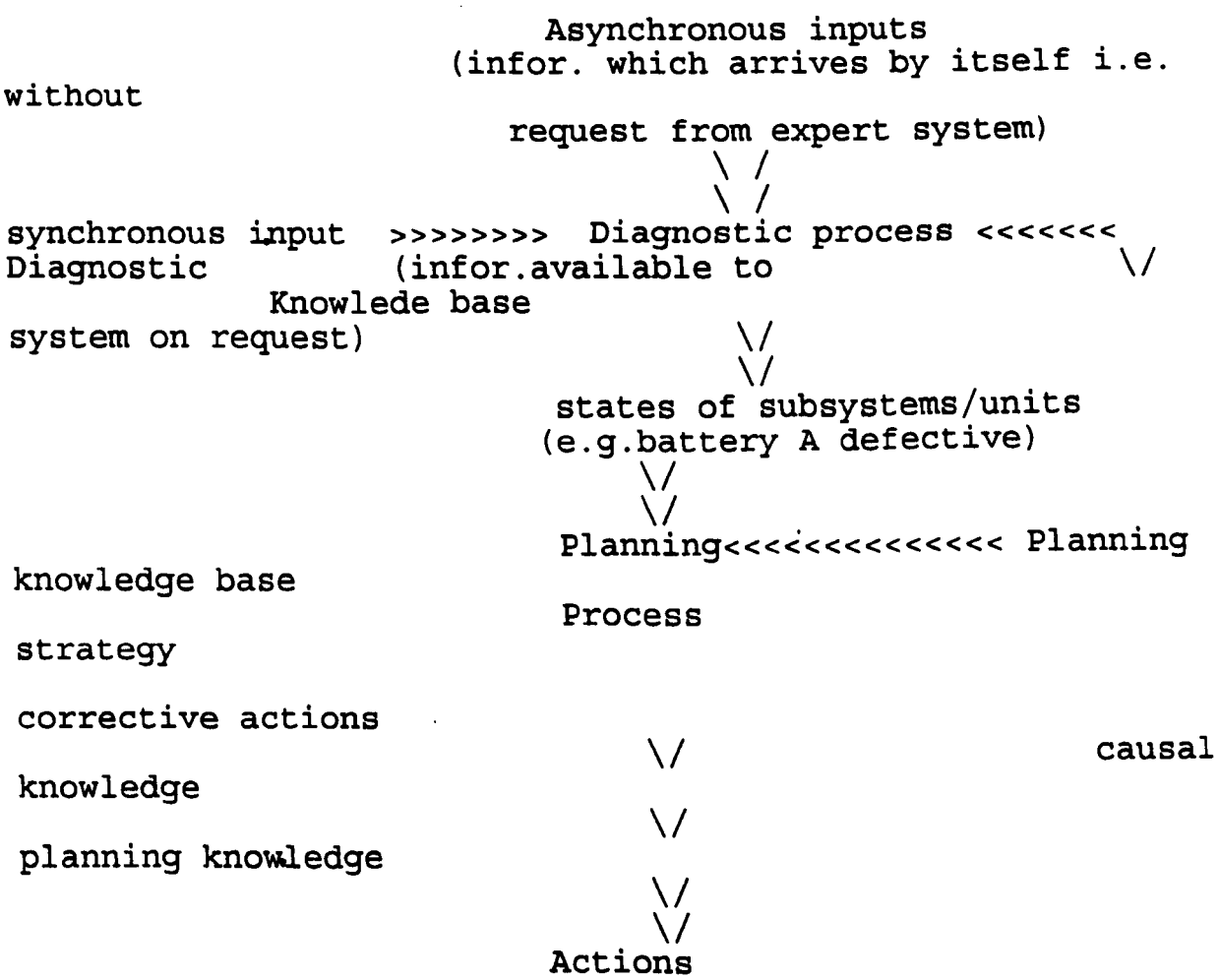
Expert systems & artificial intelligence techniques in general are characterised by the combination of numericl & symbolic computation.
The core of the expert system technology is the ability to represent the knowledge typical of the applicatin domaine.
Twoinference methods:
-1) Backward-chaining (or goal driven inference) is based on matching an initial goal (assertion) with rule conclusions. The conditions of the rules with matching conclusions then become input to the backward chaining process.
-2) Forward chaining consists of matching given facts(data) with rule conditions.
Source:

122) Donzelli P, et al; Expert System Study for Spacecraft Management
Feb.1987. ESA report.

Note 104
Outline: XIV. OPEN LOOP SYSTEMS-expert systems-fuzzy logic
Subject: On Board Expert System for Management of Autonom...

Current spacecraft(s/c) management philosophy adopts a deterministic approach where predefined procedures are based on the assumption that all preconditions are perfectly bounded.
sucha premise is less & less verifiable with respect to the growing complexity of the new generation satellite requirements of autonomy, reliability & performance.

Knowledge Spec.Formalism(KSF):



Primary aim of KSF to facilitate the communication between knowledge enginers & domain experts.

Fault management tasks:
- failure detection or verification of reported failure.

-limitation o resulting damage(quick response required)
  -redundancy switching
  -safe mode initialization
    -safe attitude manouvre(TTC link,solar array,orientation)
    -safe mode for paylooad instruments
    -disconnection of non-essential loads

-identification of failure(diagnosis)
- self test and evaluation of s/c status
- resourses inventory
- assessing impairment of the mission

-elimination of the failure
- re-initialisation
- reload/dump memories or programs
- repair

-adaption to enduring failure
-evaluation of optimum operational configuration for degraded mission
-s/c reconfiguration after approval.

MODELISTIC KNOWLEDGE REPRESENTATIONS allow the combination of math. equations & formuas, forward/backward rules and high level programs integrated among them to describe the behavior & structure of the components. This allows to biuld operational running models by defining the structure of the connections among components an informal behaviour for each component. Such kind of model can follow the design evolution being incrementally transformed in a formal model while the precise behaviour of each component is defined. Source:

122) Donzelli P, et al; Expert System Study for Spacecraft Management
Feb.1987. ESA report.

Note 105
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Mechanism of the Mind; de Bono

Source:

10) De Bono; The Mechanism of Mind; Penguin;1986

Note 106
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Homeostasis;Negative Feedback

Homeostasis is the self regulating process by which biological systems tend to maintain stability while adjusting to conditions that are optimal for survival; if successful..life continues; if unsuccessful..death. the stability attained is a dynamic equilibrium, in which continuous change occurs yet relatively uniform conditions prevail- very much as in a poool below a waterfall. Such systems are called open; in a test tube they are called closed.Biological systems are all of the open type.

Both negative & positive feedback , in the form of individual & species behavioral patterns, are involved in maintaining the overall dynamic equilibrium of the community. This large steady state is often referred to as the "web of life". many activities are keyed to the external environment through biological rhythms e.g. hertbeat, tides, seasonal changes in vegetation, annual migration of birds.

Self regulation is of primary evolutioary significance, since it operates for the species & the organism as well as for lesser subsystems such as enzyme concentrations.

Living forms are not "in being" they are "happening"; they are the expression of a perpetual stream of matter & energy which passes the organis, or cell etc., & at the same time constitutes it. This stream of energy & matter appears to be governed by the same laws of thermodynamics thta hold for test tube reactions & combustion engines.

The objective of everything is survival....from the the subtle hormone cycle interplay to the predator- prey relationship. Feedback is invoved everywhere.
Source:

65) Encyc.Brit.8/1016

Note 107
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organising Systems(SOS)

SOS concerned with circularity, recursiveness & self-reference.

- knowing is acting(Heinz von Foerster 1981,Kelly 1955, H.Maturana 1970,1987)
Source:

92) Kenny V & Gardner G:constructions of Self Organising Systems

Note 108
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organising Systems

Self organising systems(som) concerned with: circularity, recursiveness & self-reference.

We are what we do, what we know is what we do; knowing is acting...if we desire to see we must learn how to act.

Maturanas theory of autopoiesis for the five areas of: the ontology of explaining; reality; the ontology of cognition; social phenomena; & ethics. He differentiates between the "domain of explanation" & the "domain of experience". this is dealt with by reference to two alternative pathways of explanation; a) that of transcendental objectivity, & b) that of constituted objectivity. The former assumes that there exists a world which is independent of our distinguishing it, while the latter assumes that no-thing exits if we do not bring it forht through our operations of distinction. (ontology: metaphysics dealing with the state of being.)

See paper in file. Many useful charts.
Source:

92) Kenny V & Gardner G:constructions of Self Organising Systems

Note 109
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organisational ability of the Brain, cont'd.

- This specific process defines the criteria according to which the brain classifies sensory signals from the outer world.

-the genome specifies the rules to which the predetermined connectons can be changed as a function of their activity. These mod. rules can mediate associative functions,associations of connections occurring whenever there is contingency of activity in time & space.

- there are also the rules according to which relations between the phenomen in the outer world are evaluated & internalised htrough structural mods. off connectivity.
-
-these premises are well adapted & reflected the knowledge which the genome has acumulated during phylogeny about the physical reality within which the dev. organism evolves. Experience-dependent self organisation has little in common with with passive imprinting of a tabula rasa but rather appears as an interactive process which is subject to numerous genetically determined constraints. Sensory activation patterns have to match prespecified response properties of the already existing and highly active nerve nets in order to promote long term modifications. The adaptive process appears to have a threshold which is different than the activation threshold that needs to be trespassed to relay sensory signals. To induce a long term modification it was not only necessary to appropriately excite the respective neuronal pathways, but modulatory systems had to be activated in addition. These modulatory systems influence the functional state of virtually all cortical & sub-cortical areas through widely distributed efferent connections & receive their input from numerous centre of the brain.
Thus large neuronal arrays are involved in the decision process which determines from moment to moment whether a particular activation pattern should lead to long-lasting modifications of circuity. The modularity systems identified so far as having a permissive function in neuronal plasticity seem to be involved in the central control of the arousal level, in the maintenance of attention & their activity probably also reflects fluctuations in motivation.

The DEVELOPING brain ought to be considered as a highly active & primarily self containing system which, when born, ALREADY POSSESSES substantial knowledge about the structure of the world into which it is going to adapt itself. This knowledge is stored in the brains architecture & in the rules allowing for activity-dependent modifications of this architecture. Thus when the brain is born & confronted with a dramatic expansion of accessible environment, it poses a number of precise questions to this environment with the purpose of optimizing & adapting its internal structure to REALITY. In a number of neuronal systems these questions are

raised only during a brief & critical period. If answers are not available the prospective functions do not develop & these deficits are in most cases irreversible.

The brain & its environment appear as components of a closed, highly interactive system.

A cause of developmental errors is suggested by the particularities of the self-organisation process. The possibility must be considered that the brain does not formulate the right questions or does not ask with sufficient insistency to obtain answers. Thus any malfunction of the highly complicated modulatory systems that are involved in the gating of drives, motivation & attention and any disturbance in the genetic a priori "knowledge" about the nature of the world can be expected to entrain severe development disorders. Developmental disorders which cannot be attributed to deprivation or to distinct lesions in sensory or motor systems but nevertheless lead to disturbances of cognitive functions similar to those expected from deprivation are in fact due to malfunctions of the modulatory systems and to disturbances in the brains architecture, the latter leading to inappropriate questions.
Source:

93) Singer W;Brain as self organising system

Note 110
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organising Brain.

The following notes have been selected from this reference:

-cognitive functions have to be learned.

-genetic instructions are in principle not sufficient to specify neuronal connections with sufficient precision.Self organisation processes are implemented in addition which allow to optimize genetically determined blueprints of connectivity by making use of functional criteria.. Thus, neuronal activity becomes an important shaping factor in the development of the structural & functional architecture of the forebrain.

-neuronal activity is modulated by sensory signals.

-environmental factors can influence the development of the neuronal networks.

-the above shaping processes are additionaly controlled by modulatory systems.

- the activity of the modulatory systems depends on central states such as arousal, attention, & perhaps also motivation.

- experience dependent self organization should not be considered as passive imprinting process but rather as an active dialogue between the brain & its environment.

- the connections between neuronal populations are not random but highly specific.

- the very neuronal signals which serve information processing in the mature are used to structure dev. processes.

-the early movements of embryos can be considered as an epiphenomen of a self-organising process which serves to increase the specificity of neuronal connections using functional parameters as selection criteria.

- during the dev. stage activity, dependent shaping of neuronal connectivity occurs not only as a function of self generated activation patterns but also as function of sensory experience.

- "seeing" has to be learned during a critical period of post natal development.

- persons unable to process signals from spatial contours(due to cataract e.g.) were unable to recover visual functions when operated upon as juveniles or adults after restoration of optical media(eyes); newly available visual signals were experienced as noise/ pain & pattern

recognition was impossible...many returned to blind status.

-higher mammals & man who have frontally positioned eyes with overlapping visual fields have the ability to match the images encoded by the two eyes & to calculate from the disparities of these two images the distance of objects in space.

-changes of synaptic efficacy require activation of the post-synaptic structure & that the direction of the change-increase or decrease of efficacy-depends on the correlation between pre- 7 post-synaptic activation.

- an additional & indespensible condition that needs to be fulfilled to render this experience-dependent selection process successful. Reshaping of afferent connections may only occur at instances when the animal is attentively fixating with both eyes & must not take place when the eyes are moving in an unco-ordinated way.

-the selection process is not solely dependent on retinal signals but is in addition gated by non-retinal control systems capable of determining the instance at which retinal activity may be used to induce changes in circuit

- the generation of action potentials in the post synaptic cell is not sufficient to produce a change. Even when contour vision is unrestricted & retinal signals readily elicit responses in the neurons of the visuual cortex vision-dependent mods. of excitatory transmission fail to occur in a variety of rather different conditions.

- retinal signals only influence the development of cortical functions when the animal uses them for the control of behaviour

- nature has organised very elaborate algorithms of self-organisation to economise & compliment genetic instructions. The genome(an entire set of hereditary factors contained in a haploid of chromosomes) specifies the general layout of the system & the rules of the self-organisation process.the latter in turn optimize the realations between the components of the system & between the system & its particular environment.

- the genome determines the dev. of feature detectors whose specific response properties emerge independently of experience.
Source:

93) Singer W;Brain as self organising system

Note 111
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organising Systems(SOS)

Based on the work of Per Bak, Brookhaven National Lab.; who is often quoted & is credited with the "theory of self organised criticality".

for self organised critical systems, all the scales of length & time, from the size of the whole to the size of the smallest microscopic component, are equally important. The smallest disturbance may grow & engulf the entire population.

Progress towards the self organised critical state does not need the assistance of a driving force or an external influence but is somehow the result of the many-component nature of the system.

You can interpret the large scale behaviour of complex systems, often hidden by fluctuations, in terms of an organisation scheme for all the underlying events.

Self organised state is insensitive to lengths & times; i.e. no particular length or time-scale stands out from any other.

Two clear signals, or fingerprints, show whether a complex system of events is obeying the theory of self organised criticality.
The first,called FLICKER NOISE or 1/f noise, is a precise pattern that describes the apparently random fluctuations of the events over time.
The second is the appearance of so-called SELF-SIMILAR or FRACTAL, arrangements of the places where the events happen

Source:

94) Mehta A. Self organising sand pile.

Note 112
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organisation and Environmental Management.

A rather ponderous paper about (simplistic) application of the above. One or two quotes given below.

SO theories address the same phenomena: the unpredictable spontaneous creation of structure in far-from-equilibrium systems. The character of a sociobiophysical system may be strongly affected by sudden changes in its subsystems or the systems environment, for example, the advent of a new technology, the introduction or eradication of a species, the development of new economic linkages, or the establishment of new policies & laws.
Source:

95) Slocombe,Grzybowski; Self organisatio theories & Environmental management.

Note 113
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organising Systems; computing aspects/ neur...

Neurons are interpreted as ADAPTIVE FILTERS which can learn their responses by modification of their transmission parameters.

The associative memory function, by which structured memorised information can be recalled from its fragments or constituents, is one of the basic operations in thinking, & its firts physical analogies come from optical holography or related operations.(van Heerden, Gabor).

The brain network is a very complicated feedback system, having local & global feedback & chemical interactions.

Avoid a comparison of the neural networks with logic or digital ccts.; the collective phenomena cannot be explained by logic operations.

The neural network is more akin to the analogue computer.

Correct operation can only be guarenteed if the neuron is an active part of the living organism, with all the chemical & physiological stabilizing control effects included.

The function of a neuron is to fire actively when it recognises a particular value combination in the incoming neural signals.

The brain is a complicated feedback system which involves various kinds of backward control, on the local network as well as globally.

Learning must involve some kind of internal states in the brain.
Source:

97) Kohonen t: Adaptive, Associative, & self Organising Functions in Neural Computing.

Note 114
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Simulation of ..

Could we simulate the predicted envirnment for the corse of a programme in order to "test" its ROBUSTNESS; relate this Taguchi work. This may enable the realism/ pragmatism of the risk definition/ action/warning limits and consequent intervention to demonstrated.
Could the military "CRISIS MANAGEMENT" TECHNIQUES APPLY?

With Cray/ parallel processing/ neuron computational techniques very many interactive parameters/ dimensions could be simulated eg navier Stokes work in aerothermaldyn flows....this contains compressibilty/ turbulent/ local disruptive effects/ internal-external interactions etc.....all with possible analogues in strategic planning-implementation.
Source:

105) Meaker Thomas; Seminar entitled "Issues & Problems involved in the Management of an European space project"; City Un.May, 1991.

Note 115
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Automation in Aircraft; the increasing remotenes...

Paper analyses airline accidents from human failure/error point of view; the following summary statistics were noted:
"Summary of inforation trnsfer problems cited in Aviation Safety Reporting system(ASRS)":
(10,815 citations in 9,046 of 12,373 consecutive reports):
Message not originated..... 37%
Inaccurate, incomplete, ambiguous, garbled.....37%
Correct but untimely..... 13%
Not received or not understood.....11%
Not transferred due to equipment failure.....3%
Source:

127) BILLINGS C. The Automatic Human.Aerospace,March,1991.

Note 116
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Company Compared to Living Systems

"Once it was E. Germany's top electronics producer. Now Robotroon is a cumbersome dinosaur beset by marketing forces. Its first goal is to survival.
Source:

132) Robotron Fights for its Life.Int.Man.Dec.1990.

Note 117
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Caltech & Oxford have Created a Silicon Neuron

Operates in analogue rather than digital mode.
Tries to repeat analogue reactions of the brain.
Source:

133) Rensberger B. What a chip shares with a Brain Cell.
Int.Herald Trib.Dec.201991.

Note 118
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Presentation Techniques.

Paper evaluates: Chernoff faces,
symbolic star plot
glyphs
boxes
profile plots
symbolic scatter plots
kliener-hartigan tree symbols
generlised draftsman display
andrews plot
parallel axis graphics
cartesian hyperspace graphics

Source:

134) Cluff,Burton;A characterzation & categorization of higher dimensional presentation techniques.

Note 119
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Use of Patternation in Notetaking

Note taking recommende using two adjacent pages: one for pattern, the other for graphic or more linear information
Source:

135) Brain Patterns-advanced methods & uses.

Note 120
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Chaos

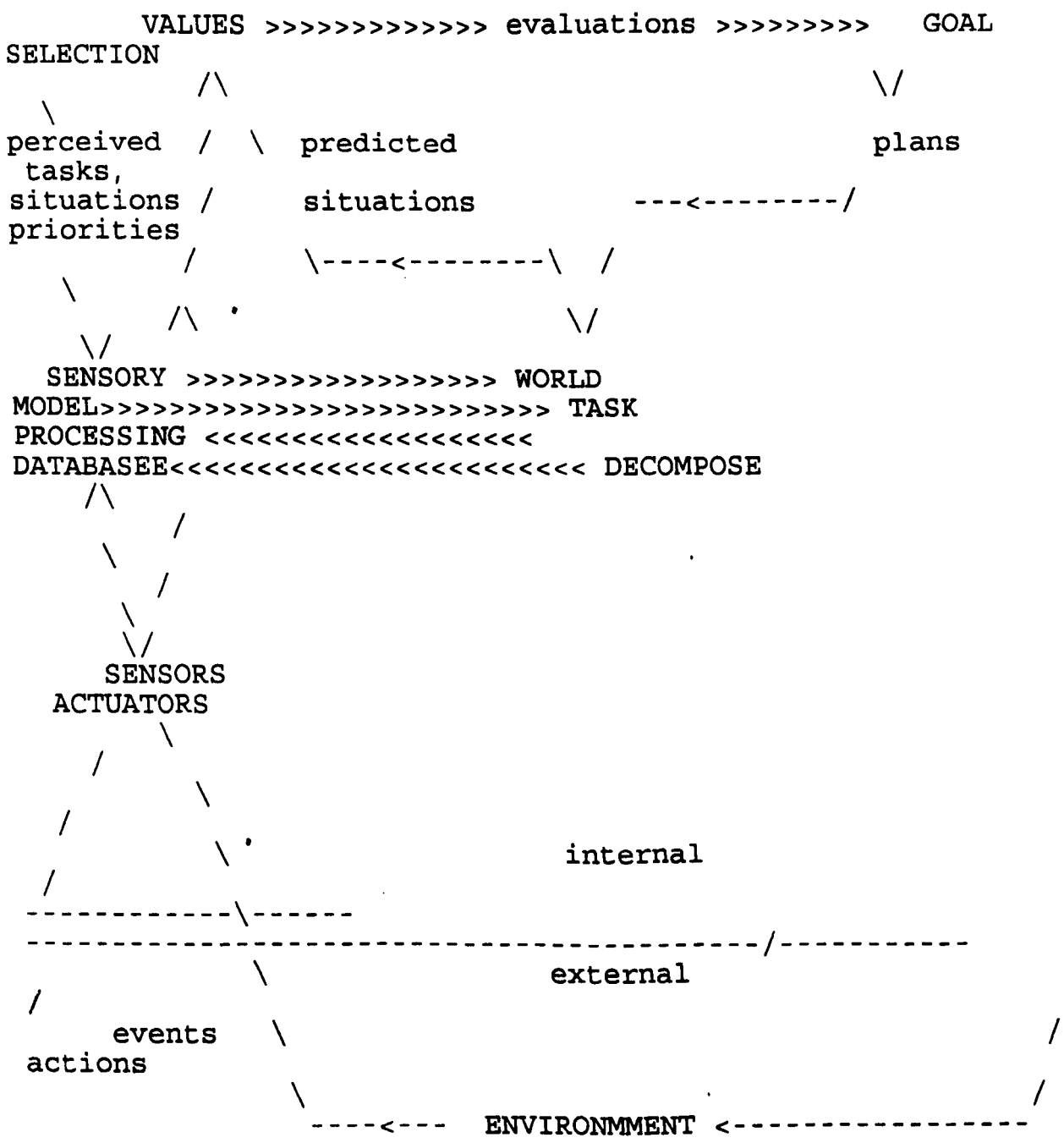
Discussse Poincare charts, Lyapunov exponents, dimensions& power spectra.; and transition from torus to chaos.

Source:

136) Forced & coupled chemical oscillators.(Book...?)

Note 121
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Neural Networks for Control.

An intelligent control system:



Source:

137) Miller, Sutton,Werbos; "Neural Networks for Control".(Book...?

Note 122
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Memory

Much of what we retrieve from memory may be hidden from conscious awareness.
Traditional memory tests are EXPLICIT because they do require the person to consciously remember a prior episode. memories that revveal themselves in the absense of awareness have been termed "implicit memories". an example of an implicit memory test is if a word is flashed in front of you for about 0.035sec it wil be difficult to name the word, because the exposure time is short. But if you had read the word say 24 hrs. previously you would be much more likely to name it.
hence MEMORY & CONSCIOUSNESS can readily be separated; some researchers conen that there are distinct memory sections in the brain.
PET(positron-emission topography) is used to monitor the brain. Subject is injected with radioactively-labelled water; where many particles are being eemitted the brain is particularly active.
Source:

138) Shanks D. Rembrance of things unconscious. New Scientist.aug.24.1991.

Note 123
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Teaching Smart People How to Learn

Because many professionals have always been successful they have never experienced failure & therefore cannot/ have-not learned from it.
Learning is not HOW people feel(motivation) but how they THINK.
Source:

139) Argyris C.Teaching Smart People how to Learn; Har.Bus.Rev.may-june,1991.

Note 124
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Role of Chaos in Reliable Information Processing

Information is not only produced by dissipating the degrees of freedom in a system, but also by increasing resolution in systems with few degrees of freedom.
The answer to why a cognitive system MUST be chaotic in order to perform effective signal processing can be offered, a) in the time, and, b) in the frequency domaine:

a) by creating a Markovian time-division multiplexing the system allows separation of sensory modalities & it regulates for each one of these modalities a time processing interval commensurate with the rate of sensory input;

b) turbulent chaos(non-equilibrium noise) as a modus operandi of the thalamocortical pacemaker under a mild excitation contains a broad spectrum of temporal(& spatial) frequencies;; hence it can constrain "patches" of post synaptic functional areas in the cortex, and create coherent patterns which can match a wide variety of incoming (spatial)-temporal patterns.

Specifically, COGNITION is manifested at the cortex as a result of a matching process between pairs of spatial-temporal patterns each containing a great number of elemental units(neurons).
In each pair, one pattern (the same for all pairs) s the unknown information; it is embodied in incoming triggers coded either in sequences
of pulses frrom the periphal nervous system or, if it comes from other areas of the central nervous system, encoded in strings of macromolecular(neurotransmitter/hormonal) releases from pre-synaptic endings.
The other pattern of the pair is one of the patterns created by the processor; it constitutes a prestored patial-temporal "mosaic" embodied in a set of synchronised postsynaptic membrane potentials or a spatial-temporal pattern of postsynaptic membrane receptors.

Source:

140) Nicolis R; The role of Chaos in reliable information processing. Journal of the Franklin Inst.v317,n5,1984.

Note 125
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Self Organising System Obtaining Communication A...

Two intellectual roots are used.
Associatron, a model for associative memory with a neural network structure,is used as the memory in the brain, and information from the outer world is accumulated in it. Concepts regarding objects & attributes are extracted from the stored information, where the associatron properties are utilized. As they repeat common experiences the differences between the words become smaller and smaller, and finally the robots agree on a word for each object. At this stage the robots can exchange information with their words and each can act accordingly on the word from the other. The study shows that the self organising system with the above function can be constructed as a neural network model; no apparent supervisor exists.
Source:

141) Nakano,Sakaguchi,Isotani,Ohmori; Self-Organising system obtaining communication ability. Bio.Cybernetics 58, 1988.

Note 126
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Chaos

The following notes have been selectively extracted from the above reference:

- chaos is persistent instability;

- chaos seems to be resposible for maintaining order in the natural world;

- many systems that are constantly changing are extremely sensitive to their initial state- position, velocity and so on. As the system evolves in time, minute changes amplify rapidly through feedback. This means that systems starting off with only slightly differeing conditions rapidly diverge in character at a later stage. Such behaviour imposes strict limitations on predicting a future state, since the prediction depends on how accurately you measure the initial conditions.

- within the beautiful graphics associated with chaotic systems there are often lifelike forms; there are shapes that repeat themselves on smaller & smaller scales- a phenomenon called "self-similarity".

- distinguishing the paths or orbits by words(e.g. the L(left) or R(right) word made up by a possible path of a pin-ball as it moves from top to bottom of a pin-ball table...on striking any ball it could go L or R) instead of initial conditions is known as symbolic dynamics.

- dynamical instability is the average of a measure of the rate of growth of small deviations.

- topology: the geometry that deals with continuities and connections among varying quantities.

- the sensitivity to initial conditions is the key to understanding why determinism does not necessarily imply predictability.

- the departure from proportionality for a simple pendulum as the amplitude of swing increases is an example of non-linearity.

- extreme sensitivity of the initial conditions characterises a chaotic system.

- chaos is a dynamic phenomenon

- the presence of periodic solutions implies the presense of steady states too.

- there are two distinct forms of attractor: single point, corresponding to steady state; and closed loop, corresponding to periodic motion.

Source:

152) Hall N.(Editor); Guide to Chaos. Penguin.1992

Note 127
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Chaos

- non-linear systems are unsolvable.

- chaotic dynamics discovered that the disorderly behaviour of simple systems acted as a creative process. It generated complexity; richly organised patterns, sometimes stable and sometimes unstable, sometimes finite, but always with the fascination of living things.

- chaos and stability are not the same.

- a chaotic system can be locally unpredictable, globally stable.

- Marcus's work on the Great Red Spot of Jupiter concluded: "the spot is a self organising system, created & regulated by the same nonlinear twists that create the unpredictable turmoil around it. It is stable chaos.

- a determinate system can produce much more than just periodic behaviour.

- a complex system can give rise to turbulence & coherence at the same time.

- bifurcation diagrams:changing one parameter can cause the system to move from steady state(equilibrium), to a point where the equilibrium splits in two, these bifurcations then come faster and faster, and then the sytem becomes chaotic.

- chaos is ubiquitous; it is stable. Complicated systems, traditionally modelled by hard continuous differential equations, could be understood in terms of easy discrete maps.

- chaos brought this message: simple deterministic models could produce what looked like random behaviour. The behaviour actually had an exquisite fine structure, yet any piece of it seemed indistinguishable from noise.

- numbers that produced aberrations from the point of view of normal distribution produced symmetry from the point of view of scaling. Each particular price change was random & unpredictable. But the sequence of changes was independent of scale; curves for daily changes & monthly price changes matched perfectly.(Mandelbrots cotton price data review).

- contrary to intuition, you could never find a time during which errors were scattered continuously. Within any burst of errors, no matter how short, there would always be periods of completely error-free transmission. (Mandelbrots cluster noise in communications work).

- Cantor dust: begin with a line, remove the middle third; then remove the middle third of the remaining segments & so

on. The cantor dust is the dust of the points that remain. They are infinitely many but their total length is 0.

- in the minds eye, a FRACTAL is a way of seeing infinity...the name Mandelbrot gave to his shapes. His studies of irregular patterns in natural processes & his exploration of infinitely complex shapes had an intellectual intersection; a quality of SELF-SIMILARITY. Above all, fractal meant self-similar.
Self-similarity is an easily recognised quality e.g. the infinitely deep reflection of a person standing between two mirrors.
The word FRACTAL came to stand for a way of describing, calculating, & thinking about shapes that are irregular and fragmented, jagged and broken up - shapes from the crystaline curves of snowflakes to the discontinuous dists of galaxies. A fractal curve implies an organising structure that lies hidden among the hideous complication of such shapes.

- systems that lose energy to friction are dissipative. Astronomical systems are not; they are conservative, Hamiltonian.

-an ATTRACTOR is not just any trajectory of a dynamical system; it is the trajectory toward which all other trajectories converge. That is why the the choice of starting conditions does not matter.

- in the brain information is stored in a plastic way, allowing fantastic juxtapositions and leaps of the imagination. Some chaos exists out there, and the brain sems to have more flexibility than classical physics in finding the order of it.

- hiding within a particular system could be more than one stable solution. An observer might see one kind of behaviour over a very long time, yet a completely different kind of behaviour could be just as natural for the system; a transitive system.

- fractal descriptions found immediate application in a series of problems connected to the properties of surfaces in contact with one another.

- the KOCH curve has infinite length in a finite space.
Source:

153) Gleick J.; Chaos; Cardinal; 1988.

Note 128
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Chaos;(124 cont'd.)

- FRACTAL meant self-similar; self-similarity is symmetry across scale. Self-similarity is an easily recognised quality e.g. the infinitely deep reflection of a person standing between two mirrors.

- fractal descriptions found immediate application in a series of problems connected to the properties of surfaces in contact with one another. One simple but powerful consequence of the fractal geometry of surfaces is that surfaces in contact do not touch everywhere. The bumpiness at all scales prevents that.

- the word FRACTAL came to stand for a way of describing, calculating, and thinking about shapes that are irregular and fragmented, jagged and broken-up.
A fractal curve implies an organising structure that lies hidden among the hideous complication of such shapes.

- when more energy comes into a system, Landau conjectured when discussing fluid turbulence, new frequences begin one at a time, each incompatible with the last.

- the STRANGE ATTRACTOR lives in PHASE SPACE. Phase space gives a way of turning numbers into pictures, abstracting every bit of essential information from a system of moving parts.
Mathematicians had to accept the fact that systems with infinitely many degrees of freedom- untrammelled nature expressing itself in a turbulent waterfall or an UNPREDICTABLE BRAIN- required a space of infinite dimensions.

- Systems that lose energy to friction are dissipative; astronomical systems are not, they are conservative, or Hamiltonian.

- an ATTRACTOR is the trajectory towards which all other trajectories converge. Therefore the choice of starting conditions does not matter.

- Feigenbaum said the following of the brains machinery of perception; information is stored in a plastic way, allowing fantastic juxtapositions and leaps of imagination. Some chaos exists out there, and the brain seems to have more flexibility than classical physics in finding the order in it.
While he was computing trajectories and orbits, he considered that there was something about these functions that must be recursive, self-referential, the behaviour of one guided by the behaviour of another hidden inside it. (TM note: open systems??)

- Lorenz said the following of chaotic systems. Hiding within a particular system could be more than one stable

solution. An observer might see one kind of behaviour over a very long time, yet a completely different kind of behaviour could be just as natural for the system. Such a system is called intransitive. It can stay in one equilibrium or the other, but not both.
An almost intransistive system displays one sort of average behaviour for a very long time, fluctuating within certain bounds. Then, for no reason whatsoevere it shifts into a different sort of behaviour, still fluctuating but producing a different average.

- there are structures in NON-LINEAR systems that are he same if you looked at them the right way...UNIVERSALITY!

- Feigenbaum stated that the process doesn't care where it is, and moreover it doesn't care how long it's been going. The only things that can ever be universal, in a sense, are SCALING things. In a way, art is a theory about the way the world looks to human beings. Its abundantly obvious that one does't know the world around us in detail.

- Non-linear feedback regulates motion, making it more robust. In a linear system, a perturbation has a constant effect. In the presense of nonlinearity, a perturbation can feed on itself until it dies away and the system returns automatically to a stable state. Libchaber believed that biological systems used their nonlinearity as a defense against noise.
He also considered that FLOW was SHAPE plus CHANGE, MOTION plus FORM.
One can think of flow in many ways, flow in economics etc. First it may be LAMINAR, then BIFURCATING to a more complicated state,, perhaps with oscillations. Then it may be CHAOTIC.(TM note: this seems to apply to the way people, and companies, behave with increasing overload.)

- dissapation bleeds a complex system of many conflicting motions, eventually bringing the behaviour of many dimensions down to one
Source:

153) Gleick J.; Chaos; Cardinal; 1988.

Note 129
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Chaos;(125 cont'd.)

- Libchaber: according to the new theory, the bifurcations should have produced a GEOMETRY with PRECISE SCALING, and that is just what he saw, the universal Feigenbaum constants turning in that instant from a mathematical ideal to a physical reality, measurable and reproducuible. One bifurcation after another producing an infinite cascade.

- the MANDELBROT SET is a collection of points. Every point in the complex plane- that is, every complex number- is either in the set or outside it.

- the boundary between two or more attractors in a dynamical system served as a threshold of a kind that seems to govern so many ordinary processes, from the breaking of materials to the making of decisions. Each attractor in such a system has its basin, as a river has a watershed basin that drains into it. Each basin has a boundary... leading to the study of FRACTAL BASIN BOUNDARIES.
The border between calm and catastrophe could be far more complex than anyone had dreamed.

- the LYAPUNOV EXPONENT. This number provided a measure of just the topographical qualities that corresponded to such concepts as unpredictability. The Lyapunev exponents in a system provided a way of measuring the conflicting effects of stretching, contracting, and folding in the phase space of an attractor. They gave a picture of all the properties of a system that lead to stability or instability. An exponent greater than zero meant stretching-nearby points would separate. An exponent smaller than zero meant contraction. For a fixed-point attractor, all the Lyapunov exponents were negative, since the direction of pull was inward toward the final steady state. An attractor in the form of a periodic orbit had one exponent of exactly zero and other exponents that were negative. A strange attractor had to have at least one positive Lyapunov exponent. Analysis showed vividly how some systems could create disirder in one direction while remaining trim and methodical in another.

- chaos was the creation of information. Shaw considered the following. Just as turbulence transmits chains of vortices to the dissipating small scales viscosity, so information is transmitted back from the small scales to the large. The channel transmitting the information upward is the strange attractor, magnifying the initial randomness just as the Butterfly Effect magnifies small uncertainties into large scale weather patterns.

- Kolmogorov and Yashi Sinai: .."entropy per unit time" applies to the geometric pictures of surfaces stretching & folding in space. The conceptual core of the technique was a matter of drawing some arbitrary small box around some set of initial conditions...as one might draw a small square on

the side of a balloon, then calculating the effect of various expansions or twists on the box. The change in area corresponded to an introduction of uncertainty about the systems past, a gain or loss of information.

- Packard: at the pinnacle of *complicated* dynamics are processes of biological evolution, or thought *processes*. Intuitively there seems a clear sense in which these ultimately complicated systems are generating information.

- Shaw: you don't see something until you have the right metaphor to let you PERCEIVE it.

- RUELLE: truly random data remains spread out in an undefined mess; but chaos- deterministic and patteren- pulls the data into visible shapes.

-GAIA HYPOTHESIS: the conditions necessary for life are created and maintained by life itself in a self-sustaining process of dynamical feedback.

- WINFREE:instead of trying to guess at the biochemistry involved (in researching biological clocks by collecting data from captive mosquitoes), he looked at the problem TOPOLOGICALLY- that is, he looked at the QUALITATIVE SHAPE of the data, instead of the quantitative details.

- A small change in ONE PARAMETER - perhaps a change in timing or electrical conductivity- could push an otherwise healthy system across a BIFURCATION POINT & into a QUALITATIVELY NEW BEHAVIOUR.(TM comment: INTERVENTION!!).A critical control system issue is ROBUSTNESS; "small jolt effects"

Source:

153) Gleick J.; Chaos; Cardinal; 1988.

Note 130
Outline: XV. OPEN SYSTEMS-SELF ORGANISING SYSTEMS; CHAOS
Subject: Chaos:(126 cont'd.)

- FRACTAL processes associated with scaled, broadband spectra are "information rich". Periodic states, in contrast, reflect narrow band spectra and are defined bt monotonous, repetitive sequences, depleted of information content.

- In the mind there is a HIERARCHY of scales, from the neuron upwards, providing an opportunutiy for the interplay of MICROSCALE and MACROSCALAR so characteristic of fluid turbulence and other complex dynamical processes.
A living organism has the astonishing gift of concentrating a "stream of order" on itself and thus escaping the decay into atomic chaos.

- HUBBARD: in nonlinearity and feedback lay all the necessary tools for encoding and then unfolding structures as rich as the human brain.

- nature forms patterns. some are orderly in space but disorderly in time, others orderly in time but disorderly in space. Some patterns are fractal, exhibiting structures self-similar in scale. Others give rise to staedy states or oscillating ones.
Source:

153) Gleick J.; Chaos; Cardinal; 1988.

Note 131
Outline: XVI. TRAJECTORIES
Subject: Dimensions/Managerial Thought Struct.& Competiti...

Competitive positioning has been criticised because it has been based largely on economics & structure thus giving it a static (snapshot) nature.The terms strategic group & industry have impeded progress: the former because it focuses on similarities of strategies found between 2 or more firms in an industry & not on dufferences between the firms. The latter point because researchers have usually been given an industry to study.
Instead of debating the above, use "competitive space"; this inc. those firms , business units or activitieswhich are deemed close enough competitors to warrant interest in their competitive positioning vis-a-vis each other.
Personal construct theory(Kelly, 1955) postulates that cognitive dimensions will be interrated within an individuals constructive system. Therefore there are both environmental & internal cognitive reasons to believe that the dimensions elicited from strategists will be interrelated.

Source:

87) Mapping strategic Thought; Huff,anne sigismund.

Note 132
Outline: XVII. QUESTIONAIRE
Subject: Questionaire Design

Statements that describe the process of problem formulation & that indicated the importance of several descriptors; respondents were asked to respond in terms of their specific problems.
Source:

43) Likert R; Participation Management, group involvement inc. decision making.

Note 133
Outline: XVII. QUESTIONAIRE
Subject: Design and Implementaion of Questionaires

All about "how to do questionaires."
Source:

47) Yin R."Case Study research; Design & methods".Sage pubs.Beverly Hills. 1984.

Note 134
Outline: XVIII. MODEL
Subject: Ideal versus Actual Models

Actual model; executives assume organisation can do something when they formulate the strat. plan & they then drive the company to do it sometimes irrespective of the realism of what they are doing; in fact they tend to ignore the actual environment, or its changes if they are contrary to the strat. plan...or they (deliberately) percieve it to be as they want it to be...ignoring the misfits/ problems. Ref. eg the fall of Brit.& Commonwealth via the collapse of Atlantic.

For questionaire: how do execs. gauge the capability of their organisation to be able to do the work in the long term...do they have contingency plans for failures/ changes?

(TM thoughts; July 1990.)

Source:

60) Meaker T.More Thoughts; Oct.1990

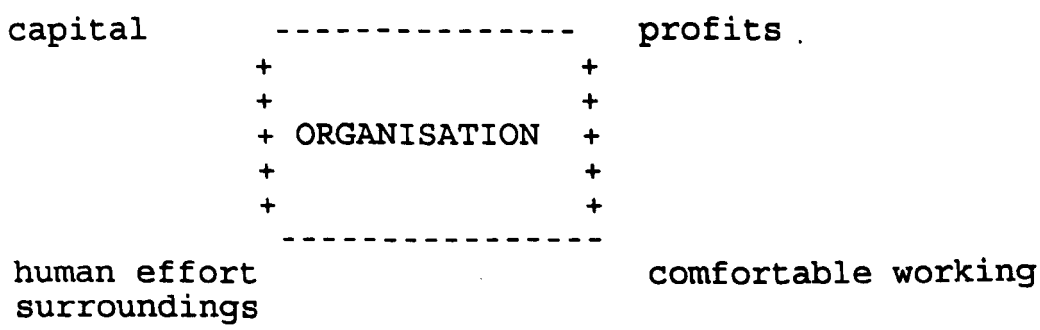
Note 135
Outline: XVIII. MODEL
Subject: Meteorological Model

Meteorological modelling and prediction may be analogous to progamme dynamics. Consider all aspects.Intervention by man is not possible but there are surely interventive forces involved. (TM thought,June 1990)
Source:

60) Meaker T.More Thoughts; Oct.1990

Note 136
Outline: XVIII. MODEL
Subject: Systems Model

The following model is presented:



Source:

63) Litterer J: The Analysis of Organisations: 1967: Wiley.

Note 137
Outline: XVIII. MODEL
Subject: Symbolic Approach.

Do not try to find underlying model; carry out a symbolic representation of the situation.

Decision maker often tries to avoid undesireable outcomes rather than striving towards the most desireable.

"INPUT-IN - CONTEXT - OF - OUTPUT - DIALOGUE. Use this; it seems to fit actuality...what managers would like.

It is possible TO CHANGE DECISIONS CONSISTENTLYby varying the way choices are framed.(McNeil et al; 1982. Neale & bazerman; 1985. Tversky & kahneman; 1981.)

Source:

69) Mallory & Michalowski; A Symbolic Approach to computer-assisted preference elicitation. Human Systems Management 8(1989) 225-231 (in perception file)

Note 138
Outline: XVIII. MODEL
Subject: Definition of Natural Law Models

To qualify as a law of nature rather than as a simple empirical relationship among observables, a model must be;
-INDEPENDENT of the particular situation in which it is observed: we cannot have one law of energy for nuclear reactors & another for kitchen stoves.
-ANALYTIC: local space-time infrmation is enough to determmine the model, and we need not account for what is happening in a distant location or time.
-INVARIANT: the model should not depend upon the scale or language used to describe it; i.e. it should be co-ordinate free.
Source:

116) Negoita & Ralescu: Simulation,Knowledge-based computing, & Fuzzy statistics.van Nostrand Reinhold,1987.

Note 139
Outline: XVIII. MODEL
Subject: problem resolution flow chart

The Synectics Flow Chart is as follows:
- task headline
- analysis
- springboard
- selection
  states intrigue
- states action suggested, or
- asks for suggestion, then
- paraphrase suggestions/builds
- itemised response
- modification
- possible action(s)
(inc. next steps).

The concept of the value of idea continuum is explained as follows:

idea--plusses--major concerns, then either
- redirect, or
- build/modify, then
-----" how to " statemnet giving direction plus background thinking---leading to an idea(or modified original idea---and so to the "plusses"....etc. "loop" again.
Source:

223) Nolan.Vincent; Synectics; Journal of Management Development,vol.1, no.2 1982.