The Soft Systems Approach

(For an introduction to systems theory, read the paper Systems Thinking)

1. Describing a system

Using the 'systems' approach can help to change systems to meet changed environmental conditions, giving adaptation systems greater power over maintenance systems. According to Beer[1], the stages to be adopted in using a systems approach are:

1. AWARENESS of the procedures and operations for which systems specifications are to be constructed.
2. COMMITMENT of those involved in managing and operating the procedures to undertaking a study of them.
3. DETECTING the attributes of a system to confirm the existence of a system
4. SEPARATION of the systems(s) from its (their) environment by defining the boundaries.
5. SELECTION of individual systems.
6. DESCRIPTION of each system: its components (tasks, roles, equipment, etc.), assembly (organisation, management, physical positions and relationships) and purpose (aims and relationship with other systems).

Because a system can be a very complex set of interactions, procedures, roles and relationships, this last step, describing the system, can be a challenging task, but it is possible to do so through an interactive process of replying to five basic questions:

What is the system for?	What are its objectives, what is the intended outcome?
Who is the system for?	The staffing of the operation, and also the physical resources employed, but not the customers of the system even when they are actively involved in it, as they are participants in the 'WHAT'.
How are the resources employed to enable the system to operate?	The ratio of human to non-human resources, their work practices, roles and procedures.
When will the system function?	The timescales employed, both start and finish times for individual sequences and the overall length of the operating cycle (eg class times and college years).
Where will the system function?	Locations for the various system operations and their spatial demands.

These five dimensions (What, Who, How, When and Where) provide the basis for a system description. They can also be used to explore the effectiveness of an existing system by asking 'Why?' for each set of answers. Why is this outcome produced? (Is it required by customers, is it necessary to enable customer requirements to be met?) Why are these resources employed? (Are there alternative people/roles and/or technology?) Why are the resources employed in this way? (Are there better combinations and/or procedures?) Why does the system function at this time and/or place? (Are there better times and/or locations?)

[1] Stafford Beer (1985) Diagnosing the System for Organizations John Wiley, London and New York

By asking 'Why?' we must often refer to the policies or values which guide the system. What are the determining requirements for this system's operation; are they historical customer behaviour, for example? All too often a system designed for one set of requirements will continue to work to that specification long after the original demand has ceased to exist.

2. Operations of Process?

One consequence of this analysis is that it becomes possible to understand the complex interactions which a system involves by creating a visual model of the systems which comprise the production process for a good or service. The 'Process' occurs at the time ('When?'), place ('Where?') and in the way ('How?') that the system determines, utilising the input of resources ('Who?'). The 'operations', from the managerial and control perspective, are the outcomes of the decisions to employ those resources, at that time, place and in that way (this analysis draws heavily on the work of Shingo).

By distinguishing between the operational systems (a series of discrete activities) which fit together to create the production process and the process itself (which may be a single continuous process or a sequence of activities with delays between stages), it becomes possible to identify areas where problems are likely to occur, when adjoining systems in the process are not designed to work in harmony, creating barriers which impede the process - this is the approach used in Business Process Engineering[2]. Instead of looking at the organisation from the perspective of structure, with a fragmented production process, look at instead from the perspective of the process - follow a product or service through the organisation as it gets ‘made’, to see how internal boundaries between systems helped or hindered the process.

From the manager's point of view, the nature of the product or service (Process) is determined by the decisions about operations - What, When, Where, How and Who - and is the product of the effective working of the system. One question generated by this is the extent to which control systems (feedback loops) are based upon Operations or Process. If the manager can only control Operations any feedback on Process must, by definition, relate to that which the manager does not directly control.

The distinction between 'Process' and 'Operations' is an important one for managers and relates directly to the production models which the manager uses. The 'process model' reflects the 'process' dimension in the systems matrix and is production as seen from the ‘product’ perspective. The 'organisational model' of reflects the 'operational' dimension of the matrix and is production as seen from the manager's perspective.

One criticism of this approach is that it treats the operations as non-sentient systems, lacking awareness of the environment in which they operate. However, as we have already seen, organisational systems are dependent on people and are sentient systems. This is where soft systems theory offers further help. Developed by Peter Checkland, soft systems theory adds further dimensions to the general systems model.

---

[2] Michael Hammer and James Champney, (1995) *Reengineering the Corporation: A Manifesto for Business Revolution* London: Nicholas Brealey.

The six elements to the soft systems model are:

Transformation	A statement with a verb or verbs to describe what happens or should happen
Customers:	The beneficiaries of the system; the indirect objects of the transformation verb
Actors:	The people who are instrumental in the transformation process occurring
Owners	The people or organisations controlling the system, having the power to change or shut it down, to whom it is accountable
Environment	The constraints operating on the system, which are outside the control of the actors
World-view or Weltanschaung	The outlook or philosophy underpinning the system (the actors' & owners' paradigms)

The centre of the model is the same, the transformation process (described by asking What?, Who?, How?, When? and Where?), but it recognises that this process is dependent on the actors who are responsible for the transformation, the customers who, in a process like education and training play an active part in the process, the owners to whom the actors are accountable, the environment in which this all takes place which imposes constraints on the process, and the world-view (or weltanschaung) which shapes the attitudes, values and beliefs through which the participants' perceptions of the process and of each other are viewed. In this model the system is less mechanistic than the conventional systems model, recognising that humans shape their world as much as they are shaped by it.

One consequence of using this model is that it encourages a more complex set of answers to the questions which inform the system analysis. In exploring the participants in the production process we are encouraged to consider not just who they are, but what motivates them, what determines their priorities and their understanding of the world that they live in, and how they view the process in which they play an active role.

Underpinning this analysis however, is a general systems theory which is inter-disciplinary, understanding and integrating knowledge from a wide variety of specialisms and providing a framework for synthesis and integration of very diverse and differentiated fields of scientific understanding which enables communication to occur between them, whilst at the same time maintaining an applied emphasis to resolve practical problems. However, when applied to organisations, general systems theory presents certain disadvantages, including an emphasis on structure and function rather than meaningful human interaction and a tendency to identify with sources of power (eg managers) rather than participants (eg employees). This is what soft systems theory attempts to counteract, with its emphasis on the issues of accountability to owners, the world view of the participants and the effect of constraints on behaviour of the system and the participants.

3. An holistic approach

Furthermore a systems approach, especially one based on the soft systems model, encourages an holistic analysis, by looking at parts of social organisations in relation to other parts. Although the system and its constituent sub-systems are defined by boundaries, these boundaries in an open system are permeable and open systems interact with their environment; it is through this interaction that the organisation's role and performance can be understood.

There are three primary properties of systems which demonstrate the importance of holism:

1. Properties or behaviour of sub-systems have an effect on the whole system.
2. The properties or behaviour of any sub-system and its effect on the whole system depends on the properties and behaviour of at least one other sub-system (i.e. no sub-system can operate independently of all other sub-systems).
3. Every sub-system, no matter how far the system is divided (i.e. at whatever level the system is analysed), has these properties.

Furthermore, the whole system will exhibit properties or behaviours which none of its sub-systems possess (i.e. *synergy* - the whole is greater than the sum of its parts) whilst sub-systems may only function as parts of the whole and are constrained in their functioning because they are parts of the whole. The effectiveness of sub-systems, therefore, is conditional not on the effectiveness of other sub-systems but their interaction with each other (i.e. function is determined not just by the design of components but by their assembly). This makes the concentration on boundaries and the interaction across them significant. By enquiring not just about the procedures, but the attitudes and beliefs of those operating those procedures, and the accountability that they heave for their performance, and to whom they are accountable, disjunctions in the whole system can become apparent.

But interactions are not only internal, between sub-systems. The system as a whole interacts with its external environment and sub-systems interact with their internal environments; therefore it is important to understand how open any system is and the mechanisms for that interaction, particularly:

Boundary definition	How clearly defined and visible are the boundaries?
Permeability	How easily are the boundaries penetrated?
Regulation	How strongly are the boundaries policed?

These are the mechanisms by which it is determined how far systems are to be separated from each other. As has already been noted, the role of managers (in practice if not by design) is frequently to define, control access and regulate these boundaries at various levels within the system (the hierarchies).

Furthermore, the environment in which systems exist (i.e. the larger system) also determines the performance of those systems and there is a weakening of the assumptions about cause and effect (A is a necessary and sufficient condition for B) when applied to social systems, because variations in the environment can have significant effects on causal relationships. Put crudely, what works in one college may not work at all in another, simply because the environment does not allow it to work, despite the importation of the complete procedure and the training of staff in its operation. This is because social systems are teleological (exhibit goal-seeking or purposive behaviour) and the goals or purpose are defined by the system of which they are a part. If the new system does not conform to that purpose (formal or informal) then the system will not operate as intended.

The interaction of a social system with its environment is largely through information exchange; information operates not as a passive product but as an active component of the system, with the ability to change its behaviour or structure and consequently, over time, systems can become selective in their ability to exchange and process information. Humans and the organisations they form and inhabit live in constant states of tension with what they desire to be or do and what they are or able to do. This can be destructive or constructive in its impact on an open system and its adaptive qualities. Information may be absorbed more readily if it confirms the beliefs of those who are part of the system, and they will only adapt in response to those signals which fit with their beliefs and goals.

This makes the management of change singularly problematic, in that the reasons for the change and the purposes of the new system may not conform to the world-view of the actors responsible for enabling the change to occur. All too often staff in colleges (and in many other organisations) complain that they are not well informed, that communication systems are poor; often the problem can be analysed to reveal that it is not the absence of information which is the problem but the nature of the information which lies at the root of poor communication - people don't want to know what they are being told. This makes change hard, because tight, impermeable boundaries are used to reject the change, denying information which enables interaction and thus open systems.

FURTHER READING

PB Checkland (1981) *Systems thinking, systems practice* John Wiley, London and New York

DS Smyth & PB Checkland *Using a systems approach: the structure of root definitions* in *Journal of Applied Systems Analysis* Vol. 5 No 1 pp 75-83