Block 1 Introduction
Unit 2 Themes and frameworks
Unit 2 Themes and frameworks

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Aims

- To introduce some conceptual frameworks for the design and improvement of management control systems.
- To explain the relevance of management control to decision making, performance measurement and evaluation in organizations.

Objectives

After studying this unit, you should be able to:

- Explain the concepts of bounded rationality and unresolved conflict as they affect management control systems.
- Use the idea of double loop learning in organizations.
- Describe the use of SIS methodology.
- Understand the importance of directness, reliability and validity in performance indicators and their underlying constructs.
- Use the matrix of the effects of uncertainty to classify organizational control situations.
1 Introduction

In Unit 1 we said that this course was about management, performance measurement, evaluation of performance, decision making and control. This unit elaborates on the relevance and interdependence of all those areas. Inevitably it is somewhat biased towards the theoretical, but the theory is there to improve future practice. As two of our critical readers said:

'It was very theoretical ... however, the theory discussed is important and managers rely upon their MBA courses to get their theory!'

'In this unit we are working from theory to practice.'

Conceptually Unit 2 covers three broad areas. Sections 1 and 2 deal with the ways in which the realization of how haphazardly real decisions were made has enriched and improved formal control theories of the firm. A systems macro-level approach to the design of control systems is the topic of Section 3, while Section 4 is about the technicalities of measurement, reliability and validity in control systems. Section 5 concludes with a matrix demonstrating how the various frameworks presented so far can help with the study and practice of performance measurement and evaluation.

1.1 Control in context

The modern business firm is an impressive social creation. Since the nineteenth century, it has been credited with major contributions to economic progress and growth, as well as to human misery and degradation. Perhaps because it is a relatively modern invention compared with other major social institutions, because it is often seen in ideological terms, and because it requires integrated attention from several different perspectives and disciplines, the firm is well understood neither by practitioners nor by social scientists.

(Cyert and March, 1992, pp. 237–238)

It is probably a sign of a healthy situation that at present when so little is understood, a great many theories purporting to explain managerial, economic and organizational behaviour should coexist, as our human curiosity attempts to remedy our lack of knowledge. The total range of activities involved in managing a large organization, whether it is a business or a public service, is in any case far too broad to be covered by any one theoretical approach. For you as a manager, various approaches will be useful and appropriate within different contexts according to the subject area to be studied. Thus in a course concentrating on financial management, the principal theories considered will concern finance, accounting and economics, while the study of human resource management relies heavily on theories of psychological origin.

Since this course is about performance measurement, much of the time will be spent on discussing possible improvements in the design and use of management control systems. But first in this unit we will remind you of the context within which such control activities are important, by examining how they relate to organizational decision making and management theory in general.

The relationship between decision making and managerial control is an intimate one, difficult to disentangle conceptually. External control is exerted on an organization by its shareholders and other stakeholders. Both internal control
and decision making are important functions of senior managers, and yet even quite junior managers will be likely to have some control and decision making amongst their responsibilities. If this were not so, they would not be managers. Decisions must be made at a detailed level, especially about targets, when a control system is being designed. In its turn, the feedback from control systems provides information on which major strategic decisions may be based.

Senior executives have long sought ways to better control the enterprises they run. Internal controls are put in place to keep the company on course toward profitability goals and achievement of its mission, and to minimize surprises along the way ...

Internal control means different things to different people. This causes confusion ...

Internal control is broadly defined as a process, effected by an entity's board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of objectives in the following categories:

- Effectiveness and efficiency of operations.
- Reliability of financial reporting.
- Compliance with applicable laws and regulations.

(Committee of Sponsoring Organizations of the Treadway Commission, 1992, p. 1)

The boundary between internal and external control is not always clearly distinguished, a problem which lies at the root of many complex disputes over ownership and accountability. Recent examples include the efforts of shareholders to resist hostile takeovers or to influence the ethical stance of their company, and the clashes between UK school governors, head teachers and funding authorities over the day-to-day running of schools.

To understand more about the interrelationship between what is known about managerial control and organizational decision making we must return to their theoretical origins. The managerial control theories used in this course represent a school of thought that has developed and evolved over the last 30 years or so. During this evolution, both models from other disciplines and actual research findings from organizations have been incorporated. Control theories are classified by origin as economic theories of the business firm, but they have been considerably modified by the research discoveries of behavioural scientists. They are both prescriptive and descriptive: they can describe how theorists think organizations ought to be run, and explain how they are actually operated.

All organizations must make major decisions about their structure, direction and relationship with their environment. The more senior you become as a manager, the more varied and yet the more intricately interconnected your responsibilities will become; the more serious and more urgent the decisions to which you must contribute. You will be aware that major decisions are seldom made by one person alone, and they are certainly not likely to be made along the established criteria that have evolved for day-to-day matters. Making a substantial decision is a process that takes time and involves many people. As already pointed out in Unit 1, there is more to decision making than gathering information. Managers can only deal with so much information at once, and groups of managers will interpret the same information in different ways. It is no longer believed (if indeed it ever was by practical managers) that major organizational decisions are always made in a purely rational and logical manner.

As you saw in Unit 1, originally control models and ideas taken directly from engineering were used to devise extensive accounting systems. Comprehensive checks and balances were designed to act as valves to control and direct an
organization towards its financial objectives, using feedback collected in the form of accounting figures. Clearly, such systems provided much more information than managers had possessed previously. However, it has become evident over the last couple of decades, as Eccles (in his Reader article) and Chua et al. (1989, quoted in Unit 1) point out, that accounting information on its own is not sufficient to control and direct the behaviour of a large modern organization. A feedback system that only tracks the movement of money is not sophisticated enough to fulfil the multiple objectives of modern organizations. Quality and service objectives, for example, are very hard to quantify precisely.

Engineering control theory gives us the templates, which by analogy and even metaphor, as well as by direct comparison, can help us understand the behaviour of systems that incorporate human characteristics. But modern management control theory means much more than applying feedback control models to an organization. Conglomerations of people, money and machinery do not behave exactly like inanimate mechanical or electrical systems. Research into the actual behaviour of decision makers in organizations gives us the key ideas with which to enrich and adapt pure control theory.

1.2 Bounded rationality and unresolved conflict

Two research-based ideas that have had a profound impact on modern management control theory are the notions of bounded rationality and unresolved conflict. Unresolved conflict is the simpler of the two influences, and has been covered to some extent by reminding you of stakeholder perspectives in Unit 1. Unresolved conflict means conflict that is internal to the organization. Recognizing its influences requires accepting that the self-perceived interests of all staff, whether owners, directors, managers or other employees, are not necessarily identical. Individuals will therefore be liable to pursue their own objectives as well as or instead of those of the organization, and no employment contract can be drafted that will totally prevent conflicts of interest for everyone. Obvious as this may seem, many management theorists have assumed the contrary.

Bounded rationality has become a very important idea over the last couple of decades, as theorists have found it increasingly difficult to describe and explain how important decisions are actually taken. As we have already pointed out, sometimes the provision of excellent performance information does not seem to lead to effective organizational decision making. People do not always behave in strictly logical ways. The more we can understand about how important management decisions are made, the better we can design and use performance measurement to improve those decisions, and the better we can understand why feedback is not always used rationally.

Completely rational decision making implies that first the problem situation is analysed systematically, then all possible alternative solutions are considered in detail. Criteria are drawn up and used consistently to choose between the possible alternatives, and finally the best of the alternatives, as judged against the agreed criteria and nothing else, is chosen and implemented.

Research shows that, in practice, organizations and their managers do not usually behave in such a clearly structured way. Although methodologies for systematic problem definition and the evaluation of alternative solutions against
specific criteria have been found to be helpful by managers, softer more people-orientated organizational development skills are also needed. Successful new policies are not usually implemented entirely by rational argument or logical bureaucracy.

Bounded rationality arose from the ideas of limited rationality, for which Herbert Simon won the Nobel Prize for economics in 1978. The classic management paper was 'Theories of Choice and Decision Making' by March (1982) which, among other developments, gave rise to the often quoted idea of 'garbage can decision-making'. The paper got straight to the point in the first sentence:

*Actual decision making, particularly in organizations, often contrasts with the visions of decision making implicit in theories of choice.*

(March quoted in Paton et al., 1984, p. 91)

March explains that theories of choice, by which he means mathematically based models attempting to predict choice, depend on four assumptions, all of which can be strongly criticized.

The problem is that, although this simple model has been useful in many problem areas where parameters can be estimated relatively easily, for example in queuing theory or cost/benefit analysis, when research is done on how senior management decisions are actually made in organizations, the observations do not fit the theory.

March gives reasons for this, covering each of the four original assumptions. The first two assumptions are that all possible alternatives and their consequences are known. But March points out that during a complex decision all possible alternatives are unlikely to be considered. People must expend effort and search for information, and even the most intelligent and diligent manager can only consider a limited amount at any one time. When a reasonable amount of information has been gathered that includes an appealing alternative that is satisfactory, the decision maker may *satisfice*, that is, choose this acceptable alternative rather than continue to search for a perfect solution. You may think that the totally rational organization ought to consider a much wider range of possible alternatives before making decisions, but this might not be the most cost-effective use of its managers' time. Continuing the search for the very best solution is known as *optimizing*, and will be practised for example in life-critical situations.

Optimizing and satisficing are valuable ideas in an organizational context because they remind us that, as long as goals are being achieved, many potentially useful alternative ways of operating will remain undiscovered because there is no motivation to continue searching.

In times of adversity these unconsidered alternatives, known as 'slack', may be sought out and investigated. Some will be adopted and prove useful. Slack in an organization is not simply a reference to staff who are not fully stretched, but can refer to any 'resource' alternative. Creativity untapped, materials wasted, money not collected or machinery underused could all contribute to organizational slack.
The third assumption that March criticizes is that subjective preferences about alternative consequences are always important. He observes that sometimes institutions make decisions according to rules and traditions or even hunches, rather than the blatant self-interest of their most powerful members.

*Theories of choice underestimate both the persuasiveness and sensibility of an alternative decision logic – the logic of obligation, duty and rules. Actual decisions seem often to involve finding the ‗appropriate‘ rule as much as they do evaluating consequences in terms of preferences.*

(March quoted in Paton *et al.*, p. 94)

March says it is as though human society has evolved various rules and traditions to acknowledge that what we want most immediately may not be the best for us. The more cynical amongst us may equally observe that rules and traditions are useful in order to reduce the effort necessary to make a serious decision, as well as serving to avoid the expression of strong emotions.

It is March’s observations about the fourth assumption, that the alternatives and their consequences are judged logically against one another to produce the most rational solution, that has become the most memorable. Here he introduces the idea of ‗garbage can‘ decision-making. The passage is worth quoting in its entirety.
It is little wonder that in March’s original paper this section was headed ‘Disorder’. We suggest that you spend a couple of minutes reflecting on whether the ‘garbage can’ decision-making process ever happens in your organization.

Most controversially, March ends his paper by asserting that decisions per se are not the be all and end all of the decision-making activity. It is the psychological experiences generated during the process that matter. You may or may not agree with his point of view as expressed in the following passage but we urge you to consider it rather than reject it immediately.
Over time March's article has become less controversial but still remains pertinent to organizational decision making. The original article is long and covers many topics, hence our decision not to include it in its entirety. The sections discussed in this unit provide a thought-provoking explanation of why the provision of excellent information on performance, concisely communicated, will not automatically enhance the quality of any decisions taken about that performance. Human tendencies towards satisficing, rule following, perceiving contemporaneous problems as connected and valuing process above outcome may all intervene, producing a chaotic organizational environment in which rationality is definitely bounded.

**Case Study: Toxicem**

**Part 1**

The company Toxicem (a pseudonym), a medium sized but significant producer of intermediate chemicals, used steam in various phases of its manufacturing process. This was essentially at pressures between 80 and 150 psi (pounds per square inch). Demand for higher pressure steam was projected to increase and two years later the company bought a boiler capable of operating at 400 psi. However, the projected demand did not materialize and the boiler was satisfying requirements at 80 psi. To accomplish that, however, it had to be fuelled up to produce at 400 psi and the pressure subsequently reduced.

This stimulated the production director, Alwyn, and his engineers to think of ways to minimize the loss by putting this 'spare' pressure to productive use. One suggestion was to use the high pressure steam to drive a turbo alternator, to produce electricity which in theory would make Toxicem independent of the then state owned and supplied national network.

Following these initial thoughts some preliminary investigations confirmed the feasibility of such a project. Despite the realization that Toxicem could not afford the £150,000 necessary for the equipment, the engineers, supported by Alwyn, continued to develop this as a possible capital project. They invited the National
Industrial Fuel Efficiency Service (NIFE) to conduct a general survey at the plant. This was an activity that anyway took place every few years. This time, however, NIFE was specifically asked to comment on the economics of electricity generation.

The NIFE report estimated that savings of around £39,000 per annum would be possible, and Alwyn put together and circulated a paper summarizing the situation. Concurrent with these moves and despite the tight capital situation it had become evident that the demand for steam was now at the point when another boiler would have to be purchased. The Board of Toxicem asked for a detailed proposal.

Alwyn and his supporters saw this as an opportunity to get a high pressure boiler in place so that they could then represent their case for the long-term savings from the generation project. However, Giles the purchasing director, who was also investigating potential boilers, had publicly dismissed the generation idea as a waste of time and effort. He argued that Toxicem was really in the business of chemical production and not electricity generation. Giles favoured a low pressure boiler which was £15,000 cheaper than Alwyn’s preferred option. Although admitting that there might be possible long-term benefits, given Toxicem’s current situation, it was obvious that Giles favoured short-term savings.

**Part 2**

Purely by coincidence a National Coal Board circular arrived on Giles’ desk. This stated that they had large stocks of pulverized coal at local pits and could supply it at a very low cost for at least the next 10 years. Giles, never one to pass up a bargain, a trait that had contributed to his reputation as an effective procurer both within and outside Toxicem, decided to investigate the possibilities.

This coal, while cheap, had a very low calorific value and would not be able to raise steam on low pressure boilers. However, it could fire a water tube boiler which provided superheated steam power at 600 psi. The economics were so overwhelmingly in Toxicem’s favour that a high pressure boiler was ordered and installed.

The boiler operating at 400 psi later reduced to 80 for the plant reached its capacity about a year later. Alwyn now made his move to have the whole electricity generation debate reopened by suggesting that the boiler be raised to full pressure and the surplus used to drive an alternator. The debate continued for several months until Giles and Tom (the development director) realized that if Toxicem did produce its own electricity there would have to be an agreement negotiated with the electricity supply utility to provide standby facilities if any breakdown should occur. This, they suggested, would be very expensive. Alwyn sought and obtained corroboration of these charges. The capital control committee, advised of this, rejected the project as Giles predicted.

The managing director of Toxicem decided to retire. Within the company there were two clear candidates for this job — Alwyn and Giles. From Alwyn’s point of view Giles, having won the battle on the electricity generation project, had enhanced his image and was the prime candidate. What could he do to either look good himself or somehow downplay Giles’ success?

Alwyn decided to review the generation project to see if there was anything in it that he could use. He began by scrutinizing all the project documentation which the subsequent debate had generated. From this it appeared to him and his engineers that the cost of standby supply was unreasonably high and might in fact be an error.
He then did two things. He wrote to the Confederation of British Industry asking for their comments on the charges. He also gave notice to the Capital Control Committee that he wished to reopen the debate. The reply from the Confederation confirmed that the charge had been inflated and gave a more reasonable basis for standby supply. Alwyn also stated that the maintenance costs would have to be higher than those given by Giles' costing.

Conclusions

This move essentially won both the debate and the managing directorship for Alwyn, a post from which he has subsequently retired. The topic itself was still very much a live issue when the interviews were held within Toxicem for this and other decisions. There were still pro and anti camps and they still did not talk very much to each other.


Activity 1

The case study describes the processes of making what, at first, appears to be a fairly insignificant decision: to buy an alternator to convert excess steam pressure into electricity.

Examine this phase of the process from the purely 'rational' perspective, outlined earlier in this section, by focusing on the following questions.

- How 'optimal' was the original choice?
- To what extent did this project represent the utilization of slack resources?
- How subjective were the alternatives and their consequences?
- To what extent could they be judged against each other?

Comment

The choice facing Toxicem seems, at least with hindsight, to be quite amenable to rational analysis. Indeed, if we focus on the outcome, it appears to be a very rational and logical end to the process. In short, the numbers just did not add up. Indeed, Alwyn was putting up a project to utilize a slack resource which apparently had no significant impact on the short-term cost structure. Despite the data that were collected, did Toxicem really consider all the alternatives? This is very difficult for a non-technical commentator to answer. Were there other objectives which ruled out consideration of other options? It appears not. Toxicem's management wanted to reduce dependence on the local electric company but how do you cost that given that they faced a limited set of alternatives?

Judgement in this phase was based more on cost per unit than on cost of dependency. An interesting mismatch?

Why should that be?

The issues become clearer but the process muddier in Part 2.

Then, as you can see, careerist and political considerations surface - a series of activities which confuse the process. Why?

We suggest primarily because there is a lack of structure (rules) for handling the tension between decisions and career aspirations. In short, the decision is only incidentally about electricity generation. It becomes the setting, if you like, for a bigger drama.
So, indeed, as March tells us, decision making can become an arena for symbolic actions.

Putting proposals and papers to the capital control committee is ritualistic in that issues focused the participants on a 'battleground' which they both understood and whose processes had been sedimented down through countless other project proposals.

Note also that there was still some hangover from this decision. How might that shape future choices?
2 Double loop learning in organizations

Armed with an appreciation of the problems of bounded rationality you still need to solve problems and exert management control. Systematic frameworks save you having to reinvent the wheel when responding to each new challenge. The frameworks you have met already in this course are based on control theories of the firm.

... control theories of the firm emphasize the idea that a firm deals with cognitive limitations by adapting incrementally to its environment. ...

A firm is assumed to have a collection of control variables that can be varied and can be presumed to produce some effect on performance, conditional on the state of the environment and the actions of competitors ... The firm tries to use the control variables to accomplish two things: first, it seeks to achieve its current targets with respect to things like profitability and sales by increasing revenue and reducing costs. The actions taken by a firm (e.g. raising price, increasing output) are intended to achieve a goal (e.g. a particular level of profit, a certain market share). Second, it seeks to learn something about the world in which it operates. The results of actions are analyzed to generate information that might be useful in the future. (Cyert and March, 1992, pp. 217–218)

'Cognitive limitations' means not being able to respond to a vast amount of information all at once. The above paragraph is not just a restatement about control and performance measurement. Note that it also describes two ways in which managers can exert control. As well as using the single feedback control loop you met earlier, organizations that survive and grow use double loop learning. However efficiently a control loop meets its target, it may not remain effective if that target is no longer relevant because the situation has changed. Re-evaluating the target and replacing one control loop (or system of interconnecting loops) with a completely different one is known as double loop learning, and is often associated with 'the learning organization'. An organization, like a person, can be described as learning by experience. It can only do this if the culture and structure are such that staff can readily exchange their learning experiences, including mistakes, as part of their development.

Next, read the following extracts from the classic book by Argyris (quoted by Paton et al., 1984) where he defines organizational learning, both single and double loop.

Organizations are continually engaged in transactions with their internal and external environments. Industrial corporations, for example, continually respond to the changing pattern of external competition, regulation and demand, and to the changing internal environment of workers' attitudes and aspirations. These responses take the form of error detection and error correction. Single-loop learning is sufficient where error correction can proceed by changing organizational strategies and assumptions within a constant framework of norms for performance. It is concerned primarily with effectiveness - that is, with how best to achieve existing goals and objectives and how best to keep organizational performance within the range specified by existing norms. In some cases, however, error correction requires an organizational learning cycle in which organizational norms themselves are modified. ...

Then the managers must undertake an inquiry which resolves the conflicting requirements. The results of their inquiry will take the form of a restruc-
turing of organizational norms, and very likely a restructuring of strategies and assumptions associated with those norms, which must then be embedded in the images and maps which encode organizational theory-in-use.

We call this sort of learning double-loop. There is in this sort of episode a double feedback loop which connects the detection of error not only to strategies and assumptions for effective performance but to the very norms which define effective performance.

Single-loop learning, as we have defined it, consists not only of a change in organizational strategies and assumptions but of the particular sort of change appropriately described as learning. In single-loop learning, members of the organization carry out a collaborative inquiry through which they discover sources of error, invent new strategies designed to correct error, produce those strategies and evaluate and generalize the results. Similarly, double-loop learning consists not only of a change in organizational norms but of the particular sort of inquiry into norms which is appropriately described as learning.

We will give the name 'double-loop learning' to those sorts of organizational inquiry which resolve incompatible organizational norms by setting new priorities and weightings of norms, or by restructuring the norms themselves together with associated strategies and assumptions.

(Argyris quoted in Paton et al., 1984, pp. 116, 117, our emphasis)

Argyris gives an example of an organization that took many years to acquire double loop learning.
We can illustrate these ideas using control loop diagrams (Figures 1–3 overleaf). Note that organizational norms correspond to targets.

We hope that by now the Product X example will seem old-fashioned to you. Many commentators would argue that organizations that fail to learn in Argyris’ sense cannot survive in the long term in today’s competitive market place and that successful modern enterprises have learned the lessons that Argyris is teaching. You might like to debate this at a tutorial or self-help group.

The Case Studies feature other examples of organizational learning. The Czech chocolate and biscuit factory Čokoládovny, featured on video 1 and audio 1 has had to experience much double loop learning. The targets and norms of production under the command economy up to 1989 have become obsolete. Everyone in the organization has had to learn to work differently, as they enter into partnership with their new Western European collaborators.

When ICL restructured and introduced its emphasis on quality, the staff also had to make many adjustments to their control systems, as the whole managerial culture changed (see Case Study Booklet).
With smaller, younger organizations, there is often much single loop learning to be done, because little control existed. Stockholders may never have agreed on targets, as you can see for Lewisham Theatre in the Case Study Booklet, which was trying to fulfil many conflicting aims.

**Activity 2**

Develop examples of single loop and double loop learning in an organization with which you are familiar.
3 Systems approaches

Different theories are chosen for different levels of organizational problem. We have seen that control theory is used as a thinking tool for improving sub-systems. It provides detailed analogies once the various systems and sub-systems have been identified. Control theories are in fact one type of systems theory. There are numerous ideas, models and theories of many different types, both abstract and applied, that fall under this heading. Some systems theories are more valuable at a macro-level because they can encompass problems of unresolved conflict and bounded rationality. Such approaches are particularly suited to problem diagnosis: the question of what exactly should be controlled.

Changing targets and replacing a control system are a response to drastic change in the environment. The boundary of the system of control has been altered, or perhaps it was never carefully defined for our exact purposes. If a large complicated control system is not working well but no-one has much idea why, it might be better to rediagnose the whole problem from scratch rather than adjust each loop gradually, with equally unpredictable results. Now we will look further at a systems approach that can be useful for tackling major design problems.

Holloway (1990) demonstrates the applicability of systems approaches to a variety of complex organizational problems. She points out that they need not exclude other perspectives on a problem area. The first extract, below, provides a reminder about systems thinking and methodologies, before discussing some specific approaches.

"Systems thinking" [theory] indicates that systemic characteristics are sought and valued ... theory ... [can] provide insights to help describe and explain some problematic aspects of organisational structure and behaviour revealed by analysis of real world situations ....

The use of systems ideas varies with the chosen approach, which implies a set of assumptions about reality – especially social reality. We can define a systems 'methodology' as a defined set of analytical steps appropriate to these assumptions. In turn, we can find a range of 'models' being used as diagnostic or design tools, within and appropriate to the assumptions of different 'approaches', which are broader thought-development aids and can be used in a wide range of ways. Techniques, tools, methods – all may be employed in the pursuit of understanding, and may or may not be unique to systems approaches.

The most obvious distinguishing characteristic of systems thinking is that conscious effort is made to look for 'systems' in the situation of interest, or to study its problematic features systematically. This means focusing at least initially on 'whole' rather than parts or particular aspects. However, while we may look for things which we identify as systems, we are putting a label on an intellectual construct which helps us order the complexities around us, and which may be unique to our individual perceptions ....

If seeing aspects of our world as systems is an intellectual activity, the system we describe may well not exist as such in reality, and other people's descriptions of ostensibly the 'same' system may look quite different ....

(Holloway, 1990, pp. 73-74)
Holloway describes four important points about systems approaches, which can be seen as strengths.

1. Systems approaches aim to be holistic, rather than reductionist. This means that emergent properties are recognized. (Emergent properties, for those of you who have forgotten, are defined as follows. 'Each level has some properties that make it different in more than scale from the one below, which would not have been predicted simply from knowledge of the characteristics of the layer below.')

2. They have a wide range of focus, from atoms to the universe. (In this course we are only concerned with approaches that are potentially suitable for the analysis and improvement of human activity systems in complex organizations.)

3. Some uses of systems thinking can be described as technological, in that they can underpin and complement other methodologies which are applied to bring about practical changes.

4. They commonly use modelling.

### 3.1 Systems intervention strategy

(Adapted and edited from P679 Planning and Managing Change, Block 3, Sections 2–10, as studied in Stage I of the MBA programme.)

The systems approaches used in this course are feedback control theories and models, which have already been introduced, and systems intervention strategy (SIS), also known as the hard systems approach. A third approach, soft systems, will be briefly mentioned. The Open University's SIS is a methodology for deciding which parts of the organization have systemic properties, and can therefore be a valuable guide to designing control systems. Many of you will be familiar with these ideas from previous OBS courses, so this section will be revision for you. If you are new to the subject, this section, condensed from the Planning and Managing Change module of B880 The Competent Manager, will act as a very brief introduction.

SIS depends on your appreciation of its three overlapping phases.

- **Diagnosis**, the process by which you develop an angle from which to tackle a particular set of change problems, and in which the purposes of the change are clearly identified.

- **Design** is the phase in which alternative methods or 'options' for achieving change are suggested and explored.

- **Implementation** really starts with a commitment to see a change carried through, but is the process of developing a means for bringing the desired change about and then seeing it through.

In Figure 4 the phases are deliberately shown as overlapping because in practice you will find that ideas on 'design' creep into the latter part of 'diagnosis', and questions of 'implementation' will, and should, influence 'design'.

Figure 5 is a general model of SIS and Figure 6 summarizes the steps within it. In Figure 5 the three phases are shown now as arrows encircling a sequence of numbered individual steps. The intervention strategy is depicted as a cyclical process. In practice this can mean either through the entire cycle as shown in the diagram or merely back through parts of the cycle in the manner of 'forward two steps, back one'.
Figure 4
The three overlapping phases of the systems intervention strategy.

Figure 5
General model of the systems intervention strategy.
<table>
<thead>
<tr>
<th>THE THREE PHASES OF THE STRATEGY</th>
<th>THE STEPS OF THE STRATEGY</th>
<th>WHAT KINDS OF ACTIONS ARE APPROPRIATE TO EACH STEP?</th>
<th>WHAT TOOLS AND TECHNIQUES ARE AVAILABLE TO HELP?</th>
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<tbody>
<tr>
<td>Diagnosis</td>
<td>0 ENTRY</td>
<td>• Start by recognizing that change is a complete process</td>
<td>• Make use of the concepts of &quot;mess&quot; and &quot;difficulty&quot;</td>
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<td>• Structure and understand the change in systems terms</td>
<td>• Use diagrams</td>
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<td>• Get other points of view on the change problem or opportunity</td>
<td>• Set up special meetings</td>
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<td>• Set up some objectives for the systems which you are examining</td>
<td>• Create a model of things as they are</td>
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<td>• Think of the objectives of the change itself</td>
<td>• Set up an &quot;objectives tree&quot;</td>
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<td>• Decide on ways of measuring whether an objective is achieved</td>
<td>• Prioritize your objectives for change</td>
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<td>Design</td>
<td>4 GENERATE A RANGE OF OPTIONS</td>
<td>• Develop any ideas for change as full options</td>
<td>• Brainstorming</td>
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<td>• Look at a wide range of possibilities</td>
<td>• Idea writing</td>
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<td>• Your objectives may suggest new options</td>
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<td>What will it be like?</td>
<td>5 MODEL OPTIONS SELECTIVELY</td>
<td>• Describe the most promising options in some detail</td>
<td>• Comparisons with best practice in other organizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ask of each option: What is involved? Who is involved? How will it work?</td>
<td>• Diagrams are simple models</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Computer simulations</td>
<td>• Cost-benefit analysis</td>
</tr>
<tr>
<td>Implementation</td>
<td>6 EVALUATE OPTIONS AGAINST MEASURES</td>
<td>• Test the performance of your options against an agreed set of criteria</td>
<td>• Diagrams are simple models</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Set up a simple matrix to compare the performance of your options</td>
<td>• Cost-benefit analysis</td>
</tr>
<tr>
<td></td>
<td>7 DESIGN IMPLEMENTATION STRATEGIES</td>
<td>• Select your preferred options and plan a way of putting the changes into place</td>
<td>• Look for reliable options</td>
</tr>
<tr>
<td></td>
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<td>• Check back to the &quot;problem owners&quot;</td>
<td>• Plan times and allocate tasks</td>
</tr>
<tr>
<td></td>
<td>8 CARRY THROUGH THE PLANNED CHANGES</td>
<td>• Bring together people and resources</td>
<td>• Sort out who is involved</td>
</tr>
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<td></td>
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<td>• Manage the process</td>
<td>• Allocate responsibility</td>
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<td></td>
<td>• Monitor progress</td>
<td>• Review and modify plans if necessary</td>
</tr>
</tbody>
</table>

Figure 6 The steps within the systems intervention strategy

The 'cloud' at the centre of Figure 5 is labelled 'problem owner'. The dotted lines indicate that the idea of process is paramount in using SIS and in operating this methodology regular discussions with the problem owner(s) (usually, your 'bosses') will be needed to test out your ideas. The outcome will either send you looping back to refine earlier thinking or clear the way to progressing to the next stage.
Steps 0 and 1: Entry and systems description – ‘Where are you now?’

The box labelled ‘entry’ on the diagram shows that a ‘messy’ change task has been recognized and that you have decided to use SIS as a structured, logical approach. As such it represents the start of a diagnostic phase in which the next step is called ‘systems description’. This step serves two functions. First, it will help to ‘unfreeze’ discussion. More important perhaps is its second function in setting the stage for generating a wider, more complete view of the ‘systems’ to be changed.

Description as part of diagnosis

In essence, this phase is concerned with:

- getting clear what people want
- establishing a boundary around the problems
- clarifying the relationships between the major sub-systems
- understanding the structure of the ‘mess’
- deciding what objectives will be served by the change.

Systems description

This phase consists of three major steps. It was first developed as a means of understanding the behaviour of systems over time but it serves well as a diagnostic device.

The first step is best described as a process of ‘engagement’, or ‘locking-in’ to the task in hand. The terms ‘awareness’ and ‘commitment’ also convey the same idea. This amounts to you and other managers responsible satisfying yourselves that you are clear about the reasons for attacking the problem by designing or redesigning a control system as part of improving organizational performance.

For example, in the case of a manufacturing company with financial problems this might take the form of:

... a commitment to ensuring a future for the company and protecting the jobs of its employees.

(Note that this statement contains a potential conflict of interest if a reduction in the size of the company were to be considered.)

At another level, if we were concerned with finding new opportunities for a successful company the statement might include:

... a commitment to developing new markets whilst maintaining market share for existing products ...

In the public sector we might find:

... a commitment to developing a more flexible system for administering social security payments whilst reducing the level of fraudulent claims.

Note that in the marketing example we have moved away from the somewhat negative or pessimistic tones which sometimes dominate discussions on control and change. Inevitably, in many instances, the change will arise in the context of problems, but in other cases the challenge may be one of growth and development in the sense of exploiting new opportunities for a business.
Thus, typically, we might wish to explore the implications of looking at, say, a bank as:

- an employment system
- an information storage and transmission system
- a profit-making system.

Juggling these around will allow you to identify and develop an angle on the problem which begins to suggest a useful way of proceeding. Sometimes this can be described as detecting or finding systems, teasing them apart or separating them out, and finally selecting a useful sub-set.

The final step in ‘description’ involves the representation of the chosen ‘relevant systems’. Because the discussion of the issues has been conducted in terms of ‘systems’ this final stage in problem construction involves the use of simple ‘systems’ models to describe both the structures of the systems you have chosen and their behaviour over time.

Diagrams allow you to build up and record a series of models which describe the behaviour and structure of the system which you have chosen to examine. By doing so any ambiguities in your view of the problem will become apparent and you will also have available a set of figures which make your view of the problems of change and their settings available to other people. The boundary of the problem will be particularly important, so if SIS is unfamiliar to you, pay special attention to the next sub-section.

**The helicopter image**

Some students find it useful to imagine that a ‘messy problem’ is hidden in the landscape and can only be interpreted from an aerial vantage point. Hence the image of the view from a helicopter. If you are too high all the details are lost; too low and detail in the immediate vicinity obscures the wider view. Somewhere in between the pattern and connections of the main features of the landscape become clear and easy to see.

It is a particularly useful idea to use when trying to tease out just what should be included in your construction of a ‘relevant system’. Where is the appropriate boundary? How will you set your analytical lens to the best focus? In terms of my image think of the view of a town from the air. Do you want to impose a boundary on your view so that only one suburb of a town is in sight? Do you want to be a little higher in order to see the whole town? Or do you want to be higher still in order to see the roads, railways and port which serve the town and make it an important centre for communication? Does rising higher imply becoming detached from your favourite beliefs and attitudes to some extent?

Obviously, the height which you select determines the boundary to your view and that will depend on the purposes of your study. Are you really interested in the detail of suburban development, or are you trying to understand why the town in this example is growing? Until you decide on the boundary of the system, you cannot begin to design or redesign it.

**Step 2: Setting objectives and identifying constraints – ‘Where do you want to be?’**

Once the nature of the problems or opportunities which comprise the ‘change challenge’ has been established and agreed on, the way is clear to move on to the next step in the sequence.
To complete the diagnostic phase we must now develop a clear set of objectives and measures for the new system, and identify any constraints on the change setting. Objectives fall into two categories: those of the systems being examined, and those which are objectives of the change process itself.

Some simple working definitions may help us to get started.

1. **An objective** is a characteristic of the desired structure or behaviour of the system in its changed form. For example, we may speak of 'a specified return on capital' as an objective.

2. Its opposite, the **constraint**, is a form of behaviour or structure to be avoided in the changed system, as in a 'no redundancy' policy. Sometimes it is a matter of preference whether the particular feature is expressed as a constraint or as an objective, but usually a constraint is outside the boundary of the system.

3. The **measure** is a scale by which the degree or extent to which an objective is achieved (or a constraint is upheld) may be determined.

**Setting objectives**

Formulating clear and succinct objectives is seldom easy. Frequently, you will find that some objectives appear to be subordinate to others, in which case the construction of an objectives tree (as in Figure 7) will help to clarify your thoughts.

The primary function of objectives and measures is to provide a set of clear unambiguous criteria for decision making in the later phases when SIS directs you to making choices between options.

Frequently, the major constraints will be imposed externally on your organization (e.g. legal requirements, safety standards) but the objectives and constraints should also reflect the concerns of the decision makers or problem owners. It is important first to develop a set of objectives which are consistent with the themes emerging from the diagnostic phase. This can be started by first establishing an appropriate 'high-level' objective or goal. This may take the form of statements such as: 'maintain long-term viability of the business' or 'ensure highest quality of service consistent with profitable operations'. Notice that the latter example is of an objective coupled to a constraint. It is common to find that constraints appear to be 'stronger' than objectives. For example, safety standards act as constraints on the operation of an airline. The airline must conform to these standards if it is to retain its licence to operate commercial flights.

![Diagram of an objectives tree](image)

*Figure 7  The structure of an objectives tree*
Figure 7 shows how an objectives 'tree' might emerge beneath such a high-level objective. It also shows a common error made in the development of objectives. There is a confusion between options and objectives lower down the 'tree'. Two of the lower 'roots' on this 'tree' are here shown as 'Option 1' and 'Option 2'. These really only come into the next phase of design. The danger is not the inclusion of these options but the risk of mistaking them for objectives.

Figure 8 shows an objectives tree from the Jaguar car company.

**Step 3: Formulating measures; completing the diagnostic phase - 'How will you know when you've got there?'

For our purposes a 'measure' can be defined as 'a means of estimating or assessing the extent to which an option contributes towards the achievement of an objective'. Examples might be the level of output of a factory, or the percentage of faulty parts produced by a particular production line. However, this may still leave the unit of measurement open. You will find that a few objectives in any set will be 'non-quantifiable' or 'soft' in our terminology. For these you will require a little ingenuity to devise a ranking or weighting system which allows you to compare options.

**Step 4: Generating options - 'How can you get there?'

Even in a highly constrained change setting there is a value in generating a wide range of options, for the combination of some feature of the outside, 'odd ball' proposal and a conventional strategy ('redesign the form', 'rewrite the job description') may just liven up an otherwise unattractive change. There are several enjoyable ways of doing this. Perhaps the most common is a 'brainstorming' session. Students who have studied the Stage II MBA course B882 Creative Management will know of many more.

Finally, it is important to remember that the problem owner must come back into the debate here to guide the choice of options for more detailed study.
Step 5: The core of the design phase; modelling of options — ‘What will it be like?’

In engineering and architecture this stage of developing and modelling proposed designs is usually time-consuming and expensive. The development of prototypes in the automobile industry is a good example, when just one feature of a design, such as the bodywork, will progress from line drawings to computer-drawn 3D composites and on to sculpted clay and canvas full-scale mock-ups. For our purposes the most appropriate forms of modelling may be much more economical. Diagrams of various kinds showing the structure and behaviour of several options will frequently be sufficient for these can be used as a basis for debate about the performance of the options, and subsequently a guide to commissioning more detailed modelling or ‘feasibility’ studies by specialists.

A whole range of modelling methods are available:

- Physical models (architectural models, wind-tunnel test pieces, etc.)
- Mock-ups (model mock-ups of new products — cars, aircraft, etc.)
- Computer simulation models (of complex production systems, financial systems, etc.)
- Cash-flow models (either manually produced or computer-driven)
- Experimental production lines, or laboratory-scale process plant
- Scale plans and drawings (alternative office layouts, organizational structures, etc.)
- Cost/benefit analyses (as models of the likely trade-offs which would take place if a particular option were exercised. This is commonly done for capital projects as a means of modelling the potential benefits of a range of options.)
- Decision tree analysis
- Corporate plans or strategies (any one plan or proposal represents a ‘model’ of how the corporation or organization could develop its activities in the future)
- Organization structure plans and proposals (for example, a chart to show a new organization structure would show or ‘model’ the formal communication links or reporting channels which would come into being if it were adopted).

When using SIS you should be aware that, unless only very modest changes are being considered, the modelling process will probably take some time. Most organizations have their own procedures for modelling options, for example most of the public sector bodies have their own established in-house procedures for developing and bringing forward proposals for new capital projects. Management services divisions in almost all companies have their own procedures for developing new computer software. Finance departments set down procedures for analysing cash flow, banks have their own methods for preparing business plans, and so on. This suggests that the idea of ‘modelling’ is much more familiar and widespread than it at first appears. Moving beyond this to evaluation shows for the first time how objectives and measures can be put to use.

Step 6: Evaluation of options — ‘Will you like it?’

The evaluation stage in the strategy is a decision area, a stage at which the range of options can be reduced through a study of the likely outcomes of adopting an option by using the measures of performance.
The logic in this process of intervention allows choices to be made against previously determined criteria. Figure 9 shows an evaluation matrix which will allow comparison between options on the basis of quantitative measures for a set of objectives.

You should note that even without precise quantitative measures it is still possible to use ranking, weighting or scaling which may take care of the evaluation between options when the objectives are a little unclear. Political processes and bounded rationality considerations will also come into play to resolve the balance of the debate as personal preferences are expressed.

**Step 7: The design of implementation strategies – ‘How can you carry it through?’**

Assume that your problem owner(s) has given you the green light to go ahead with an approved option. It sounds encouraging but your job is still far from finished, for the innocent title to this stage hides a minefield.

There are three strategies for implementation which we will consider briefly here: the ‘big bang’ change, pilot studies and parallel running.

1. The ‘big bang’ model implies that on one day the old system stops and the next day the new one starts. This is quite common with moves from one office to another or with opening operations on a new site. We can think of the opening of operations at Heathrow airport’s new Terminal Four as a ‘big bang’ change. A careful plan or blue print was drawn up which enabled all operations to be switched from one terminal to the new one over a single weekend. ‘Big bang’ implementations of change carry high risks of failure and are probably best avoided if at all possible.

2. The ‘pilot study’ model of implementation implies that an experiment will be run on a small scale to see how the proposed change would work in practice. For example, if in a national organization such as a bank or a building society it is decided to go for a new method of operating a high street branch office, it would make sense to try out the proposed changes on a ‘pilot’ scale before going to the trouble and expense of adopting the
change nationally. This kind of incremental change is common in the kind of organization illustrated by the example. It obviously provides an opportunity for redesign and modification which is its most important advantage.

3 'Parallel running' applies most frequently to the implementation of new computer systems, but can be applied to other kinds of changes. As the name implies, two or more operations are maintained simultaneously and thus it is expensive, but it has the advantage of low risk and reliability. If the new system does not work well while on trial, no disaster occurs because the old system is still in operation. An example might be a new computer system to handle a firm's payroll. 'Parallel running' means the old system can still do the job in place of the new if faults occur.

Figure 10 shows SIS used to illustrate how performance measurement can help decision making.
Soft systems methodology, originally devised by Professor Peter Checkland of Lancaster University, offers an alternative but complementary systems approach (Checkland, 1981; Checkland and Scholes, 1990). It is useful for creating greater staff (and sometimes customer) participation and for highly politicized decisions, in other words for coping with unresolved conflict. Strong organizational development skills and plenty of time are required. Soft systems approaches are often combined with the diagnostic stages of SIS, to help tease out the underlying nature of the problem to be confronted and, if possible, controlled.

Checkland's soft systems methodology (SSM) ... incorporates the assumptions of soft approaches in a clearly defined methodology designed to facilitate organizational change. It accepts the validity of diverse world views as well as explicitly applying systems concepts to the analysis of complexity. ... Organisations are treated as cultures, in which value systems are highly significant.

(Holloway, 1990, p. 98)

Like SIS it is an iterative approach, divided into seven distinct stages, some of which are located in the real world of messy problems, and some of which involve abstract 'systems thinking'. Highly structured stages are incorporated, but their role is less prescriptive than in SIS, leaving more opportunities for creativity.
4 Problems of measurement

To recap, we have argued that poor measurement, whether in design or in implementation, is not the only reason for a lack of management control in an organization or larger human system. Nevertheless, there are many technical problems of measurement, in its broadest sense, that can negate our best efforts at improving performance.

Applied social science theories are particularly useful for tackling measurement problems, for example choosing sensors, once the sub-system under consideration has been broadly defined. Although engineers and technologists are experts at inanimate systems and their properties, and can predict the behaviour of extremely complex control systems, they are less used to dealing with the uncertainties that human behaviour introduces.

To look at why measurement can be so difficult we will think further into the detail of looking for weaknesses in a simple, single feedback control loop. We have the aim of improving the system’s ability to contribute to decision making. The system consists of some combination of people, finance and machinery. To keep our example simple, assume there is only one fixed target.

In this case, problems of measurement of performance really start with the sensor. This should be sensing (detecting) something that, when compared with the target, indicates whether the desired performance is occurring in the system and, if so, how much. How much of the finished article or service is emerging from the transformation as the outputs?

4.1 The problem of directness of measurement

Assume that you want the sensor to measure something, not merely sense whether or not an object, a person or a process is present amongst the outputs. There are two potential interconnected measurement problems that can affect accuracy: the reliability and the validity of the PI (performance indicator). Both of these are likely to be connected with the directness of the indicator, that is how far away it is physically and conceptually from the property it is intended to detect and measure. You may remember from Unit 1 that very few management PIs are direct measures—they are usually more properly described as indicators.

If you are measuring length, width or height, you probably use a ruler. The material of the ruler physically touches the output. The scale on the ruler is a direct indicator of the length of a physical object. The scale provides the measure (centimetres, inches, etc.) and the ruler is the tool used to obtain the measurement. Most measurements, even in the physical sciences, are more indirect, for example oscilloscopes ‘measure’ waves. Measures of money are usually indirect too: the Bank of England does not count its currency by observation of bags of coins; and the day’s takings at a large retail outlet are displayed on a computer screen as many will have involved cheques and credit or debit cards. Measures of personal ‘properties’ or characteristics are even more indirect. If there was a handy pencil and paper test of leadership potential you could assess your junior managers much more quickly. In this case the test would be the tool and the measure would be some predetermined scale, which could be qualitative or quantitative.
Properties themselves are often referred to as 'constructs' since few are directly physical like height and weight. In a classic textbook, Kerlinger (1986, p. 397) writes ‘A construct is an invented name for a property.’ Thus managers are often dealing with indirect ('proxy') indicators of hypothetical constructs. For example, replies to a questionnaire about attitudes towards the organization may be used as an indicator of overall employee motivation levels. A clear definition of motivation is still debatable, and the questionnaire will not be perfect, but the construct and the information gathered may be valuable for managers wishing to improve performance. It is all a question of understanding the limitations of any measurements used.

4.2 The problem of reliability

To return to our ruler as a tool for direct measurement, its accuracy is determined by its reliability and its validity. Reliability is by far the simpler criterion. It is obvious that if a joke ruler that looked like wood but was made of strong elastic could be made, it would not be suitable for sensing the length of output objects. It would give highly variable readings if repeated measures were taken of the same objects. That the material is not rigid is not the important factor. The scale being prone to variability is the key.

When constructs are more abstract, such as personality characteristics that are supposed not to change over time in the adult population, tests can be assessed in an analogous way: they are repeated after a time interval and these repetitions are tested with large populations of adults. If answers are consistent, the test is reliable over time. Note, we are using the word ‘reliability’ in a quite technical way. We may not be sure exactly what it is measuring, if we are sceptical of the theory behind its construction (for example the controversy over IQ tests) but we can be reasonably confident that it is measuring the same something each time. Thus ‘reliability’ is used more to reflect ‘repeatability’ than ‘absolute truthfulness’.

4.3 The problem of validity

Validity is the more alarming topic for those who need to defend their measures. Questions of validity concern how you can provide evidence that your sensor or indicator measures what it is supposed to measure. No-one would criticize the use of a mercury thermometer to take a person’s temperature but it would not be much use to control a thermostat on a blast furnace. This is an example of the tool being inappropriate, so invalidating the measurement.

Validity also depends on the measure being appropriate. You could use a mercury thermometer to measure length but saying that a piece of wood measured 20°C by 5°C by 3°C does not transfer useful information (see Figure 11).

The most valid measure is one that agrees with independent external evidence that the required property is present in that quantity. Pencil and paper tests on offer to managers, usually via trained experts, are (or should be) supported by independent evidence that their use can predict the qualities being sought, in the same way that a test of word processing or language comprehension abilities is likely to predict those who will be able to use these abilities at work. A machine
to check the quality of manufacturing output to a specific standard would need to be verified as being capable of doing so, and a programme of accounting software sold to detect a particular problem of cash discrepancies should have been tested against several cases where problems are known to have occurred.

The more indirect the sensor, again the greater the problem. In a modern hospital, no doubt the information system could record accurately how many patients are discharged per week, but this would not be a particularly valid measure of the effectiveness of the organization. A high discharge rate for a few weeks could signal a special scheme to catch up on long waiting lists, which would suggest ineffectiveness to most of us. Such an indicator might however be appropriate as a measure of efficiency over a specific period, if taken among other measures.

**Activity 3**

Devise a sensor to record labour turnover. Note potential difficulties.

**Comment**

To make sure that the sensor can record labour turnover appropriately should not be too difficult as long as personnel records are kept in an accessible form. Do they record age, sex and entry qualifications, if these are the variables of interest, or will a tedious search of archived forms have to be made? Do they include all relevant types of employee if the organizational structure has changed recently? Do departments really regularly update information to send to any centralized functions that may need it, or do they wait until it is requested? Did you include people who were promoted, or redeployed elsewhere?

Most performance indicators rely on proxy (indirect) measures to produce the quantitative information required to compare outputs with targets. The less direct an indicator is, the more danger that it will be unreliable or invalid. However, we are not seeking highly accurate scientific measurement for most management control operations. What is important is that we are aware that there will inevitably be some imperfections in our sensors, that we know where these arise, and that we attempt to use the best sensors available.
4.4 Comparators and actuators

In the case of labour turnover described above, the comparator is the person inspecting the statistics, who should have an easy job if output and target are in the same format. The problem comes when this is not the case, the proverbial task of comparing apples with pears. Counting the total number of fruit will not help if one group of stakeholders strongly prefers pears and another hates them. It might be necessary to weight the numbers of each to give a composite measure. A weight reflecting the value of each commodity would need to be attached to moderate the actual number of commodities. This is of course the basic principle underlying much statistical and economic work, for example cost/benefit analysis and the retail price index.

The manager who is an actuator has a more difficult task, as you have seen in Unit 1, SAQ 2. To return to the labour turnover example again, they may not be much the wiser for knowing that targets are not met, because the control loop does not give many clues about why staff are leaving. The analysis of exit interviews, if records exist of them, might answer the original question more easily than the labour turnover statistics.

Note that we have switched systems now, to the 'staff satisfaction system' from the 'staff turnover system'. The statistics are a good indicator of something wrong, but cannot automatically tell you what that something is. A sensor of dissatisfaction may be able to do so. It cannot ensure that the actuator can improve the position, however, for if the problem is lower pay than competitors are offering, the manager may not have the power to raise wages. More senior managers may reject the case for doing so if profits are down, or may suggest another type of recruit who will accept the current rates.

So, consideration of the actuator returns us to the problems of human activity systems, in that the actuator-manager may not have the power or the inclination to alter inputs.

4.5 Problems of definition: targets

Most other problems are more likely to arise when you are designing or redesigning a control system, rather than when improving it. The most obvious one is deriving a suitable target. Strategic management texts often concentrate on mission and objective setting and other planning techniques. You may have already seen in B881 Strategic Management that setting usable targets from the most sophisticated planning processes is a major problem. We are facing the problem of operationalization, which is common to all types of science. Operationalization is about whether a construct or property can be measured. It requires a knowledge of reliability and validity as introduced above, but it also requires judgement about purpose.

The approach taken by the social scientist on how to define something clearly enough to know when you have found it, let alone to measure it, is to ask 'What is the question?' In other words, think about why you are trying to define this. For example, why might a manager want to measure labour turnover? It could be to make the case for a different recruitment policy, or more recruitment, or a job redesign, or a training programme, or because someone in the next layer of the hierarchy has asked for it, or because it has always been recorded. Depending on the combination of reasons that apply, various indicators of labour turnover might be used to derive good targets. Possible examples might be annual
percentage decrease, percentage per year for new recruits under or over a certain age or qualification level, women leaving out of total women compared to the same figure for men, etc.

Obviously, this is an easy example, but it could go on to form part of a profile of a department's success. In such a case low or decreasing labour turnover might be an indicator of an equal opportunities policy working, or of good recruitment and induction procedures that save on expensive readvertising, or of creative job redesign initiatives.

In general, the simpler (or cruder) the target, the easier it is to operationalize. Everyone can recognize how a specific improvement in ROCE year on year can be measured but a useful target for the Probation Service will require much harder thinking. The reliability and validity of potential measures will be considered alongside what can practically be obtained and what the stakeholders setting the target hope to achieve.

### 4.6 Why measure anyway?

If you are designing a sophisticated system, you will probably not be able to devise quantitative measures for all of your outputs. The question of whether or not this matters divides practitioners. Those with an accountancy or hard science background may say that a target and an output must be quantifiable — we must know how much of it there is. A little more, or considerably less, or satisfactory to 40% of recipients is not considered useful. But we would argue that in many areas, such as the services provided by therapists, social services, hospitals, etc., such qualitative measures are useful, indeed essential. They are difficult to weight in order to build up profiles, but they are necessary to make decisions on effectiveness against sophisticated value-driven institutional goals.

Social scientists also argue (endlessly, it seems to some of us!) about the relative values of qualitative and quantitative methods of investigation. In this section we are attempting to fit their most relevant arguments into a nutshell, a practice that many of them would consider inappropriate.

The battle between quantitative and qualitative measures can be seen as being about information. If you can obtain precise quantitative measures you are more likely to be able to estimate whether your results (the difference between output and target that precipitates action) have arisen purely by chance, and you are more likely to be able to make predictions about the future of the system under observation. You have gathered a great deal of information. In some areas of management this is vital. However, the danger is that sometimes we rely too much on quantification to collect and analyse information that was fairly well known anyway. We neglect the exploration of new areas where little is known because there are no clear and obvious measures. But every piece of information collected about an unknown area reduces our uncertainty, even though we should remain aware that its reliability and validity are suspect for predictions. It is the best information we have at the present. In some areas, such as perhaps the evaluation of therapy, or the artistic merit of exhibits in a museum, it is the best we are likely to get.

If a complex series of statistics collected about the performance of a production line tells us that maintenance on machine 151 is the weak link because it precedes falls in output, that will be very valuable. But if some of the key staff knew that anyway from experience, a collection of their opinions might have
been quicker and cheaper. It could also have told you more about their knowledge and opinions, illuminating the workings of the whole system. That would provide extra useful information.

In a situation where we know very little, a search for qualitative information can provide a great deal. It is useful for exploring new areas, and providing a differentiated view of what may have seemed a simple category. You could not devise a suitable survey of customer opinion on a complex product unless you had some idea who the customers were. If in fact they mainly fell into one of two quite separate groups, with opposing tastes, you would get a misleading result from simply counting all regular purchasers and aggregating their demographic characteristics. You might conclude that the market was much wider than in fact it was. Focused discussion groups could reveal strongly opposing opinions about certain qualities of the product which could then be incorporated into a wider survey. Actual quotes from discussions are helpful here. The two groups, if occurring in the wider population, could help you segment your market.

Qualitative ‘measures’ are regularly used in the control loops designed to motivate individual managers, as we will see in Unit 4. Although the forms in general use normally contain rating scales (not a very precise assignment of numbers, as most of you will know from trying to fill them in), the output from disciplinary or appraisal interviews rests on the meanings attributed to the numbers by the participants. Not every appraiser who detects outstanding or appalling performance gives accurate feedback! They make judgements on the qualitative evidence gained from the interaction and their relative positions in the wider organizational system.

If an organizational culture does not favour such judgements, people are often reluctant to use qualitative information, or at least to admit that they do. But evidence to justify the use of a qualitative sensor can be collected as systematically, that is as much in accordance with the dimensions of reliability and validity as quantitative information (see Table 1).

**Table 1  Systematic evaluation of information**

(Source: Easterby-Smith et al., 1991, p. 41)
5 Conclusion

When you reach the end of this block we hope that you will understand that attitudes to performance measurement and management control vary widely amongst both practitioners and academics. We feel that they can be arranged tentatively along a continuum that corresponds to the hard–soft distinction you may have met during other courses. Problems are divided according to the preponderance of their hard or soft properties, so the approach most likely to be successful, for example SIS for ‘harder’ problems, could be selected. Softer problems involve people more, are less amenable to quantification, involve conflicts over values and require wider staff participation over a longer period; indeed, they might never be completely resolved. Harder problems can be very complex in the number of variables involved but there is more chance of agreement on objectives and constraints, and the strong likelihood of a satisfactory solution.

In a similar way, some people take a hard view of performance measurement. They would argue that, if experts think and work hard enough, our targets and our measures can be improved enough to produce excellent performance measurement, completely quantified, which in turn provides superb information for decision makers, who will thenceforth make first class decisions. At the soft end are those people who believe the whole exercise is so inherently difficult conceptually due to the nature of human performance and its lack of quantifiability, and because assessment is so value laden and involves so many conflicts of interest, that any control by measurement should be avoided. For such people, control systems will always be drastically imperfect, so such systems will inexorably tend to be manipulated by those who apply them and subverted by those to whom they are applied. Bounded rationality and unresolved conflict will oust any systematic attempts to obtain effective management control.

Whilst aware of these views and respecting how seriously they may be held, the Course Team’s views are clustered around the middle of the continuum. (Or sitting on the fence!) We think that the best managers can achieve real tangible improvements in performance measurement, evaluation and organizational decision making. Some situations and some organizations will always be less problematic than others in terms of what can be achieved. Improvement will not be easy, but neither will it be impossible.

These views, known as the contingency approach to decision making, are concisely expressed in the matrix in Figure 12, which represents typical characteristics of decisions and control systems occurring in different organizational situations. It is derived from UK research into control and management information systems by Earl and Hopwood (1980), combined with US work on organizational decision making by Thompson (1967) and McMillan (1980), as adapted by Daft (1992).

You should notice that a decision process can be attributed to a cell without having all the characteristics listed within that cell. The matrix is not intended to banish ambiguity by forcing decisions into conceptual boxes. It should be used creatively to analyse which methods of control can be used to contribute to, or are likely to result from, any given decision process, as well as to realize and accept that when there is great uncertainty over both means and ends, control over performance will be limited, however precise some measures involved might appear.
In cell 1 we find that because objectives are clear and the likely consequences of various ways of reaching those objectives are well understood, there is not a great deal of uncertainty. Plenty of information is available. Decisions about effective control systems will be complex but structured methods, such as SIS, will be suitable to help with them. There may be much hard work involved and the technicalities of measurement could be extremely challenging but organizational politics should not intrude too much. It should be possible to optimize on decisions, such as targets. This situation might represent the commissioning and installation of a new production site.

Cell 3 might describe the situation when a new and highly lucrative market is opening up very quickly. Again objectives are known and broadly agreed but little is known about the best ways to achieve the desired ends. The challenge is new, time is short and no obvious methodologies exist to evaluate all options in depth. Plenty of satisficing will take place. A learning organization can be successful here because it is accustomed to calling on the creativity and previous experience of its managers to tackle problems, and is flexible enough to adapt. The clear objectives should help in the design of technically strong systems with rapid feedback to measure effective organizational performance, and allow managers to be good actuators when adjustments are necessary.

Cell 2 probably reflects a familiar and frustrating situation. You know where you should be going and how to get there but equally powerful others disagree on the objectives, or on how they should be prioritized. There is much unresolved conflict. Your rational powers of persuasion and knowledge of measurement technicalities will be highly necessary but certainly not sufficient to obtain your ideal solution. Different and contradictory control systems will probably exist. Everyone will be attached to their favourite schemes and no-one will act purely rationally. You will have to bargain and deal in organizational politics to achieve your solution, or some compromise towards it. Investment in a new product or the closing of a department might be typical of this situation.
Cell 4 is the furthest case away from cell 1 in that no-one fully understands exactly what is going on. Perhaps the organization or department is new, or has grown very rapidly, or is acting in a very controversial area. We could be describing a social services organization attempting to deal with a flood of new regulations, continual shortage of resources and rising numbers of its clients, who are needy but unpopular with the community at large. In a cell 4 situation you cannot avoid bounded rationality and unresolved conflict. The situation is unclear and there are few data, let alone hard information, on possible options to reach the variety of unclarified or disputed objectives. The boundaries between internal and external control may have become blurred. Any decisions may feel as though they followed the garbage can model but decisions have to be made. Rigorous control systems cannot be designed yet but you can begin to devise performance measures for any organizational objectives that can be clarified.

Figure 13 attempts to illustrate the matrix in another, even less formal, way. Assume that an organization can be perceived as operating at any one time in a manner which fits along a continuum between total rationality and complete chaos. We believe that the condition of total rationality at one end of the continuum is mythical. The concepts, theories and frameworks which you have met in Block 1 are intended to assist you in moving towards better management decision making and control, by reducing ambiguity and uncertainty where possible. We do not claim that there are any tidy solutions that can remove ambiguity and uncertainty from your managerial lives but we are sure that the knowledge and application of a rich variety of systematic frameworks can improve organizational performance.

**Activity 4**

Using Figures 12 and 13, try to classify a particular substantial decision in which you have been involved.

**Activity 5**

What is the main barrier to better performance measurement and decision making in your organization?

Is it (a) poorly defined targets, (b) inaccurate measures, (c) lack of feedback, (d) feedback being ignored, (e) too little information for decision makers, (f) organizational politics, (g) something else – what?
References


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Text