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Volume 2

Business Performance Measurement – A Soft Systemic Approach

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Chapter Seven: *Systems Literature Review*

7.0. Introduction

The previous chapter concludes with the assertion that a Soft Systemic approach to measurement will be more applicable in passive/qualitative, active/quantitative or active/qualitative measurement situations. In order to articulate what such a Soft Systemic approach to measurement is it is necessary to review the Systems literature. Whilst the main focus of this chapter is in the Soft Systemic writers other areas of the Systems movement have been included in order to provide context to the Soft Systemic approach.

The chapter reviews the work of a selection of writers who may be considered to be inside the Systems movement and who have written about measurement. The writers discussed were chosen because; either their work can be argued to be typical of a certain kind of systems thinking; and or, their writings are recognised to be key in the development of the contemporary Systems movement.

Nowhere before has a Systems literature review concentrated primarily on the concept of measurement, so the following aims to be both a record of the main arguments about measurement in the Systems Literature as well as an opportunity to evaluate this work. Hence each section has two parts. The first records the main aspects of what the particular author has written with regard to measurement. The second part comments upon the work in light of the research objectives of this project.

The process of measurement is fundamental to any application of Systems science, Flood and Carson (1988) draw attention to this in their introduction to the theory and application of Systems science:

> *"structured and even messy situations can be viewed as giant and dynamic data sources, and that to grasp any kind of understanding about them requires that access to the data is achieved. This is the art of measurement."*
>
> Flood & Carson (1988) p.63

As stated above the aim of this review is to provide an overview of what writers within the schools that make up the Systems movement have said about measurement, with a particular emphasis on the Soft Systemic writers. In order to do this it is necessary to describe what constitutes the Systems movement. This problem has been tackled by a number of writers previously, noticeably Lillienfeld (1978) and Schoderbek et al (1980) who all provide histories and descriptions of the Systems movement. With the rise of Critical systems thinking writers such as Jackson (1982, 1983, 1985a, b, 1987), Jackson and Keys (1984), and Ulrich (1988) have analysed the Systems movement in terms of the philosophies inherent in different methodological approaches. Since it is not within the scope of this project to add to this work it was necessary to choose one on which to base this investigation. At the beginning of a philosophical review of current Systems thinking Jackson (1991) identified four schools of thought in the contemporary Systems movement:

> *"It is our concern now to take in turn the four main strands of modern systems thinking - hard, cybernetic, soft and critical."*
>
> Jackson (1991) p.293

This chapter reviews writers within the Systems movement in terms of the four strands identified by Jackson (1991) above. Since the primary concern of this research project is

to define a Soft Systemic approach to measurement particular emphasis is paid to Soft Systemic writers. The chapter starts with a review of writers within the hard school such as Kircher (1959), Jenkins (1972), Jenkins & Youle (1971), Forrester (1961), Wolstenholme (1990), Sterman (1984, 1994). Next the review moves briefly to cybernetics writers Weiner (1948), Ashby (1956), and more significantly to the work of Beer (1981). After which the Soft Systemic writers are reviewed in the key section of the chapter, the works of Churchman (1947, 1959, 1971), Ackoff (1979, 1981, 1986, 1994), Checkland (1981), Checkland & Scholes (1990), Warfield (1989) are reviwed. Finally the writings of Jackson (1991) and Ulrich (1983, 1987) are discussed in order to set the review into the context of the final significant school within the contemporary Systems movement, Critical Systems thinking.

7.1. Hard Systems Thinking

The defining feature of the Hard Systems approach is the assumption that problem situations will possess a clear and unitary set of goals, which must be achieved as efficiently and effectively as possible. Usually the system is presented as some form of quantitative model with which Systems practitioners experiment in attempt to optimise the performance of the model / system.

7.1.1. Kircher

7.1.1.a. Review

Kircher's (1959) interest in measurement seems to have been driven by his belief in the benefits that models bring to the decision-making process. He described three categories of models of management problems that are based on measurable data.

Descriptive models aim to portray relationships that are seen to exist in a situation. Kircher (1959) viewed the construction of this type of model as the first step in a business analysis. In order to do this the desired goals needed to have been set, the reason for the measurement had to have been established, and the measuring methods must have been adopted and employed. Having built a descriptive model a **predictive model** followed. Prediction for the whole model was felt to be possible if one factor could be reliably predicted and the relationships held i.e. budgeting was a typical example of the use of this type of model. If one is aware of the gross margin percentage and can predict sales revenue, then one knows how much your costs of goods sold should be. From this one can estimate how much goods to buy or process, if it was so desired.

According to Kircher (1959) a **decision model** is a set of predictive models with an optimiser that serves as a means of choosing between them. To continue with his budgetary example, one could prepare a set of budgets (predictive models) that represented different possibilities of a given situation. Then if one wishes to maximise profit (the optimiser) a budget decision could be made automatically by choosing the budget that returns the largest profit. So measurement has enabled the practitioner to reach a situation where a once complex decision is rendered automatic we must engage in measurement. Kircher (1959) articulated this role for measurement clearly;

> *"..it can be seen that when certain objectives are clearly defined, and the factors of the situation are objectively measured, then the decisions are almost automatic."*
>
> Kircher (1959) p.66

Kircher (1959) went on to identify seven elements that needed to be investigated in relation to business measurement:

1. Determination of the objective of the business entity - the purpose that is to be served in a particular situation.
2. Determination of the types of factors that might serve to attain the objective.
3. Selection of the key aspects of the factors - the aspects that are to be measured.
4. Choice of; a) a measuring method b) a measuring unit.
5. Application of the measuring unit to the object to be measured - the central action of measurement.
6. Analysis of the measurement - relating it to other measurements (where *other* refers to time or kind).
7. Evaluating the effectiveness of the measurement by determining the extent to which it assisted in the attainment of the objective.

Of the seven areas that are outlined above perhaps the most interesting is the fourth, the choice of a measuring method and a measuring unit. Kircher (1959) observed that although much theoretical work had been done in this area very little was of use to people in business, the same can still be said today. This practical redundancy of theory to the business world can be attributed either to a failure of application or an inappropriateness of theory. Although not explicitly stated in his discussion Kircher (1959) seems to be hinting at a failure of theory as the cause. He felt that some of the concepts of measurements needed to be further defined (redefined). Specifically the **concept of quantity**, in relation to which he complained;

> *"Following the mathematicians, most writers appear to treat "quantity" as referring to an abstraction which somehow has almost a physical significance of its own."*
>
> Kircher (1959) p.72

Kircher (1959) felt it would be more useful to re-establish the concept that quantities are measurements of qualities e.g. the quality of length appears in many objects. So then a quantity is an abstraction that describes a particular type of quality or characteristic. Hence the problem for the observer is to identify characteristics in the object to be measured and then match them to similar characteristic/qualities represented by the measuring unit (quantity). Kircher (1959) also stated that the characteristics must be **invariant** in that they can be identified and seen to persist over time. Since every object and every event in the universe is unique the process of abstraction is crucial to identifying invariant qualities.

One of the most obvious, and yet, arguably the most important of Kircher's (1959) observations about measurement was his recognition of the importance of **purpose** in the measurement process. Firstly he stated that all measurement must be purposeful even if the reason is simply curiosity. Following from this he believed that if one was to

make a formal measurement then one must also accept the responsibility to make some effort to define one's purpose or reasons for making that measurement. He was mainly concerned that if the purpose of measurement is not made explicit then interpretation of data by someone other than the original researcher, or at a later date, becomes less meaningful.

7.1.1.b. Comment

Perhaps the whole philosophy of the Operational research approach is illuminated in the quotation from Kircher (1959), shown above, where he states that complex decisions are rendered automatic if one can define clear objectives and then objectively measure situations. Primarily then the role of measurement within Operational research is to provide data for decision models. To suit this role ideally measurement should be objective, since the ability of a model to provide the most appropriate solution will be affected by the quality of measurement. Later in this literature review the concept of objective measurement is discussed in further detail.

With regard to measurement there are two specific aspects of Kircher's (1959) work that should be high lighted here, since they particularly stand out. The first of these is his recognition that measurement is a purposeful activity. He called for practitioners to accept the responsibility of making explicit one's reasons for doing the measurement. Kircher (1959) wanted this because he was concerned to ensure that data would be useful and meaningful to someone other than the original measurer. It is an important point to recognise that data will be shaped by the personal purpose of the measurer as well as those of the objectives of the system. Although by no means so sophisticated this does have shades of the soft systems writers work on purposeful activity systems and the need to articulate worldviews that is reviewed later.

The second interesting feature of Kircher's (1959) work for measurement is his criterion for evaluating the effectiveness of measurement. He stated that this should be

determined by the extent to which measurement assisted in the attainment of the objective of the system. This is an idea that is concurrent through most of the Systems literature and is fundamental in differentiating the systems approach to measurement. Since the validity of a measurement system is connected to its usefulness and not to more traditional concepts such as accuracy and statistical confidence. Consequently this is a theme that is returned to both in this literature review and many other parts of the thesis.

7.1.2. Jenkins & Youle

7.1.2.a. Review

The work of Jenkins & Youle (1971) and Jenkins (1972) are synonymous with Systems Engineering. Hitchkins (1992) posed the question, what is wrong with classic Systems engineering? He argued that the advent of soft Systems thinking had not been kind to the image of Systems engineering:

> *"Those in the soft camp caricature the approach as "head-down", concerned with optimisation, obsessed with quantitative metrics and highly pragmatic."*
>
> Hitchkins (1992) p.7

An approach that has been perceived to be as 'obsessed' with metrics is of obvious interest to this review that is 'obsessed' with measurement. Jenkins (1972) and Jenkins & Youle (1971) are generally regarded to be the definitive works describing the Systems Engineering approach. Systems Engineering is primarily concerned with designing systems so that they can be optimised. Jenkins & Youle (1971) described the process of optimisation as choosing the system that yields the highest value of its performance criterion. The performance criteria must be strongly linked to the purpose of the system, since their role is to measure the whether the overall objectives of the system are being

truly attained. Whilst discussing the Systems approach to data and information collection they wrote:

> *"It demands that information gathering and storage should be directed towards purposeful ends, namely to meet the objectives of the corporate plan more effectively."*
>
> Jenkins & Youle (1971) p.91

As soon as the objectives of the system have been settled the performance criteria need to be established. The more precise the objectives the easier it is to define the criteria for any particular system. According to Jenkins & Youle (1971) performance criteria may be inadequate for six reasons:

1. Criteria are inexcusably vague.
2. Criteria are excusably vague, but no one has agreed on ways of achieving acceptable and agreed compromise around this vagueness.
3. Unnecessarily large number of criteria, so they get in the way of each other.
4. Commonly accepted criterion is perceived to be unrelated to the true objective and so people ignore it.
5. Accepted criteria incapable of being measured with any degree of precision.
6. Some people accept one set of criteria, other another set.

Jenkins & Youle (1971) p. 25

Jenkins (1972) wrote that such problems could be avoided by ensuring that criteria are truly related to objectives, simple, direct, clearly agreed and accepted even if qualitative. He also stated that very often these criteria would be economic in nature, such as return on capital or cost per unit of production. However he warned against the temptation of precise mathematical criterion that would not embrace all the objectives. He advocated

the use of qualitative performance criteria even if these meant the use of subjective measures:

> *"it is better to bring to the foreground these subjective elements rather than bury one's head in the sand and to pretend that one is making progress by using a criterion which is easy to quantify but irrelevant to the real world situation."*
>
> Jenkins (1972) p. 157

Having chosen the performance criteria Jenkins (1972) thought it was important that every individual involved with the system should be informed of them. Also if there are a number of different possible performance criterion for the system the designer must consult with the senior manager concerned to agree which should be used. Once the criterion is agreed then data collection should start; efficient data collection requires three things:

1. Clear thinking about the problem so that relevant information sources can be tapped.
2. An ability to communicate in speech and writing so that people are stimulated into parting with information and volunteering new information.
3. A grasp of statistical techniques so that the significance of the data can be appreciated in drawing conclusions.

Jenkins & Youle (1971) believed that very often organisations were collecting too much information and so before any more data was collected by an organisation a number of areas should be addressed. Firstly they felt that often managers were provided with information for no other reason than that it existed, they stressed that this was a backward approach. Managers' needs for information in terms content, quality and timing should be analysed and then attempts to meet it made. Secondly, no new information should be created until it is clear that the decision could not be taken with

such a high degree of precision without it. It follows then that all types information not being used by the organisation should be scrapped. Finally before data collection is sanctioned it should be appraised economically to show that it is of value.

7.1.2.b. Comment

The key to Systems Engineering is to design, build and then optimise the performance of a system. So the idea of optimisation is crucial, not just in the management of the system but also in determining the design of a system. Optimisation can be thought of as striving to achieve the highest value for a system's performance criterion (Jenkins & Youle (1971)), consequently measurement is integral to the Systems Engineering approach. Once again measurement is viewed as a purposeful activity that should assist the system to meet its objectives, however unlike the Operational research approach discussed before the Systems Engineering approach recognised the difficulty in defining objectives. In some cases it is difficult to define precise objectives and hence difficult to define performance criterion. Jenkins & Youle (1971) accounted for this problem by accepting that performance criteria may be excusably vague; which means they felt that measures could be qualitative and vague as long as they were agreed and accepted by all. Indeed Jenkins (1972) demonstrated a very important step in the evolution of a Systems approach to measurement by endorsing the use of subjective measures, if they were more relevant to the system's objectives. The concept of subjective measurement and all that this implies will be major part of the literature review and indeed the rest of this thesis.

There are three other issues that are worth reiterating in relation to the discussion about Systems Engineering and measurement. Firstly, statistical analysis is still an important part of the evaluation of data particularly in terms of the significance of data in relation to conclusions that may be drawn from it. This sort of evaluation will be contrasted with the ideas of the Soft Systems authors reviewed later. Secondly, that an ability to communicate is paramount in data collection. This gives rise to the concept that data

collection is more than a one-way process; information can flow to the object of measurement as well as away from it or them. This is a fundamental principle of the Soft Systemic Performance Measurement Framework introduced and used later in this thesis.

The last point that is worth drawing attention to is the participative aspect of the Systems Engineering approach to measurement. Jenkins (1972) proposed that every individual involved with the system should be informed of the performance criteria. This is a far cry from the participative ideas of Ackoff (1994) and the emancipatory theme of Ulrich (1983,1987), which are discussed later, however it indicates recognition that measurement has to depend on the behaviour of those involved in a system.

7.1.3. Forrester

7.1.3.a. Review

Jay Forrester (1961) was interested in the development of models of business systems that could assist managers using the techniques of System dynamics. He felt that one of the problems with this model-building approach was an over reliance on statistical data at the expense of descriptive information. He identified this concentration on statistical information as a barrier to the model building process. He detected a strong reluctance to build models in problem situations because potential users thought that they had a lack of adequate data. Too often he noted that data is collected whose value is not worth the cost of collection, at the same time highly crucial and easily available data is ignored. Forrester (1961) was at pains to point out that the first step in a model building process should not be extensive data collection:

> *"There seems to be a general misunderstanding to the effect that a mathematical model cannot be undertaken until every constant and functional relationship is known to high accuracy."*

Forrester (1961) p.57

Forrester (1961) was concerned that the desire for understanding and accuracy meant that significant factors are often left out of models because they are unmeasured or perceived to be immeasurable. Hence intangible influences are ignored or assumed to have zero affect, Forrester (1961) stressed that zero is probably the only value we know to be wrong. He seemed bemused by desire amongst manager for extensive data to exist before building numerical models, and yet the same managers happily use descriptive/verbal models without the requiring extra data collection. He recognised that both verbal and mathematical models are abstract descriptions of the real world, and made the point that a maths model may be more orderly and precise but it is not necessarily any more accurate.

According to Forrester (1961) the first step when constructing a model is to get a reasonable structure to fit the descriptive knowledge of the system, after which plausible numerical values should be assigned. The great strength of a Systems approach is its ability to deal with this type of descriptive information, as Forrester wrote:

> (the Systems approach aims)... *"to explore systems behaviour outside of the normal ranges of operation. These ranges will be outside the region of any data that could have been collected in the past."*
>
> Forrester (1961) p.59

The sort of ranges that Forrester (1961) identified above can only be accessed if an organisation makes full use of its descriptive information, something that many organisations do not do. This particularly concerned him since he believed that ninety-eight per cent of the information in organisations takes the form of descriptions and experiences and only two per cent exists in the form of statistics and traditional

numericals. By adopting a Soft Systemic approach to measurement previously unmanageable descriptive information can be captured and put to use.

The use of descriptive knowledge implies that one will be dealing in relative magnitudes of factors, differing importance of factors and assumptions. Forrester (1961) firmly stated that descriptive knowledge can be translated into quantitative form, since mathematical and numerical notation is merely a language for expressing ideas. Hence this language will always introduce precision to a situation but does not imply accuracy:

> *"Attaching arbitrary scales and quantitative values to these concepts can provide orderliness without carrying any implication about accuracy."*
>
> Forrester (1961) p.451

Reducing the emphasis on accuracy meant that Forrester (1961), in common with the vast majority of Systems writers, did not place much stock in statistical tests of the numerical values of parameters. However he did think that statistical tests could be carried out, if worthwhile, only after:

1. The objectives of the model have been decided.
2. Boundaries of the significant system have been determined.
3. The pertinent variables have been chosen.
4. A hypothesis of the interaction of variables has been formulated.
5. An arbitrary judgement decision has been made about what constitutes passing the statistical test of parameter value.

Forrester (1961) p.119

Forrester (1961) thought of accuracy as an attribute that should be linked to the goals and objectives of the model being constructed. Broadly speaking he felt that there were two types of objectives for a model. If one wants a full explanation of the real world and

intends to use it to engage in predictions about the future, then a model must be both precise and accurate. However if one wants to construct a model in order to better understand a system and clarify thinking about a situation then the model is useful only if it represents what we believe about a situation. In this case the only requisite of the system is that it be precise.

7.1.3.b. Comment

The primary interest of traditional Systems Dynamics as represented by the work of Forrester (1961) is to use measurement in order to provide data for models of problems. Therefore one of the aims of a Systems Dynamics is to encourage organisations to make use of this model building approach. For many modelling automatically implies the need for accurate data and if this data is not available then the modelling process cannot proceed. Forrester (1961) argued that this was not the case; in doing so he made a number of interesting points in relation to measurement. The major revelation of the Systems Dynamics approach to measurement is the desire for, and the use, of descriptive information. Forrester (1961) believed that this type of descriptive information was largely ignored by most organisations, furthermore that this information is the most prevalent and most useful in the organisation. This type of information can be linked to the idea of qualitative information discussed in previous chapters, that it based on experiences, descriptions and organisational learning. It is this type of information on which models should be based, not just because it is more available, but also because it is more important.

Furthermore descriptive information can be translated into quantitative form. There has been a widespread misconception that data can only be expressed in quantitative form if it is accurate. The Systems Dynamics approach, and indeed the Soft Systemic approach described later in this thesis, strongly rejects this view. Mathematical and numerical notation is a language for expressing ideas it should not carry any implications about

accuracy. It does imply precision but this is different to accuracy, again a distinction that is not made often.

Tackling another misconception the System Dynamics approach does not subscribe to the idea that models can only be useful if they are based on accurate information. Accordingly the degree of accuracy of data needed for a model will depend on the objectives for the model. Essentially the issue resolves around whether one wants to make predictions or not. If one is interested only in better understanding the system then precision is all that is needed. Since Soft Systems thinking does not try to predict behaviour we could say that in a Soft Systems approach to measurement precision is a requisite property but accuracy is not. This is a theme that will be returned to later in the thesis.

7.1.4. Wolstenholme & Steerman

7.1.4.a. Review

Since Forrester (1961) originally presented the ideas of Systems Dynamics their use has spread to many different types of situations. Lane (1993) and Lane & Smart (1994) have tried to describe the current situations to which the methodology is applied as a way of placing the views of different writers and practitioners within the System Dynamics discipline. Essentially they have identified a shift of application into more soft areas. This shift represents a changing interest from the dynamic structure of the model and the application domain, to the behavioural characteristics that are commonly apparent in complex systems. Lane (1993) and Lane & Smart (1994) argue that there has been a growing recognition of the importance of using the System dynamics process to produce purely qualitative models e.g. Wolstenholme (1982, 1990) and Steerman (1984).

Wolstenholme (1990) stated that the choice of constructing a quantitative or qualitative model would largely be dependent on the softness of the situation. With the construction

of quantitative models becoming more difficult in softer application domains. However he stressed that the model is built to fulfil a purpose and so as long as there is agreement as to the relationships of the model by the group involved it satisfies its purpose. Consequently he wrote that the model is built to gain insight into the behaviour of the whole system and so precision as to the nature of the relationships are of primary importance, not statistical accuracy:

> *"It is considered that the shape of relationships is more important that their absolute, statistical accuracy and that in any holistic approach accuracy must often be sacrificed in order to remain problem orientated."*
>
> Wolstenholme (1990) p.48

So Wolstenholme (1990) believed that user agreement is more important than statistical accuracy when producing a quantifiable Systems Dynamics model. This idea has strong implications for the process of model validation. He recognised the importance of statistical replication techniques, however he felt that tests for the exact correspondence between a model's output and past data is only significant for models that are used for absolute, short term forecasting. Systems Dynamics models that are about multiple relationships and policies may be very different form past data. Once again he identifies user agreement as being the key the question of model validation:

> *"In Systems Dynamics models validity is seen as a more complex concept which centres on user confidence in the model."*
>
> Wolstenholme (1990) p.59

Sterman (1984) proposed a number of tests for validating Systems Dynamics models that are not primarily based on a statistical approach. These tests centred around three areas, a model's structure, behaviour and the arising policy implications. The first two are more traditional in nature since they compare the nature of the model with the real

world system, indeed some statistical validity tests may be carried out to investigate the behaviour of the model and system. The third aspect, policy implications, is a more progressive area of confidence testing since it investigates the use of the model. Here he indicated that one of the central issues is whether the model has led to an improvement in the real system. Hence the method of validation is linked to subjective assessment as to the usefulness of the information derived from the model.

Through Senge (1990, 1994) Systems Dynamics has become very publicly linked to research into Learning Organisations. Perhaps one of the best and most recent introductory papers on this subject is Sterman (1994). In this paper he passes comment on the act of measurement essentially describing it as complex and subjective. Before turning to the soft Systems writers it is interesting to contrast the call for objective measurement from the early hard Systems writers such as Paul Kircher (1959), with Sterman's (1994) modern 'hard' Systems view of measurement:

> *"The act of measurement introduces distortions, delays, biases, errors, and other imperfections, some known, other unknown and unknowable. Above all, measurement is an act of selection."*
>
> Sterman (1994) p.299

7.1.4.b. Comment

It may be argued that the quotation above shows how even the hard school of systems writers has recognised that measurement can be a subjective process. Indeed if it is to capture truly useful information then measurement must be subjective and qualitative. The overriding concern of modern hard systems writers seems to be the ability to provide useful insights in to the real world. Perhaps of all the contemporary systems movement their emphasis may be considered to be the most pragmatic. Their aim is to build purposeful models that lead to real world improvements. Therefore subjective / qualitative data may be used if it helps the model to influence the real world. Hence the

usefulness of the model to impact the real world is the overall arbiter of the approach. This sort of pragmatism is a key theme of the Soft Systemic approach to measurement proposed later in this

7.2. Cybernetics

7.2.1. Wiener & Ashby

Cybernetics is a strand of the Systems movement; the classical writers in this area are Wiener (1948) and Ashby (1956). Norbert Wiener's (1948) work is extremely technical in nature and is concerned with the science of communication & control. It is far less concerned with the application of this science in social systems, since this is the point at which the complex challenge to measurement begins Wiener's work is not investigated here. Ashby (1956) may be considered the second key cybernetic writer; he regarded measurements as representing parameters to be input to a cybernetic network. The complexities of measurement did not greatly concern him. When arguing that machine systems techniques could be applied to a free-living organism in a complex environment he wrote:

> *"The increase in the numbers of parameters does not necessarily imply any diminution in the rigour of the argument, for all quantities concerned can be measured with an accuracy bounded only be the experimenter's resources of time and money."*
>
> Ashby (1956) p.47

The concept that accurate measures are only influenced by the resources of time and money is not an idea that fits with many of the views presented in the rest of this Systems literature review. Perhaps as would be expected given the time at which they are writing neither Weiner (1948) nor Ashby (1956) have much to contribute in terms of measurement in complex social systems. Their view of measurement could be closely aligned with the traditional view of measurement.

7.2.2. Beer

7.2.2.a. Review

Stafford Beer (1981) provided one of the most detailed approaches of any Systems writer to performance measurement. Beer (1981) believed that the dynamics of the whole structure of the viable system model depended on the quantification of its performance, an activity evidently associated with measurement. He recognised that business had traditionally used money as a measure of achievement, specifically the measures of cost, price, and cash flow. Because of this practice he felt that business performance measurement has come to be identified purely as a cost-accounting function. He felt that there was no reason for this aside from history and alleged familiarity. In fact Beer (1981) felt the predominance of this cost-accounting type of measurement is damaging to the viability of an organisation since it encourages managers to sacrifice long-term viability for short-term results:

> *"From the corporate standpoint, divisional performance is about both short and long-term viability. The notion that cost should be minimised or profit maximised within a fixed epoch leaves right out of count other factors which are vital to the future viability of the business"*
>
> Beer (1981) p.162

Beer (1981) stated that organisations were apt to ignore the latent capabilities of the firm since these resources could either be built-up or squandered by management without causing any change in the costings. Hence mismanagement of these resources he advocated the need for a measurement system that took a more holistic approach to monitoring the resources of the organisation. He also recognised the need for another common measure to replace the old and familiar concept of money. Because of the short-termist nature of money and its emotional link with the appeal of profits Beer (1981) searched for a more pure measure of achievement, he settled on productivity.

Beer (1981) described the classic measure of productivity as the ratio of what is *possible* to what is *actual*. The example he gave was that of a typist. If a typist could type 100 pages in a given time, but actually typed 50 then his or her productivity is 0.5 for that period. This was what he called a pure number. Beer (1981) extended this simple idea to incorporate latent resources of a system by adding a third level of achievement to the equation, that of potentiality. Consequently his way of measuring performance has three levels of achievement that have to be assessed:

> **Actuality:** What we **are** managing to do now, with existing resources and constraints.
>
> **Capability:** What we **could** be doing, still at the present time, with existing resources and constraints.
>
> **Potentiality:** What we **ought** to be doing by developing our resources and removing constraints, although still operating in the bounds of what is known to be feasible.
>
> Beer (1981) p.162

Beer (1981) described three different types of planning that are associated with the levels of achievement defined above. **Programming** he thought was planning at the level of actuality, since it accepts the shortcomings of the situation and does not admit that anything imminently can be done about them. This level could also be described as tactical planning. **Planning by objectives** was planning at the level of capability, here organisations set goals and objectives and strive to meet them. This level could also be described as strategic planning. The final type of planning that Beer (1981) described was normative planning, here organisations plan to meet potentiality targets. Since this plan by definition must include the removal of existing resource and other constraints, it is at once the most fraught and yet potentially the most beneficial. Whatever the type of

planning they all make use of the relationships between actuality, capability and productivity, these relationships are displayed in fig. 7.1.. Here it can be seen that Beer (1981) viewed; productivity as the ratio of actuality and capability; latency as the ratio of capability and potentiality; performance as both the ratio of actuality and potentiality, and also the product of latency and productivity.

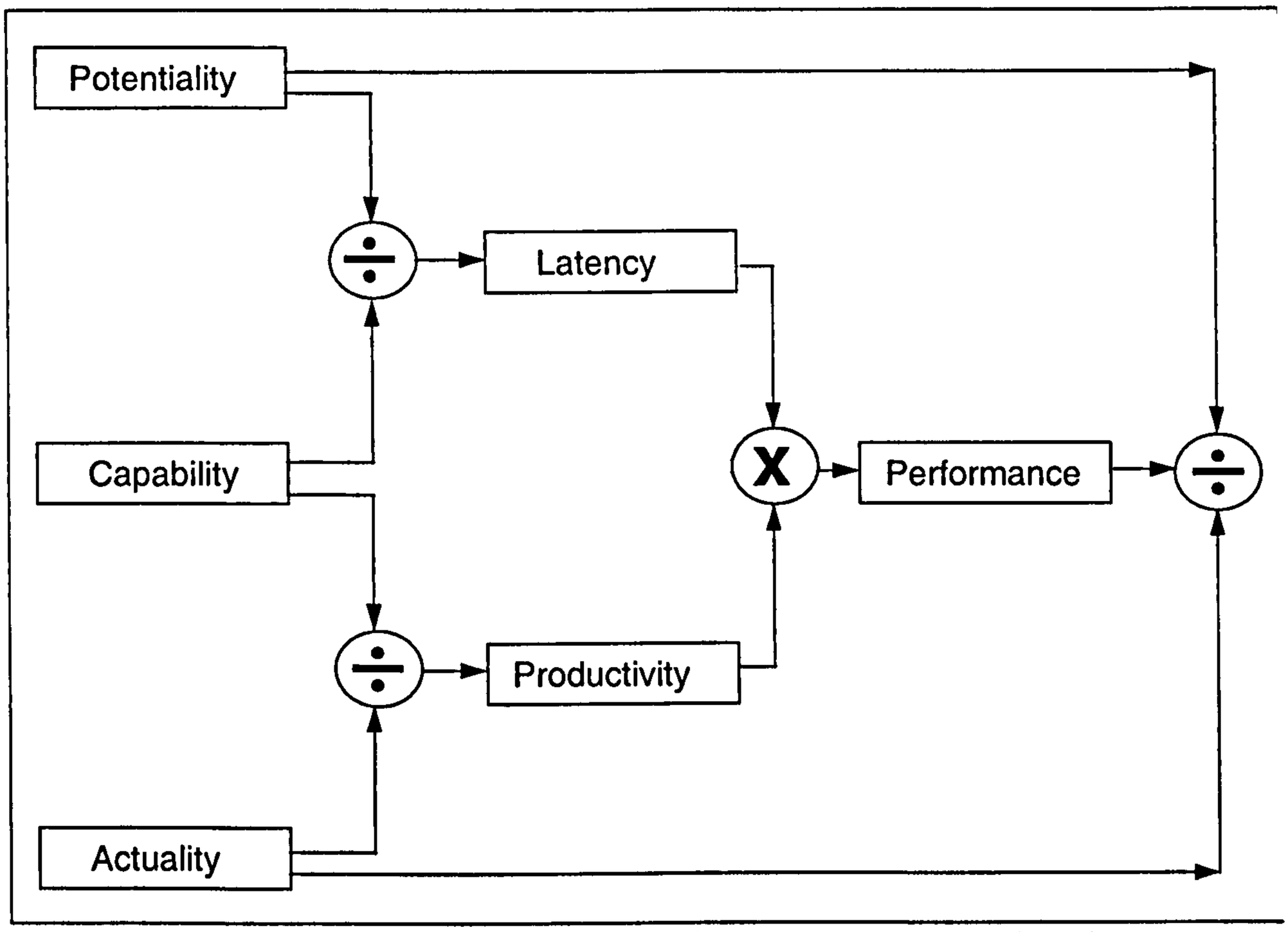

Fig. 7.1. Three measures of capacity generating three measures of achievement- Beer (1981)

Beer (1981) cautioned when using the model above that the numbers associated with the measures of capability and potentiality would be somewhat arbitrarily fixed. What mattered was that they could not be arbitrarily changed. Consequently the associated absolute values of productivity and latency indices would also be approximations, however their change from one position to another would reflect real change within the organisation. Clearly Beer (1981) saw the importance of measurement not as a means of

providing absolute values of factors but rather as means of tracking real changes in the system and its environment.

Aside from providing details of what a performance measurement systems should be Beer (1981) also provided information on the method of constructing one. For the most part this information is given in case study form. There are few who would disagree that the Chilean experience of applying the Viable System Model described in the Brain of the Firm (Beer (1981)) is not one of the most ambitious of all case studies. The main thrust of the Chilean experience was to use cybernetic principles and practices to control the Chilean social economy. At the heart of this plan was the use of computing power so that every factory in the nationalised social economy could be linked and monitored. Due to resource constraints this was to be done through the use of telexes in communication with central computing resources in Santiago, the system was called Cybernet. Each day the indices of performance would be sent by the factories to the central computers, where they would be processed and examined. If any sort of warning were implied by the data an alert would be sent back the factory.

The indices used in Chile were the same as those described above, the problem was how to identify to which activities in the factories they should be applied. Operational Research teams were assembled with the mission of constructing quantitative flow charts of the activities in each factory. These groups were tasked to identify all important activities e.g. state of input stocks of raw materials, output stocks of finished materials, any processes that might prove to be a bottleneck, employee morale. Once these measures had been identified they were presented to management who would then agree the values of capability and potentiality. In practice it seemed that each factory usually needed between ten and a dozen indices to adequately measure performance.

Aside from the description of the method of measurement this case study is interesting for two other reasons. Firstly, an obvious operational requirement was that the flow

charts assembled should work to the same format across the country. However this is certainly a practice that is not always adhered to as many organisations collect similar information that is reported in a different way in each subsystem. Beer (1981) believed that one of the strengths of the triple index productivity measure is that it can be used as a common measure across businesses. It seems that this desire for uniformity can be extended to a common means of reporting similar information. Secondly, Beer (1981) informed readers that management at each plant was free to add indices in addition to those identified by the OR groups. These indices would be calculated by the central computer in the normal way, however the management were not required to declare what the index measured. This seems be case study proof of the beginnings of the practice of empowering those being measured to be responsible for determining the information they need to do the job.

7.2.2.b. Comment

One key aspect of Beer's (1981) work is his criticism of current performance measurement practice, particularly the use of profit / money as a measure. He believed this places too great an emphasis on the short term and is a reductionist measure. However he did support the idea of having a single measure that is applicable across different areas of an organisation. In which case he advocated the use of measures of productivity, specifically actuality, capability and potentiality of productivity. Because of this his work is perhaps unique within the systems literature since it outlines a prescriptive approach to measurement. Such a prescriptive approach is not adopted by the Soft Systemic approach proposed later in the thesis because it tends to reduce the flexibility needed to deal with complex measurement situations.

Another area where Beer (1981) provides insight into measurement is his description of building measurement systems in the real world. The details of creating the measures in the Chilean businesses are interesting. It is noticeable that the local OR groups were given the job of identifying the specific indices which would measure the productivity

of their company. Hence even though there was a prescriptive high-level approach to measurement based on the three aspects of productivity, at the local level the process empowered front-line staff to determine the specific measures for the company. Hence the participative nature that is present in much of the Systems literature can be identified even in Beer's (1981) generally prescriptive approach.

7.3. Soft Systems thinking

This section draws on the work of Ackoff (1979, 1981, 1986, 1994, 1995), Churchman (1947, 1959, 1971), Warfield (1989), Checkland (1981), Checkland and Scholes (1990). Together their writings can be considered to represent the 'soft' Systems approach. The main thrust of soft Systems thinking is to recognise that the majority of problem situation are ill defined and messy. Soft Systems thinkers do not try to build quantitative models, instead they strive to deal with these situations by exploring the perceptions of the problem held by those involved with it. The short-term aim of a soft Systems approach is an accommodation of views brought about by better understanding of the problem situation. The longer-term aim is to promote continual organisational learning within the systems being investigated.

7.3.1. Churchman

7.3.1.a. Review

Churchman (1947) was one of the first to investigate measurement from a Systems science perspective. When trying to define measurement he offered an alternative definition to the commonly held belief that measurement is purely a process of quantification i.e. a process that assigns numbers to objects. He recognised the existence of qualitative as well as quantitative information and the need to measure both. Consequently he constructed a definition of measurement that concentrated not on the process of quantification but rather on the process of information generation:

> *"The function of measurement is to develop a method for generating a class of information that will be useful in a wide variety of problems and situations"*
>
> Churchman (1959) p.84

The importance that Churchman (1959) ascribed to information would not be questioned by the majority of Systems thinkers, however his incorporation of the process of information generation into the measurement process is at odds with those who might view this process as one that falls into the realm of an information system. Checkland & Scholes' (1990) diagram of an information system (fig (7.2)) reflects this view. Churchman (1959) viewed measurement "as a decision-making activity designed to accomplish an objective" (p.84). He identified four aspects that need to be considered in relation to measurement:

1. The selection of a language.
2. The specification of the items and their properties.
3. How the results can be used/standardised.
4. How to evaluate the results' accuracy and control.

Churchman (1959) p.84

Churchman (1959) went on to show that within each of the four aspects identified above a conflict exists between at least two properties that a measurer might find desirable. Hence a measurer is forced to make decisions between desirable aims where the emphasis of one aim results in the sacrifice of another.

The first issue is one concerned with the selection of an *appropriate language*. The language of a measurement system seeks to communicate to other people what the user must do to utilise the information contained in the measurement. So on initial inspection the aim of language is to promote the maximum utilisation of the information, but utilisation can mean different things. It can mean that the language must be simple so that as many people as possible can understand and hence utilise the information. However if the language is too simple it will not be able to portray fine distinctions in information and hence render the information less utilised. So the linguistic problem of measurement can be seen to be one where a measurer must make a decision that results

in the proper balance between breadth and depth of communication. The only way in which this type of decision can be made is with reference to the objectives and the actors of the system.

The *problem of specification* is to decide which objects are to be described and under what circumstances. Usually this involves such issues as those related to time, place and individuated items. Churchman (1959) saw another clear conflict of aims here centred on the economic aspect. Essentially he felt that every measurer is faced with the problem of balancing the costs of extending the application of measurement against the returns that may be gained from the increased information.

The third key aspect of measurement was what Churchman (1959) described as *standardisation*. Standards of measurement enable us to utilise information in a wide variety of situations, they provide a basis for adjusting experience in widely different contexts. The need for standards arises from the observation that not all human experience takes place at the same time or under the same circumstances. Consequently we need a mechanism to compare different experiences under standard conditions. One of the aims of standardisation is that it be simple, so that the minimum amount of adjustment is required when times, place and people change. However the other need for standardisation is that it be precise in order to differentiate the aspects of the worlds in which we live. Once again Churchman (1959) felt that it was not difficult to see conflict between the aims of simplification and precision. He described three broad levels of standardisation of data that could be chosen:

1. Data reports that remain invariant with time & place - minimises cost of adjustment but little precision, so little value when refined distinctions needed.
2. Rejection of data not collected under standard conditions - simple method but the waste of information may be very considerable.

> 3. Adjusting data by means of laws that define standards in terms of circumstance, observer and observer action.
>
> Churchman (1959) p.88

Without standards it would be necessary to provide details of all the circumstances surrounding the experience as well as providing the report of the experience itself. Therefore Churchman (1959) believed that standard conditions constituted a data processing device that simplifies the amount of data reporting provided. He concluded that the whole problem of constructing optimal standards is very difficult as both an operational and philosophical issue. Later Churchman (1971) returned to the problem of standards investigating it form a philosophical point of view. He was primarily concerned with the process of designing an inquiring system. He felt that for an inquiring system to measure it needed two things; unit and standard. A unit is a non-arbitrary, but a standard is arbitrary since it represents some standard to which a community has agreed. As he wrote (where G = a group of people):

> *"The measure of performance of a measuring system, M, is the degree to which M can design G into a Lockean community i.e. the degree to which differences about length among G's members can be resolved by M."*
>
> Churchman (1971) p.186

This agreement is usually achieved by being able to replicate the readings of a measurement system over a period of time. Once the measuring system reaches a degree of refinement where the readings are not equal, are not replicated over a period of time, then it is necessary for the variation to be analysed. The community must analyse the variance to see if it is significant or not. Hence the community can be seen to increase refinement, to create disagreement and hence create new agreement about new standards. Crucial to this process is the question of what the community will agree to be significant variance or not. Churchman (1971) argued that the significance would be

linked very closely to the teleology of the system. Hence the problem of standard definition is dependent on the perception of the teleology of the systems by its actors. Consequently the weltanshaung of the actors is critical to the process of standardisation.

Churchman (1959) again demonstrated the importance of the system's objectives and participants when he discussed the accuracy of measurement systems. He began by pointing out that accuracy is itself a measurement, in this case of the degree to which another measurement deviates from the truth. He stated that deviation from the truth has to be defined in terms of the use to which the information is put, this carries implications for traditional means of evaluating measures:

> *"Deviation from the truth must be defined in terms of the uses to which the measurement is put. This remark has the awkward consequence that accuracy is a highly relative term, the meaning of which depends on the individual decision maker."*
>
> Churchman (1959) p.92

So Churchman (1959) believed that general, statistical measures of accuracy need to be replaced, or at least joined, with measures that are more meaningful in specific situations. His interest in accuracy was triggered because measures of accuracy were, and still are, the means by which the performance of a measurement system is measured, it validity. Very early on Churchman (1947) realised that traditional measures of accuracy and validity would not meet the demands of the changing business environment. Chruchman (1947) made reference to the words of Edward Demming at a conference to investigate the meaning of measurement at which they both spoke, he recognised the result of any inspection procedure leads to some future action. This inspection procedure is clearly a measurement process that needs to be assessed, but Churchman (1947) felt the only way to do this is with was reference to the future action that would be taken as a result of the feedback provided by the inspection procedure:

> *"To evaluate the procedure, therefore, we must be able to evaluate the efficiency of this action with respect to our best interests."*
>
> Churchman (1947) p.109

The use of the term 'best interests' above is critical since it implies that some of form human judgement about its usefulness is the only way of evaluating the performance of a measurement system. This leaves the designer of the measurement system with the task of making presuppositions about the values of the actors within the system being measured. He or she must decide what purposes should be satisfied and what should not. The only guidance that Churchman (1947) gave at that time was to state that however human value is defined it should be done so in terms of the purposes of individuals. So a Soft systemic method of measurement would view accuracy as a relative term that is dependent on the way actors involved with a measurement systems use and view the information output from it. Also it seems that a Soft systemic approach views measurement as a decision-making process where the criteria for decisions are its objectives and its actors.

Churchman (1971) felt that there were three types of actors involved with a system; client, decision maker, and designer. He saw measurement as an integral part of the job of the systems designer. He saw the role of the designer as seeking to discover the underlying principle behind the client's trade-offs. They should do this by estimating a measure of performance to which numerical values of possible futures can be assigned. What he felt mattered to the designer was that he or she could make changes to components of the system so that the overall performance of the system is changed. Consequently Churchman (1971) identified two types of measures; one type that seeks to measure the overall performance of the system, and another type of lower level measures that measure the components of the system. Indeed he thought that a system

only becomes a system to a designer once it can be measured. He wrote that the system had to have the following three properties for this to be the case:

1. The Systems is regarded to be teleological and hence has a measure of performance M.
2. The System is regarded to have teleological components each with its own measure...m1, m2...etc.
3. The designer can conceptualise how changes in the component measures of performance produces changes in the performance of the overall system.

He identified three types of relationship between these component measures (m1, m2, m3...) and the total system measure (M):

1. Weakest - M is maximised only if m1, m2, m3.... etc. are all maximised.
2. Moderate - Where positive rises in any m1, m2, or m3...etc. leads to a rise in M.
3. Strongest - Where a mathematical formal expresses M as a function of m1, m2, m3...etc.

Churchman (1971) p.43

7.3.1.b. Comment

The works of Churchman (1947, 1959, 1971) must feature strongly in any review of Systems writings especially in relation to measurement. That he redefined measurement from an activity essentially to do with the process of quantification to one of information generation is paramount to a Systems approach to measurement. In a sense this redefinition represents the fundamental shift in thinking from which other issues become apparent. Churchman (1947) was one of the first to see that the process of measurement is not a straightforward one since it includes people, is complex and subjective.

Some approaches seem to imply that once the objectives of the overall the system have been set the objectives and process of the measurement system are also set. Churchman (1947, 1959, 1971) saw the role of measurement as the provision of information so the communication and usefulness of data becomes all important. He that a measurement is a decision making activity. Thus a measurement system is based on trade-offs between conflicting issues surrounding language, specification, standardisation and evaluation. He recognised that is not only a complex problem to identify what should be measured, it is an equally complex problem to determine how to measure and how to communicate the data. Here then he has identified two key problems for measurement activity; what should be measured, and what should the measurement system do? These are the issues that a Soft Systemic approach to measurement must help with, and hence those that this thesis must address.

Apart form the fundamental insights described above Churchman's (1947, 1959, 1971) work offers other interest to those concerned with measurement. Primary amongst these are his thoughts on the subjective nature of measurement particularly in relation to standards and accuracy. He drew a clear distinction between units that are non-arbitrary and standards with are arbitrary. Standards represent some standard of measurement to which a community agrees. If there is a variance in readings then a standard may have to be refined if the variance is considered significant by the community. Since a community is made up of people it becomes apparent that standards must be dependent on the perception of the teleology of the measurement system by its actors and their individual worldviews.

In the way above standards are shown to be based on the subjective agreement of a community of people. Churchman (1971) saw that this presented a problem to the designers of systems since they must make presuppositions about the values of the actors within the system. His only advice to designers on this matter was to state that human value must be defined in terms of individuals' objectives. From this we can

deduce that the values of those involved with the system need to be incorporated into the design of measurement system. Later in the thesis it will be seen that one of the major strengths of the performance measurement framework (SSPMF) advocated in this thesis is its ability to incorporate participants' values into the design of the measurement system.

Churchman (1959) thought of accuracy as a 'highly relative term', he wrote that accuracy was the measurement of deviation from the truth (p.92). The question that obviously springs to mind is whose truth? The very fact that question needs to be asked implies a degree of subjectivity surrounding accuracy that is not often recognised. He believed that the validity of a measurement system should depend on an evaluation of its efficiency at helping guide future action towards the objectives of the system being measured. This means that a measurement system must be evaluated in terms of how it assists with shaping future performance. This is in direct contrast with the retrospective methods of the more traditional statistical approach. The whole question of evaluation and validation is one that reappears through out this literature review and the thesis.

7.3.2. Ackoff

7.3.2.a. Review

Ackoff (1979) provides a good overview of his ideas about the difference between the machine and systems ages. The machine age is representative of a concentration on reductionism, cause and effect relationships against the background of a deterministic view of the universe. He contrasted this with the holistic, producer-product and objective teleology of the systems age. With regard to organisations he felt that they faced three interrelated problems: how to design and manage systems to effectively perform their own purposes, the purposes of their parts, and those of the larger system of which they are a part. He described these problems as self-control, humanisation and environmentalisation.

Ackoff (1981) points out that most measurement systems seem to be built around the **machine-age** assumption that the performance of the whole system can be reduced to an aggregation of the sum of its separate parts. Not only is this a reductionist approach, it also encourages organisations to optimise measurement of the separate parts of a system, usually in terms of quantity and accuracy. This over emphasis on measurement at high levels of resolution has meant that it is more common for modern organisations to suffer from an overload of information than a lack of information. Of even greater concern is that information that is genuinely linked to the performance of an organisation in terms of its objectives is rare and usually lost amongst an abundance of irrelevant information.

Ackoff (1986) extended the same point further when he wrote that management information systems are being designed with the wrong objective. He believed that this fault arises out of a common misperception about the needs of managers, namely that they require more relevant information. Ackoff (1986) recognised that the truly critical need of managers is to receive less irrelevant information. In order for this situation to be brought about he recommended that organisations should possess ways of filtering and condensing information (p.84). Before filtration and condensation can be used by an organisation it must have a good understanding of the information needed by its managers to make decisions.

Ackoff (1994) recognised the ability of measures to shape the behaviour of actors within organisational systems. He identified the key relationship between organisational change and performance measures:

> *"Therefore, if these measures are left unchanged, whatever else is done, behaviour will not change significantly and those changes that are made will not last long."*

Ackoff (1994) p.106

Another worry for Ackoff (1994) was that most measures currently in use in the business community are short termist in their nature. He found that too often efforts to maximise measures of annual performance were made at the cost of sacrificing future performance. When describing the performance measures that should accompany the multidimensional organisation, he stated that they should have two attributes. Firstly, that there should be some kind of uniform, explicit and unambiguous measure. This must incorporate some function of the profit generated and should be applicable to any function within the organisation. However, and secondly, he stressed that profit is not the only important performance characteristic and that other factors should be taken into account such as the development of the organisation, its stakeholders and its containing system.

Ackoff (1986) was worried about the affects of not giving managers the measurement capabilities they needed. He felt that the difficulty of measuring some attributes encouraged managers to mismanage situations by using ineffective measures. This tendency of managers to manage what they can measure rather than what they want, led him to urge the use of subjective measures:

> *" it is better to use imprecise measures of what is wanted than precise measures of what is not."*
>
> Ackoff (1986) p.35

Earlier Ackoff (1979) had written about the issues surrounding precision and objectivity, in his paper that passed comment on what he felt was the end of operations research (OR). He lamented that OR would not incorporate the arts and humanities because there existed a general misconception that this would reduce its **objectivity.** The concern of OR with objectivity is represented in the work of Kircher (1959) already

reviewed. Ackoff's (1979) attack on objectivity was two staged. Firstly he sought to show that techniques such as the significance testing of hypotheses are in fact value judgements. He stressed that the very act of choosing a significance level is a value laden judgement:

> *"There is a significance level at which any hypothesis is acceptable, and a level at which it is not. Therefore, statistical significance is* ***not*** *a property of data or a hypothesis but is a consequence of an implicit or explicit value judgement applied to them."*
>
> Ackoff (1979) p.54

Ackoff (1979) rejected other methods that claimed objectivity such as error estimation and pure, fundamental or basic research, all of which he argued involved some form of value judgement. Having dealt with the claims of objective methods he then drew attention to the work of others who had argued that objectivity, on the part of individuals, in the scientific sense is not possible. Kant (1929) and Jung (1926) respectively argued at a philosophical level that thought and observation could not be separated, and that neither thought nor observation could be separated from feeling, the source of value judgements. Churchman (1961) showed the validity of these arguments. Ackoff (1979) argued it is impossible to make the distinction between ethical-moral man and scientific man that the concept of objectivity requires. Since this concept requires human beings to act like machines, he stressed scientists can no more act like a machine than a machine can a scientist.

However Ackoff (1979) was not arguing against the existence of objectivity. He took issue with the idea of individuals being able to act objectively but believed objectivity to be a systemic property of the whole:

> *"Objectivity in **not** the absence of value judgements in purposeful behaviour. It is the social product of an open interaction of a wide variety of subjective value judgements."*
>
> Ackoff (1979) p.55

Essentially objectivity is a synergy that arises out of individual efforts that when taken together represent all possible value judgements. So, like certainty, objectivity is an idea that can be continually approached but never reached. For Ackoff (1979) objectivity is not a need for value free situations but rather value-full situations. From this we must be aware that subjectivity will always exist in measurement situations. Ackoff (1981) demonstrated this point well with an investigation of the problem of building performance measurement systems in business organisations. He identified a fundamental methodological problem; the effectiveness of performance indicators depends on how well they correspond with the real system, however there is no way to measure this. Therefore a subjective assessment must be made of how effective the performance indicators are. In this case the methodological problem centres around such issues as; whose judgement, made when and where; and, what confidence can be placed in the judgement?

From the discussion on value-full measurement above, the key would seem to be the involvement of as many relevant subjective judgements as possible. Where relevant can be defined as someone who is involved with the system being measured. This theme seems to run through much of Ackoff's more recent work (1981) (1994) where he emphasises the importance of democratising organisations and the full **participation** of workers. For example he wrote that managers should not be involved with;

> *"planning for or measurement of others: but enabling them to plan and measure for*

Ackoff (1981)

In the keynote address to the fourth United Kingdom Systems Science Society Conference, Ackoff (1995) continued to identify the importance of participation in the measurement process. Recognising that the aim of quality is to meet or exceed customer expectations he criticised current survey methods for discovering customer expectations, since very often customers themselves do not know what those expectations are. He felt that invention is the mother of expectation, and so expectations can only be revealed through the design process. Consequently it is necessary to involve the customers in a design process that creates an idealised design of the system. This is the only way that the aesthetics and ethics of the customers can be incorporated into the system. Ackoff (1994) had described the process above as interactive idealised design. He identified three requirements for the design process; technologically feasible; operationally viable; and capable of learning. Clearly the process of idealised system design has very important applications for the construction of measurement systems, these will be discussed in detail later.

Ackoff (1995) believed that the type of understanding that arises from actors participating in design can only be captured by synthetic (systemic) analysis. He identified four types of content of the human mind.

1. **Data:** consists of symbols that represent the properties of objects and events
2. **Information:** data that has been processed to be useful
3. **Knowledge:** contained in instructions e.g. answers to who, when, where, what?
4. **Understanding:** wisdom that explains a system by referring it to the purpose of the larger system of which it is a part

According to Ackoff (1995) the analytical approach reveals knowledge but does not provide us with understanding, what he terms wisdom. Wisdom can only be the product of a synthetic approach that views the system in terms of its contribution to the wider system of which it is a part. The purpose of mechanical and biological systems is to serve the function of the wider system as a whole; they have no individual purpose of their own. In a social system every level could, and probably would, have a purpose of its own. As such the system must be measured in terms of its effectiveness as well as its efficiency. Ackoff (1995) described this as making sure the system is doing the right thing as well as things right; he believed that analytical approaches concentrate on measures of efficiency, and that only the synthetic nature of a Soft Systemic approach can deal with effectiveness

7.3.2.b.

The whole thrust of Ackoff's (1979, 1981, 1986, 1994, 1995) arguments about measurement can be seen in light of his ideas on the systems and machine ages. Broadly speaking his writings indicate that he believes that traditional measurement is based firmly in the machine age tradition and that this renders it obsolete in many situations to be find in the Systems age. Ackoff's (1979, 1981, 1986, 1994, 1995) work is doubly interesting because he explicitly analyses the implications of his ideas on business organisations and he acknowledged the influence of measurement to shape the behaviour of a system. Essentially he believed that current business performance measurement leaves organisations with an abundance of irrelevant information and, or, information that encourages a short term culture which sacrifices future performance in favour of immediate profit.

The most striking feature of Ackoff's (1979) work for measurement is his attack on the traditional concept of objectivity. The desire for objective measurement is key to the traditional approach, however it is nigh on impossible to objective given the complexity

of some measurement situations. One can assume his support for the use of subjective measures, since to him all measures are subjective. The really interesting part of his argument is his concept that objectivity extends from o*f value-full* observations and not *value-fre*e ones. Following this argument the common Systemic theme of participation can be seen to increase the objectivity of measurement. This idea is incorporated into the Soft Systemic approach to measurement proposed in this thesis.

7.3.3. Checkland & Scholes

7.3.3.a.

Checkland and Scholes (1990) drew attention to the distinction between efficiency and effectiveness and argued that a Soft Systemic approach would include these measures and one other, efficacy. They wrote that the success of any transformation process could be judged on three different counts:

1. **Efficacy** - does the means chosen actually work in producing the output
2. **Efficiency** - is the transformation being carried out with the minimum amount of resources
3. **Effectiveness** - is the transformation meeting the long term aim of the system

Checkland & Scholes (1990) p.84

Earlier Checkland (1981) had demonstrated the importance he attached to measurement by making it the second requirement of his list of components of a formal system. Thus systems must have measures that signal progress or regress in pursuing objectives or purposes. Checkland's (1981) interest in measurement seems to have been driven by his belief that Systems thinking could not do without the idea of information, after all it is a 'distinction which reduces uncertainty' (p.315).

"Many would argue, in fact, that the concept of information is the most powerful idea so far contributed by the Systems Movement, comparable in importance with the idea of energy."

Checkland (1981) p.88

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attributing meaning to data in the context of the purpose of the system. This process of attributing meaning to data is shown in fig. 7.2. It is interesting that the process in the diagram starts with data already existing. This implies an assumption that recordings (data) can be collected objectively, i.e. free from interpretation. Checkland & Scholes (1990) reinforced this idea when they wrote that facts about the world could be stated neutrally:

> *"These are the givens of the world, the data which it yields to our inspection. But data do not keep their virginity."*
>
> Checkland & Scholes (1990) p.54

It is philosophical question as to the nature of the world as to whether data ever exists in a virgin state and many Systems writers would argue against this idea. Especially given the implication that measurement is, or can be, an objective process. This some what realist view of the world means that Checkland & Scholes (1990) do not dwell at great length on the issues of measurement, however their discussion on information systems had many relevant points. Indeed, according to one's definition of a measurement system, it is possible to interchange measurement system with information system in their discussion.

Checkland & Scholes (1990) stated that the common characteristics of all human activity systems are that they all involve human actors trying to take purposeful action. Since measurement is a human activity system, anyone engaged in measurement must recognise the crucial influences on the measurement system of the actors and the objectives that relate to the purposeful activity with which the actors are occupied. They recognised that information systems are human activity systems created to serve real-world action. They felt that there are two major consequences of viewing an information system in this way.

Firstly, the boundary of any information system must include the process of attributing meaning to data, thereby creating information. Since this process involves the perceptions and interpretations of human actors a fair degree of uncertainty is introduced into the system. Secondly, the design of the information system must pay attention to the purposeful activity it serves, and hence to the meanings which are relevant to the actors involved with that situation. Therefore it is important to understand how the people in the situation conceptualise their world especially with regard to the purposeful activity in which they are engaged.

Checkland & Scholes (1990) identified three areas that need to be addressed once the activity is better understood; what information would be needed for someone to do this job; from what source would this information be obtained, what form, what frequency; what information would be generated by this activity and what should be done with it?

They also commented on the process of defining performance indicators; they were worried that too often these were done without reference to the whole system. They stated that performance measures should never be one-dimensional, should never be plucked out of the air and should never be defined in a vacuum. They advocated a more holistic approach emphasising that measures become part of the description of a system and can not be usefully regarded in isolation.

7.3.3.b. Comment

The idea that data is available in the real world to be objectively collected is a surprisingly 'hard' attitude for soft systems thinkers. Given this belief Checkland & Scholes (1990) do not place great emphasis on the process of measurement itself which they see a distinct from the process of information generation, a process they do discuss in detail. The Soft Systemic approach to measurement proposed later in the thesis includes the process of information generation as part of the measurement process, hence there analysis is useful.

Key to the analysis of information generation is the concept that an information system is a purposeful system. The purpose of an information system is to provided information to influence the behaviour of the real world purposeful system it is describing. Here then information / measurement systems are linked to the real world systems they are monitoring and their validity is a function of how useful they are to those real world systems. Therefore the design of information / measurement systems must reflect the purposeful activity of the real world system of interest. Following from this one could argue that measures will one be truly relevant within the context of the overall real world system of interest which they monitor.

7.3.4. Warfield

7.3.4.a. Review

Warfield (1989) placed great importance in the need for good performance measurement. He told us that this concern arises out of the simple fact that it is impossible to define success independently of performance. Consequently he thought it was imperative to define measures at the same time as agreeing the objectives for the system. He warned that:

> *"too often objectives are defined without thought as to how their accomplishment can be identified."*
>
> Warfield (1989) p.157

According to Warfield (1989) the objective of the system will dictate the type of measurement to be used. He identified three types of objective each of which implies a different type of measurement:

1. Quantitative - Deterministic or Probabilistic measurement.

2. Binary-event - Logical.
3. Qualitative - Axiological

Warfield (1989) p.183

Deterministic measurement is used when it is possible to definitely observe that an objective has been met with certainty from numerical data. Probabilistic measurement is appropriate when there is insufficient data for certainty but the probability of attainment can be established. Logical measurement is used in situations where there is no measure of degree of attainment, but the event either did or did not happen so that objective attainment can be logically inferred to have occurred or not. Axiological is used when the objective is qualitative and so its attainment is very difficult to measure. Axiological measurement involves value judgements, attitudes, or opinions; usually this type of measurement is obtained through the use of interviews or surveys. Alternatively measurement for qualitative objectives is sometimes obtained by defining lower level supporting measures that are more specific and easily measurable.

Even when measures have been identified in association with the formation of the system's objectives there are potential pitfalls for managers. Primary amongst these is an inability to measure progress towards these goals. Often measures of attainment are defined but there is no way of assessing progress towards the goals of the system. So measures of performance should exist not only to record accomplishment of an objective, but also in some kind of intermediate fashion so that progress towards the goals can be monitored. This monitoring role is crucial to the type of performance measurement required by business organisations.

7.3.4.b. Comment

The key messages of Warfield (1989) are practical nature. He mainly deals with the problems of building measurement systems. He warns that as the objectives of a system are identified so at the same time should the measures of performance. This concept is

one also to be found in the management literature review. He also cautioned about choosing performance measures that represent the attainment of the goals of a system without enabling one to measure progress towards those goals. At a more conceptual level he argues that different types of measurement are possible within different types of situation. This is a key tenet of the Soft Systemic approach to measurement, proposed later in the thesis, which allows for different types of measurement to deal with the complexity of different situations. The concept that different types of measurement are permissible is in direct contradiction to the traditional approach to measurement.

7.4. Critical Systems Thinking

7.4.1. Critical Systems Thinking

The most recent wave of Systems thinking is based on Critical theory, Jackson (1991) identified five major commitments that that are embraced by Critical Systems thinking:

1. **Critical awareness** - closely examining the assumptions and values that enter into any system design, existing or proposed. Also understanding the theoretical assumptions of Systems methods, techniques and methodologies, and any strengths or weaknesses in application that derive from those theoretical underpinnings.

2. **Social awareness** - recognising social and organisational pressures that lead to certain Systems theories and methodologies being popular for certain application domains. Also contemplation of the consequences of using a certain type of Systems approach.

3. **Human Emancipation** - seeking to achieve for all individuals the maximum development of their potential, through raising the quality of work and life in the organisations to which they belong. e.g. work & society.

4. **Complementary & Informed Use** - of Systems methodologies in practice.

5. **Complementary & Informed Development** - of all varieties of the Systems approach.

Jackson (1991) p.298

Much of the work done under the umbrella of Critical Systems thinking has been concerned with doing critical analysis of existing Systems methodologies so that they can be incorporated into complementary approaches or meta-methodologies. This has meant that little has been written about measurement issues since these become more of a concern after the appropriate methodology has been chosen, however the work of Werner Ulrich (1983, 1987) is an interesting exception.

7.4.2. Ulrich

7.4.2.a. Review

The work of Werner Ulrich (1983, 1987) in the area of Critical Heuristics of Social Systems Design is one of the most comprehensive Critical Systems approaches. Describing this methodology he wrote that its aims are:

> *"to lay open, and reflect on, the normative implications of systems design, problem definitions, or evaluations of social programs."*
>
> Ulrich (1987) p.105

By emphasising normative content he wanted to ensure that designers were not only aware of the value judgements that flow into the practical propositions, i.e. such things as recommendations for action, design models, planning standards or evaluative judgements. But also those value judgements that exist for the context of application, i.e. life-practical consequences of those affected by the implementation. He believed that every chain of argument starts and ends with some judgements, the rational justification of which must be left open ended. Therefore Ulrich (1987) classed a system as being adequate only if it makes explicit its own normative content that underlies the justification break-offs. The system's designer must aim not at an objective but at a critical solution to the problem of boundary judgements. To help do this Ulrich (1987)

formed twelve boundary questions that should be considered, three of these questions are concerned with different aspects of measurement:

1. What is the actual purpose of the system's design, as being measured not in terms of the declared intentions of the involved but in terms of the actual consequences?

2. What is, judged by the design's consequences, its built-in measure of success?

3. Who is actually the decision taker; i.e. who can actually change the measure of success?

Urich (1987) p.108

Ulrich (1983) noted that there is always a measure of performance implicit in every system's design, but that it is not always the case that the designer is able to define it explicitly or even be aware of it. He also felt that it was vital that a distinction is drawn between the measures of performance of a system and its measure of improvement. He attached importance to this because he felt that there was a danger of a system, that is not the one that implementation is ultimately seeking to improve, improving its performance and becoming a surrogate client of the implementation. This would distract attention from the ultimate system to be improved:

"we should speak of 'measures of performance' only when the system to be designed is not the one to be improved; we should speak of 'measure of improvement' whenever the system in question is the one to be improved."

Ulrich (1983) p.228

Ulrich (1983) drew a distinction between those who are involved with a system and those affected by a system. His main concern was that the scientific rationality adopted by those involved with the system often frames the situation such that the rationality of those affected is judged to be illogical, or their comment is only sought concerning the agenda that those involved have set:

> *"It is only by giving equal status to the different rationalities of the involved and the affected that we can prevent the former from making themselves the judges who define measure of improvement."*
>
> Ulrich (1983) p.290

Hence the participation of everybody concerned with a system is a fundamental aspect of Critical Systems thinking. Those implementing a critical systems approach must not judge what is rational and what is not, witnesses from those affected by the implementation must not submit to *a priori* standards of rationality. These *a priori* standards usually coincide with those of the experts involved with the system. Ulrich (1987) was not deferential to the views of experts in relation to the crucial boundary definition:

> *"No amount of expertise or theoretical knowledge is ever sufficient for the expert to justify all the judgements on which his recommendations depend...the expert is no less a layman than are the affected citizens."*
>
> Ulrich (1987) p.111

7.4.2.b. Comment

The whole area of critical systems thinking is one that grew out of the consideration of the underlying impact of applying a methodology to a situation. Hence there has been little work specifically in the area of measurement, however the general tenets of critical thinking are applicable to measurement. It would be fair to say that the Soft Systemic

approach to measurement, proposed later in this thesis, draws strongly on the ideas of critical system thinking. One could argue that it seeks to be critically aware, socially aware, complementary and to some extent emancipatory within the measurement discipline. This argument is explored later in the thesis once the principles of the Soft Systemic approach to measurement have been introduced.

Ulrich's (1983, 1987) work offers a useful insight into how to implement a critically aware measurement system. He makes the case for ensuring that measures of performance are strongly linked to the system where improvement is sought, for at the end of the day this is their purpose. Perhaps key is his emphasis on the importance of both those involved and those affected by the measurement system. When dealing with people the design of measurement systems must incorporate the voice of those who will be affected by it. Here once again a Systems writer is calling for the participation of different viewpoints in the design process.

Finally the last quotation from Ulrich (1987) is a fine warning to would be experts in the field of measurement that in some areas they are the laymen. This message is reflected in the Soft Systemic approach to measurement, proposed later in the thesis, and the SSPMF. The framework is far from prescriptive and relies on the experts at the frontline, the affected workers, and customers to fill in much of the detail of the measurement systems i.e. in systems terms to identify the boundary judgements.

7.5. Soft Systemic measurement themes in the Systems Literature

This section seeks to draw together the key themes about measurement in complex human activity systems from the preceding review of the systems literature. These themes are drawn from the Soft Systems thinkers and fit with the approach to measurement taken by such writers, hence they are best described as Soft Systemic measurement themes. Individually some of the themes can be found in the review of the writings of some of the Hard Systems writers, but for the most part these writers reflect the traditional view of measurement described in chapter three. All the Soft Systemic themes could be found in the review of the Critical Systems approach. However they do not go far enough in terms of the emancipatory requirement of Critical Systems thinking to be collectively described as a set of Critical Systemic measurement themes. It can be argued that these themes represent basic the starting point for the task of articulating a Soft Systems based approach to measurement, as is the remit of this project. The key Soft Systemic measurement themes in the Systems literature are:

1. Use of subjective / qualitative measures
2. Recognition that measurement systems exist for the sake of the systems they are monitoring
3. Participatory design of measurement systems
4. Critical awareness of the effects of measurement

Each of these themes is considered in more detail below, with examples of where each concept is reflected in the Systems literature.

7.5.1. Use of subjective / qualitative measures

The use of subjective, or qualitative measures, is a theme reflected in most of the schools of thought within the Systems literature. The sentiment crosses from harder

writers such as Jenkins (1972), Forrester (1961) and Wolstenholme (1990) to the softer writers such as Ackoff (1979, 1986) and Warfield (1989), and the critical heuristics approach of Ulrich (1983, 1987). This concept is entirely at odds with the traditional view that measurement must be objective. The endorsement of subjective / qualitative measures enables the Soft Systemic approach to measurement, proposed later in the thesis, to be far more flexible that the traditional approach.

7.5.2. Recognition that measurement systems exist for the sake of the systems they are monitoring

Most System's writers are very clear as to the purpose of measurement, it exists to help bring about a desired kind of behaviour in the real world system of interest. This concept may be found in the work of Kircher (1959), Jenkins & Youle (1972), Sterman (1984), Wolstenholme (1990), Churchman (1959, 1971), Ackoff (1986), Warfield (1989), Ulrich (1983). Accordingly measurement is by no means an end in itself. Indeed measurement must be viewed in the context of the real world system of interest.

It is the strong reference to the system of interest that enables the Soft Systemic approach to measurement to be more flexible than the traditional approach. Since it may be argued that, for a Systems thinker, the final validity of a measure stems not directly from its accuracy, but from its use to the real world system of interest. Hence measurement must be viewed as an information generating process, Churchman (1959), with all the subsequent implications, Checkland & Scholes (1990). This concept is one endorsed by the Soft Systemic approach to measurement proposed later in this thesis.

7.5.3. Participatory design of measurement systems

Participation is the third common theme of the Systems literature. Perhaps not surprisingly it is more of a feature of those writers who might be considered in the soft stream of the Systems literature. Despite this some credence is paid to the idea in

Jenkins (1972), and Beer (1981) relies on local staff to identify local measures. However the main proponents of a participatory nature for measurement within the Systems literature reviewed are Ackoff (1981, 1994, 1995), Checkland & Scholes (1990), Warfield (1989), Jackson (1991) and Ulrich (1983, 1987). The last two writers are representative of Critical Systems Thinking (CST), given the emancipatory tenet of CST one would expect all such writers to be in agreement with participative measurement.

7.5.4. Critical awareness of the effects of measurement

The final key theme from the Systems literature reviewed is that one needs to be aware of the effect of measurement on the behaviour of the real world system of interest. This is the sort of message that one does, and would expect to, hear from the CST writers such as Jackson (1991) and Ulrich (1983, 1987). It also a feature of the work of other writers not within the CST stream such as Checkland & Scholes (1990) and Ackoff (1994). Recognising this theme is not the same as endorsing all the tenets of CST, however it does stress the idea that the act/existence of measurement will have an affect on the behaviour of social systems. The Soft Systemic approach to measurement, proposed later in this thesis, both recognises and seeks to appreciate this influence.

7.5.5.Summary

Although each of themes can be arrived at independently as logical conclusions from an analysis of the review of Systems literature in relation measurement, it is also possible to trace a logical argument linking the four key themes. When one accepts the possibility of subjective measures the traditional forms of validation for measurement, based on accuracy, become redundant. Hence a new method of validation is needed, the logical step is to say that if the measures are useful, i.e. are valued by the real word systems of interest, they are valid. Therefore the measurement process must become more participative, both in terms of design and operation, since the actors within the real

world system of interest validate the measurement system. If measurement is now viewed as participative process, thereby involving many people related aspects, it is necessary to seek to understand the effect of measurement on their behaviour, be critically aware.

7.6. Chapter Summary

The aim of this chapter was to review literature representing the key areas of the contemporary systems movement as defined by Jackson (1991) whilst paying particular attention to the Soft Systems writers. Hence writers within each of the areas of hard, cybernetic, soft and critical systems thinking were reviewed with reference to the topic of measurement. Differences in approach were to be expected and did exist. Four key Soft Systemic themes were identified, some of which were also in Hard Systems writing and all of which would be endorsed by Critical Systems thinking. These were:

1. Use of subjective / qualitative measures
2. Recognition that measurement systems exist for the sake of the systems they are monitoring
3. Participatory design of measurement systems
4. Critical awareness of the effects of measurement

It was argued that these key themes represent a basic starting point for those striving to articulate a fuller Soft Systemic approach to measurement, as is done later in this thesis. Indeed these themes were the entry point for the first cycle of the action research element of this research project described in the next chapter.

Throughout the chapter an effort was made to separate *comment* from the *review* of writers' work on measurement. This was done since it is believed that nowhere before has the Systems literature been reviewed from a measurement perspective. Consequently the chapter has a dual role. To be a general record of Systems' writers views on measurement, as well as a basis for specific comment in the context of this project and the Soft Systemic approach proposed in later chapters of this thesis.

Chapter Eight: *Case study 1: Personal Financial Services*

8.0. Introduction

This case study represents the first attempt to use the Soft Systemic approach to measurement within a real business context. Hence it marks the first major contribution of the 'action' strand of the 'action-research' methodology followed by this research project.

The Soft Systemic approach applied was based on the key measurement themes identified in the review of Systems literature, these being:

1. The use of subjective / qualitative measures
2. Recognition that measurement systems exist for the sake of the systems that they are monitoring
3. Participatory nature of measurement systems
4. Critical awareness of the effects of measurement

The themes above were used to shape the work done in the business performance measurement situation detailed below. It should be stressed that the themes were only a starting point for the Soft Systemic approach that is defined and applied later in this thesis. The team involved with the measurement project were made aware of the Soft Systemic themes at the beginning of the project as concepts that should guide their work. The themes were also used to assess progress at the end of each stage of the project.

8.1. Situational Analysis

PFS is the personal financial services arm of one of the major UK high street banks. It is mainly involved with selling pensions, life assurance, insurance of different types and personal equity plans (peps). Their parent group has recently been bought by an international bank, which has set PFS very aggressive growth targets. The stated primary goal of PFS is:

> *'to become the most successful provider of quality personal financial services in the UK, so as to deliver substantial and growing fee-based profits.'*
>
> PFS, Internal Document 1(1994)

The strategy to achieve growth is to manage profitability through close understanding of customer requirements and how their internal systems and processes are meeting customer requirements. PFS had a new Quality Development Director to oversee the integration of their processes and quality measurement systems. As part of the quality vision to build a competitive advantage based on customer intimacy and reinforced by operational excellence, they were interested to see what a systems approach might offer. Three stages to the project were outlined:

- Stage 1: To identify what the objectives of the measurement system should be
- Stage 2: To identify the business performance measurement system to be used
- Stage 3: To implement the new performance measurement system across PFS

8.2. Stage 1: Objectives of the Measurement System

8.2.1. Description of the work:

The initial stage of the project at PFS was to develop an idea of what was required from the measurement system. After two brainstorming meetings with the quality development director and representatives from both the finance and marketing departments, it was decided that PFS should be concerned with four generic objectives for its performance measurement system:

- Monitor Strategic Performance
- Generate Action
- Promote Organisational Learning
- Assist in Strategy Development/Adoption

It is a basic requirement of any performance measurement system that it **monitors performance**, however it is important that it does not measure simply for the sake of measuring, information provided must be relevant. Consequently, the measurement system had to be based around strategic performance indicators that closely relate to PFS' strategic performance. These Strategic Performance Indicators (SPIs) are behavioural indicators that link directly with the strategic objectives of the firm; ideally they have a very short lead time between strategic implementation and its measured effect. For example the number of leavers as a function of the total sales force is linked to the strategic objective of retaining experienced staff and hence increasing sales.

There are two aspects with regard to **generating action**; one concerns the provision of relevant information and the other the internal alignment of the firm. Data collection is of no use unless it can be transformed into business information. To be useful as information it must enable users to identify problem situations and track their causes. It must also

provide the right type of information to the right type of people, since the role and type of information required for different activities and processes within the organisation will be different. It is for this reason that a measurement system must provide separate outputs for the different levels of the organisation, preferably in a cross-functional and process oriented manner. As regards the internal alignment of the organisation, it is crucial that the vision and strategy are directly related to the performance measurement system. Since the strategic plan will usually consist of a set of measurable goals the performance measurement system must be able to monitor these. The measurement system should not only be viewed as a reactive assessment of performance, it is a proactive tool through which a firm can shape the actions and culture of its people.

Organisational learning is the process by which common mental models of the strategic objectives and values of a firm are developed with the aim of improving performance at the individual, team and company level. In most literature about this area there is a definite link with the ideas of organisational alignment and commonality discussed above. Indeed Senge (1992) identifies the need to learn about your firm and from this to build a shared vision as the keystone to business success. In order to learn information about the subject must be gathered and interpreted, so an organisation's measurement system will feed directly into and reinforce a firm's learning process.

The last objective of the measurement system was that it should assist in the **development and adoption of PFS' strategy**. The high-level strategy formulation on such issues as corporate values, core businesses, industrial sector, competitors, macroeconomic environment, time, processes, and organisational structure was in place and the new strategy was ready to be rolled-out to all levels of the firm. It was felt that the new business performance measurement system should be an integral part of the strategy roll-out. So the aim of the roll-out process was to generate ownership of the new strategy and performance system so that the firm's actions assist strategy implementation. There was discussion around three values inherent in a successful process of this sort; agreement, involvement

and practicality. It was agreed that the development of the new measures could be a useful way of breaking down barriers and forcing people to take responsibility for the new strategy. Finally it was recognised that no single set of measures will be applicable throughout an entire firm, specific areas must be allowed to develop their own measures for their own goals.

8.2.2. Stage One & the Soft Systemic approach to Measurement:

The first of the Soft Systemic approach to measurement themes **is the use of subjective / qualitative measures**. Since this stage of the project was primarily involved with the objectives of the measurement system and not the specific measures to be used there was little activity with regard to this theme. However it is worth noting that there was a general belief that qualitative / subjective measures would likely be part of the eventual business performance measurement system. Indeed an important guiding principles of this stage of the project was that the objectives for the measurement system should not be limited to only those that could be met from the use of traditional measures i.e. those that are both objective and empirical.

The second Soft Systemic approach to measurement theme is the **recognition that measurement systems exist for the sake of the systems they are measuring**. This theme had the most relevance of any of the four for this stage of the project, since it deals with elucidating the objectives of the measurement system. Based around the concept that measurement is a purposeful activity the team were forced to articulate exactly what the purpose of building the measurement system was. The initial answer to this question was to 'measure the performance of the business', however it was seen that this objective was a 'catch all' that hid the actual reasons for doing the measurement. After further investigation it became clear that the driving force of the new measurement system was the desire to align performance measures to the new strategy, but again this objective clouded the reasons actors within the measurement situation desired a new measurement system. It was necessary for the project team to articulate to what end the measurement system

should be aligned to the new strategy. Only at this third iteration were the underlying reasons for the new measurement articulated.

The essential feature of the measurement situation was that the key challenge facing PFS was to shift from implementing the old strategy to the new one. Therefore the new performance measurement system should help contribute to this key business objective. The new strategy required risk taking and fast growth, where as the former had emphasised cost control and fostered a risk adverse culture at PFS. The existing performance measurement system reinforced the old strategy and so was acting as a block to the successful implementation of the new strategy. The quality director and the project team believed that creating a new business performance measurement system based on the new strategy would remove this barrier, and so assist the adoption of the new strategy. It was believed that the successful implementation of the new strategy would require a significant shift in the way people at PFS made sense of their jobs. In other words, the words of a Systems thinker, successful adoption of the new strategy would require the people at PFS to change mental models.

Once the aspects of the measurement context described above had been made apparent the project team found it relatively easy to articulate the four objectives of the new business performance measurement system. Essentially these came down to: a need for the measurement system to monitor strategic performance (based on measures that reflected the new strategy of growth); a means of guiding and inspiring action that supported the new strategy; a source of information that would challenge existing mental models at PFS; and hence assist in the development and adoption of the new strategy at all levels within PFS.

Once the objectives of the measurement system had been articulated the importance of the third theme of the Soft Systemic approach to measurement became apparent. **Participation on the design of the measurement system** would be critical if the new

measurement system was to help organisational learning and help with the adoption of the new strategy. It was envisaged that the different levels and business units of PFS would develop the specific measures that best related to the new strategy for their specific context. It was hoped that as they did this they would learn more about the new strategy and foster a change in the way they behaved.

The final theme of the Soft Systemic approach to measurement was the need to create a **critical awareness of the effects of measurement.** As the articulation of the objectives of the new measurement system became more refined, it became evident that the project team were explicitly intending to use the measurement system as a lever to bring about change in behaviour at PFS. The intention being to influence behaviour away from the old strategic emphasis of cost control and caution to one of greater risk and rapid growth.

8.3. Stage Two: Identification of the Business Performance Measurement System

8.3.1. Description of activities:

Having established the objectives of the new PFS measurement system the team searched for a framework/measurement system that best suited their needs. As a result, a review of the performance measurement system currently being proposed in management consultancies and writings was undertaken. Three popular measurement frameworks were investigated: Metapraxis, Coopers & Lybrand, and the Balanced Scorecard.

The **Metapraxis** framework aims to integrate traditional measures with non-traditional, future oriented, qualitative, operational and outward looking indicators. It seeks to identify upstream performance measures such as quality, market share, stakeholder commitment, and competitor activity. It works on the assumption that these upstream measures will help firms to make earlier and more informed predictions about the traditional downstream performance indicators such as profit and cash flow. The framework builds measures in; markets; customers; products; projects; stakeholders; financial outcomes.

Coopers & Lybrand believe that most firms suffer from an information gap that makes it difficult to transfer strategic objectives into actual business performance. They maintain that to fill this gap performance measurement should be balanced, relevant and consistent. Measurement must focus on processes, finance, customers, continual learning and the external environment. Consequently the complete picture of business performance would show; information based on business priorities; key information highlighted; information which serves several functions and business processes; accountability for performance clarified; timely and actionable information.

The **balanced scorecard** (see chapter three) developed out of a study that aimed to identify the organisation of the future and its performance measurement requirements. It

was felt that most organisations of the future would exhibit; cross-functional integration; customer/supplier linkage; global scale; continuous improvement; and rising levels of indirect labour (knowledge workers) in the organisation. They emphasised the importance of shareholder value and the drivers of shareholder value; quality, service and time. The balanced scorecard advocates six key principles:

1. Measurement should be balanced so that the areas that create shareholder value are assessed.
2. Customer satisfaction, as the key value driver, should be monitored in terms of quality, cycle time and service.
3. Financial measures of performance should include shareholder value calculations.
4. Organisational learning as demonstrated by the rate of change in performance should be measured.
5. Measurement is a 'top-down' process and should be directly linked to the firm's vision and strategy.
6. Future performance measurement systems must link the individual worker to vision and strategy. Therefore all levels of the organisation must have access to information if the firm is to become truly aligned.

The balanced scorecard targets four crucial areas in which firms must build performance measures. Of primary importance is the area of **customer satisfaction**; it advocates that firms measure cycle time, the basic elements of time that define the company's ability to satisfy customer requirements, quality, and service. **Business process** is the next area and the scorecard pinpoints product design, product development, manufacturing/building and marketing. The **shareholder value** box should measure cash flows adjusted for risk and timing. Finally in the **organisational learning** box the framework recommends that market innovation, continuous improvement and intellectual assets should be measured. The developers of the framework advocate a three stage, closed loop development process.

Firstly, to develop the vision by executive sponsorship, iteration, cascading goals and goal congruence. The next stage is a process of empowerment to give employees the information, skills and incentives to continuously improve. The last stage is the development of an Executive Information System as the to bind together the firm's vision, empowerment, and performance goals.

Each of the frameworks outlined above have a different conceptual base. The Metapraxis framework is really interested in developing upstream predictors of downstream performance. The Coopers' framework identifies an information gap and tries to fill it. Both the Metapraxis and the Coopers' framework are concerned with the present. The balanced scorecard is designed to deal with the future requirements of a performance measurement system. The balanced scorecard provides the most highly developed set of principles and measurement criteria. It clearly states that performance measurement must take account of shareholder value and the value drivers. Furthermore these must be measured with reference to customers, business processes, organisational learning and the financial perspective. Despite this prescriptive approach, problems have been identified when firms have tried to use the balanced scorecard at the very top and very bottom of organisations. Mostly these problems seem to arise from an inability to identify processes at the high level and the need for specific procedures at the lowest level. It is important that firms resist the temptation to just fill in the boxes.

The other frameworks are less prescriptive, however they do identify general areas of importance. Both the Metapraxis and the Coopers' frameworks have detailed implementation procedures, particularly Coopers' that lays out a step-by-step approach. The balanced scorecard leaves most of these issues up to the individual firm, only offering a very generic implementation process. This may be due to the radical nature of the balanced scorecard in terms of the actual performance measures. Metapraxis and Coopers' are essentially building existing measures into new frameworks, whereas the balanced

scorecard calls for a review of all measures and recommends that new measures be developed.

In conclusion a firm that is interested in identifying early predictors of business performance would be best suited by the Metapraxis option. The Coopers & Lybrand framework would serve one with cumbersome systems that lack relevant information most usefully. Finally, a firm that is facing major change in its operating environment would find the balanced scorecard the most effective.

When the project team reviewed the four objectives articulated for the PFS performance measurement system, it was agreed that the balanced scorecard was most closely aligned of the measurement frameworks. The strong emphasis that the framework places on aligning measures to Strategy would ensure that the measurement system did monitor strategic performance. Also as staff were involved in developing the measures for the different business units and levels their familiarity with and adoption of the strategy should increase. The need to generate action would be attended by providing information across all aspects of the business, through the four boxes on the scorecard. In light of the fact that one of the scorecard boxes is specifically concerned with organisational learning, it was anticipated that the framework would focus greater attention on such learning at PFS. Also it was felt that if staff were involved in defining measures for their business unit and level, as the balanced scorecard framework recommends, they would be more likely to select measures that were directly relevant to their responsibilities. In other words they would be best positioned to relate measures to their everyday activities.

8.3.2. Stage 2 and the Soft Soft Systemic approach to Measurement:

As a final check on whether the Balanced Scorecard was indeed the best performance measurement framework to be used at PFS, it was reviewed in terms of the four themes of the Soft Soft Systemic approach to measurement.

The first theme is the **use of subjective / qualitative measures.** The Balanced Scorecard has no difficulty with this concept, indeed it positively endorses such measurement through the presence of the customer satisfaction box in the framework. Measures in the customer satisfaction box would very often be subjective / qualitative in nature. The Balanced Scorecard is fully congruent with the concept that there should be **participatory design of measurement systems.** The recommended implementation process of the framework is to enable teams in the different business units and at the different levels of the organisation to define their own balanced scorecard, provided it is reflecting the overall strategy.

The strong emphasis placed on aligning measures to strategy and the multi-dimensional view of the business fostered by the balanced scorecard, seemed to reflect the view that **measurement systems exist for the sake of the systems they are monitoring.** The strong link between strategy and measurement is evidence that the Balanced Scorecard aims to use measurement to reinforce behaviours that can be linked to implementation of the strategy, which was in this case the objective of the overall system. Hence it can be argued that framework is **critically aware** of the effect that measurement can have on the behaviour of the system of interest.

8.4. Stage 3: Implementing the Balanced Scorecard at PFS

8.4.1. Description of activities:

After some deliberation the internal PFS group settled on the measures shown in figure (8.1). At this point the project was handed over to a smaller group who were given the responsibility of implementing the balanced scorecard concept throughout PFS. It was originally envisaged that this group would facilitate and liase with a number of cross-functional groups who would build a balanced scorecard for each of PFS' major business processes. However the cross-functional, process oriented groups were never set up and individual functions began to build separate balanced scorecards. As a result when the first balanced scorecard was published it was a document of twenty pages that added little value to PFS.

Financials	***Growth & Development***
•Contribution •Cost/Income Trend •Costs vs Budget •Income vs Budget •Headcount vs Budget	•Projects •Salesforce Growth •Salesforce Turnover •Training Days •Product Mix •Communications
Customer Satisfaction	***Business Efficiency***
•CFI Score •Investment Performance •Penetration - Depth/Breadth •Complaints •Market Share •Customer Retention	•Product Profitability •New Business Pipeline •Premium Collection •Teleservicing

Fig.8.1. PFS Balanced Scorecard

During discussions at our final meeting with the group responsible for implementing the balanced scorecard they felt that there were two major problems barring successful implementation; a lack of general ownership of the Balanced Scorecard, and difficulty in developing cross-functional and process driven measures. They attributed many of the problems to the members of the implementation team being middle management and that they had been given very little follow-up support from senior management after the initial phase of the program. Also since the implementation team largely consisted of members of the finance department, they felt that the rest of PFS viewed the balanced scorecard to be another example of the finance department trying to control the others.

These two points accounted for the lack of ownership of the project, consequently any type of cross-functional activity was made extremely difficult. Given this situation, the group felt that the best way forward would be to ensure that the Executive Management Team would be seen to be using the balanced scorecard. Also that the balanced scorecard would be the means by which the strategic review would be rolled-out from the senior level to the rest of the organisation, and that cross-functional and process driven measures are developed by cross-functional teams.

Two of the members of the implementation team attended a conference entitled 'Integrating Financial & Non-Financial Measures'. Drawing on the knowledge they gained at the conference and their experiences at PFS, they felt that the salient features of implementing a balanced scorecard were:

- *Performance measures should be driven from the company's strategy/vision.*
- *The implementation of the Balanced Scorecard should be undertaken and controlled by senior management (dedicated to this role) from all areas of the business.*

- *The introduction of the Balanced Scorecard represents a complete change in culture for every business.*

- *It is fundamentally a new approach to running the business and alignment between each part of that business is imperative.*

- *It is preferable for measures to be primarily non-financial in their nature.*

- *It could not and would not happen overnight.*

- *The measurement and management of customer satisfaction is the key to success in the 1990s.*

PFS, Internal Document 2(1994)

The first stage of the project successfully outlined the key objectives for the measurement system. At the end of stage three, the implementation stage, it was possible to review the measurement system in light of those objectives. These objectives are reviewed below.

The first objective was to **monitor the strategic performance** of PFS. The key to the new strategy was aggressive growth, however this is not apparent when the measures within the PFS scorecard are reviewed. The measures in the financial box included many measures that reviewed performance in relation to budget, the over-emphasis on cost control and managing through budgets was exactly the sort of behaviour that the new strategy was trying to de-prioritise. So at PFS the balanced scorecard was monitoring performance, but not strategic performance. Consequently the second objective was undermined, that the performance measurement should **generate action**. The measurement system would influence behaviour and prompt actions, unfortunately these actions would be to reinforce the old behaviours not those needed to implement the new strategy.

Another objective of the measurement system was that it should assist in **strategy development and adoption** at all levels of the firm. The participatory design of the measurement system was aimed at supporting this since an understanding of the strategy would be necessary to define measures for inclusion on the balanced scorecard. As teams throughout PFS developed their scorecards they would be thinking through the implications of the new strategy for their daily work, and hence the organisation would be going through a process of organisational learning. In actuality, the roll out of the design process was not implemented successfully, such that the importance of populating scorecards with the measures that reflected the strategy was not made clear enough. Hence the design of the scorecard did not foster development and adoption of the new strategy, nor did it initiate a process of organisational learning at PFS.

The second aspect of the scorecard that was supposed to encourage **organisational learning** at PFS was the monitoring organisational learning. Unfortunately in the final design agreed by the project team this box had been renamed the 'growth and development' box. Hence the impetus that this would have given to organisational learning efforts in the firm was lost.

8.4.2. Stage 3 and the Soft Systemic approach to Measurement:

Looking back at the performance measurement system eventually implemented at PFS it is possible to identify the influences of the Soft Systemic approach to measurement. The final system did include subjective / qualitative measures; the design and implementation process of the measurement system was participative; the framework was critically aware in that it was recognised that it would influence behaviours. However the final system did not meet the objectives articulated by the project team, in other words it did not support the system that it was monitoring in the way that had been desired. The final stage of the PFS provided a number of key lessons for the

development of a Soft Systemic approach to measurement, these are discussed in the next section.

8.5. Case study 1: Lessons Learnt

The PFS work was the first attempt to use a Soft Systemic approach to measurement in a real world setting. The approach was at a very early stage in its development and consisted only of the four themes that had been distilled from the review of the Systems literature. The use of these themes to guide the development of the performance measurement system at PFS yielded some valuable lessons that have influenced the development of the fully fledged Soft Systemic approach to measurement presented later in this thesis.

8.5.1. Use of qualitative / subjective measures:

Of the four themes identified from the Soft Systems literature this is the one that creates the least number of issues when applied in the real world. Measurement practitioners in the real world, particularly in the business area, have been using qualitative / subjective measures for a long time. The members of the project team from PFS did not need convincing that they should use qualitative / subjective measures in the measurement system, since they had assumed that they would. Hence the most useful lesson learned here was not so much a new insight, but rather confirmation that real world business practitioners are comfortable with the use of qualitative / subjective measures. Confirmation too that the use of qualitative / subjective measures poses more issues for the theory of measurement than for the application of measurement.

8.5.2. Recognition that measurement systems exist for the sake of the systems that they are monitoring:

There were good and bad lessons learned with respect to this theme from the Soft Systems literature. Firstly a success, it was this theme that drove the work in stage one

to identify the objectives. The process of iteration that eventually articulated the four objectives of the PFS measurement system proved to be of great value to the project team. The PFS team were comfortable with the concept that they were engaging in measurement for a purpose, however they seemed not to have been made to think so deeply about the specific purpose of a measurement system before. The project team felt that the initial work to articulate the objectives provided a rigour to the process of development and implementation of the new measurement system. For example the selection of the performance measurement framework in stage two was much easier, because they had a clear understanding of their expectations for the measurement system.

Stages one and two of the project revealed the usefulness of this theme, i.e. the emphasis that the performance measurement systems should help serve the overall system of PFS in terms of the four objectives articulated, and that this should be reflected in the design of the measurement system. However during stage three, the implementation stage, the full importance of this theme was made apparent. The performance measurement system developed at PFS did not serve the objectives articulated for it. A major influence on this was that the implementation process did not create a strong enough awareness around this theme. The eventual measurement system did indeed reinforce the point that measurement systems exist for the sake of the systems that they are monitoring. Unfortunately in the case of PFS this meant the measurement system had defaulted to support the existing culture and behaviours, it did not help foster and reinforce the new strategic behaviours and culture.

An implication of the Soft Systemic themes was that measurement could be used in a proactive way to influence the behaviour of social systems, consequently the objectives of the measurement system must be clearly articulated in order to guide this proactive influence. This requirement was successfully filled by stage one and two, however the implementation process did not build the objectives into the measurement system.

Given the participatory approach and the proactive agenda of the measurement system a key lesson learned was to ensure that the whole organisation appreciated the objectives of the measurement system, not just the designers of the measurement system (the project team). The purpose of the measurement system must be made apparent to all those influenced by it.

When the balanced scorecard was rolled out to the whole organisation at PFS, it was mainly perceived and used as a framework by which to order existing measures. The project team reported that the groups involved seemed to have viewed the scorecard as a grid or matrix by which they should categorise the measures that they already paid most attention to. For the most part the exercise did not prompt the creation of new measures, and groups did not use the objectives of the measurement system as a means of guiding or even checking their balanced scorecards. So in the case of PFS a more concerted effort was needed to ensure that the groups developing the measurement system throughout the organisation had greater awareness of the four objectives of the measurement system, and that they were responsible for ensuring that their balanced scorecards supported these objectives. Greater general awareness was required coupled with an implementation process that reflected the Systemic themes.

8.5.3. Participatory design of measurement systems:

The rollout of the balanced scorecard at PFS was a participatory process, this process undermined the efforts of the project team to implement a measurement system that supported the objectives articulated for it. At PFS a main purpose of the measurement system was to use measurement in a proactive way to foster and reinforce the new strategy. At PFS it became apparent that if the participatory development process was left relatively unguided, the existing mental models at PFS would dominate the process and the measurement system would foster and sustain the current organisational culture and behaviours.

PFS showed that an unguided participatory process of building measurement systems would naturally produce measures that supported the current dominant, or default, behaviours of a social system. Therefore if measurement systems were to be used as a proactive influence on behaviour, i.e. to shift existing behaviour in some way, the participatory development process needed to reinforce the other Systemic themes. In this way the default influences on design, created by the mental models and behaviours that the measurement system was seeking to shift, would be replaced by the influence of the articulated objectives of the measurement system and a rich appreciation of the measurement context.

8.5.4. Critical awareness of the effects of measurement:

The work at PFS reinforced the importance of this Systemic theme. From the start the intention was to use measurement as a proactive influence on behaviour and so the project team were immediately aware of the influence that measurement may have on behaviour in social systems. The four objectives articulated during stage one may be viewed as having successfully endorsed this theme given their clearly articulated and openly apparent attempt to influence behaviour.

The key lessons in terms of critical awareness are drawn from stage three, the implementation stage. An implication of the lessons already described above is that the designers of a measurement system must seek to gain a rich appreciation of the measurement context, or situation, before they begin to design and build a measurement system. One of the key issues at PFS was that the proactive influence of the measurement system had been given great attention, however similar attention should have been given to appreciating the context of the measurement situation. If the project team had done a fuller appreciation of the measurement situation it would have anticipated some of the problems of the implementation/roll-out process.

Firstly, it would have been apparent that the dominant culture would override the proactive objectives of a relatively unguided and participatory design process. Similarly, the need for senior management to display much support of the measurement objectives would have been clearer. Also the negative perception of the project by the rest of the organisation, as another attempt by the finance function to control the business, might have been identified sooner. It was ironic that the high concentration of finance people on the project team led to the measurement system being perceived as supporting precisely the sorts of behaviours its objectives sought to shift. Hence, the key lessons learned were that critical awareness should extend past an appreciation of the influence that measurement may have on the behaviour, to include an appreciation of the context in which the measurement system will operate.

A final lesson to do with the critical awareness of measurement surrounds the self-awareness of those using the Soft Systemic approach. From the perspective of a general review of the three stages of PFS project, one can make the case that the first two stages were relatively successful in maintaining a Soft Systemic approach to measurement, whilst the third yielded less success. The striking feature of this was that stages one and two were activities carried almost exclusively by the project team, who were aware of the Soft Systemic approach, the third stage was based on activities carried out by groups who had little or no knowledge of the systemic themes. This was because it was decided that the time and resources that would have been spent creating an appreciation of the Systemic themes in the wider group would not have produced benefits worth the effort. On reflection this may have been a mistake because many of the problems encountered at stage three would seem to have been addressed if the implementation stage was more systemic in its approach. Accepting this argument, there is a case to ensure that the Soft Systemic approach does produce a practical means by which practitioners can implement a Soft Systemic approach, and appreciate that they are doing so, without having to be fully cognisant of the theory and principles that govern such an approach.

8.6. Summary

This work discussed in this chapter was the first attempt to guide a measurement situation in the real world using a Soft Systemic approach to measurement. This consisted of an attempt to follow the four soft systemic measurement themes that had been identified in the literature review. The Soft Systemic measurement themes were: the use of subjective / qualitative measures; recognition that measurement systems exist for the sake of the systems that they are monitoring; participatory nature of measurement systems; and, critical awareness of the effects of measurement.

The case study was concerned with the development and implementation of a new performance measurement system at PFS, the personal financial services division of a major high street bank in the United Kingdom. The chapter provided a situational analysis of PFS at the start of the project and then described the three stages of the case study project. Stage one was to identify what the objectives of the measurement system should be. Stage two was to identify the business performance measurement system to be used. Stage three was to implement the new performance measurement system across PFS. The chapter described the activities at each stage and then reviewed those in light of the four measurement themes. It could be argued in broad terms that the Soft Systemic approach was successfully used and added value to stage one and two. Stage three presented more challenges, none of which undermined the themes, rather they provided valuable lessons that reinforced the importance of using a Soft Systemic approach to measurement.

The final section of the chapter reviewed the lessons learned from the whole case study. These lessons were discussed in terms of the four measurement themes, but can be drawn together and summarised as a list of key lessons:

1. The use of qualitative / subjective measures presents little difficulty to real world business performance measurement practitioners.

2. The practitioners recognised that measurement was a purposeful activity, and found the emphasis placed by the Soft Systemic approach on articulating the underlying objectives of measurement both new and useful.

3. If measurement is to be used in a purposeful and proactive way to influence behaviour, the objectives of the measurement must be articulated clearly and loudly enough to create a general appreciation of them amongst all involved in the development of the measurement system. Otherwise the new measurement system will reflect the default worldview/culture of the organisation.

4. An unguided participatory process of building measurement systems would naturally produce measures that supported the current dominant, or default, behaviours of a social system. The participatory development process needs to reinforce the other Systemic themes so that the default influences would be balanced or by the influence of the articulated objectives of the measurement system and a rich appreciation of the measurement context.

5. Critical awareness should extend past an appreciation of the influence that measurement may have on the behaviour, to include an appreciation of the context in which the measurement system will operate.

6. People involved in the development of the measurement need to be aware that they are using a Soft Systemic approach. Therefore, the Soft Systemic approach must produce a practical means by which practitioners can implement it, and appreciate that they are doing so, without having full knowledge of all the theory and principles that govern such an approach.

These lessons were then used as key influencers in the work to identify of the principles and framework of the Soft Systemic approach to measurement articulated later in the thesis.

Chapter Nine: *Principles of a Soft Systemic approach to Measurement*

9.0. Introduction

"Count what is countable, measure what is measurable and what is not measurable, make measurable"

Galileo Galiliei *in Finkelstein (1982) p26*

Previous chapters of this thesis have discussed how measurement practitioners have put the sentiments of Galileo's words into good effect. This discussion reviewed areas in both hard and soft sciences, especially the area of business performance measurement, and proposed that measurement in these areas has been performed in a way not encompassed by the tenets of the traditional approach to measurement described by Finkelstein (1982, 1994). It is one of the aims of this thesis and the primary concern of this chapter to identify a set of principles that will govern a new approach to measurement, based on Soft Systems thinking.

The first part of the chapter introduces a new definition of measurement that is fundamental to the Soft Systemic approach to measurement described in this chapter. Having defined measurement the individual principles of a Soft Systemic approach are introduced and their implications for the practice of measurement are analysed. After which the new Soft Systemic approach to measurement is compared and contrasted with the Traditional approach. The Soft Systemic approach is also investigated in terms of the demands of the new types of measurement situations identified in earlier chapters of the thesis. Finally the principles of the Soft Systemic approach are compared with the key Soft Systemic measurement themes common across the Systems Literature and the lessons learned from applying these in case study one.

9.1. A New Definition of Measurement

The traditional definition of measurement precludes the activities of many contemporary measurement practitioners. Consequently the fist step for any new approach must be to offer a more encompassing definition of measurement than the traditional one. Below is the new definition of measurement introduced in this thesis which is to be the keystone of the Soft Systemic approach to measurement proposed in this chapter.

"Measurement is the process for generating numeric information to describe the properties of events, objects and behaviours in the real world."

At first glance this new definition may seem simplistic, however it can be argued that one might expect such simplicity for the definition of such a basic and fundamental activity as measurement. There are two important features of this definition:

1. Measurement is a process
2. Measurement generates numeric information

Churchman (1959) argued that measurement is a decision-making *process*. Finkelstein (1982, 1994) wrote that measurement is a *process* for assigning numbers.The new definition states that measurement is a *process* for generating numeric information. Clearly there is agreement that measurement is indeed a *process*, but what does this process involve?

9.1.1. The Measurement Process

Fig .9.1. shows the process of measurement proposed in this thesis. All measurement must start with some observation of objects, events or behaviours; more accurately put the observation of the *properties* of those events, objects or behaviours. This

observation must then be coded in some way so that it may be turned into data. This involves the assignment of a number to the observation in such a way that the number will be meaningful to those interpreting the data. It is at this stage that this process differs from one which may be drawn for a traditional process of measurement in two key ways. Firstly the traditional approach would describe the creation of data as the end of the measurement process, where as the Soft Systemic approach to measurement goes on to finish with the generation of numeric information. Secondly since the traditional approach finishes at the point of data generation it must have definite and generic rules for the assignment of numbers to observations i.e. that they are empirical and objective or, at the extreme, directly derived form fundamental measures. The Soft Systemic approach to measurement does not need such restrictive rules, as described in the next section.

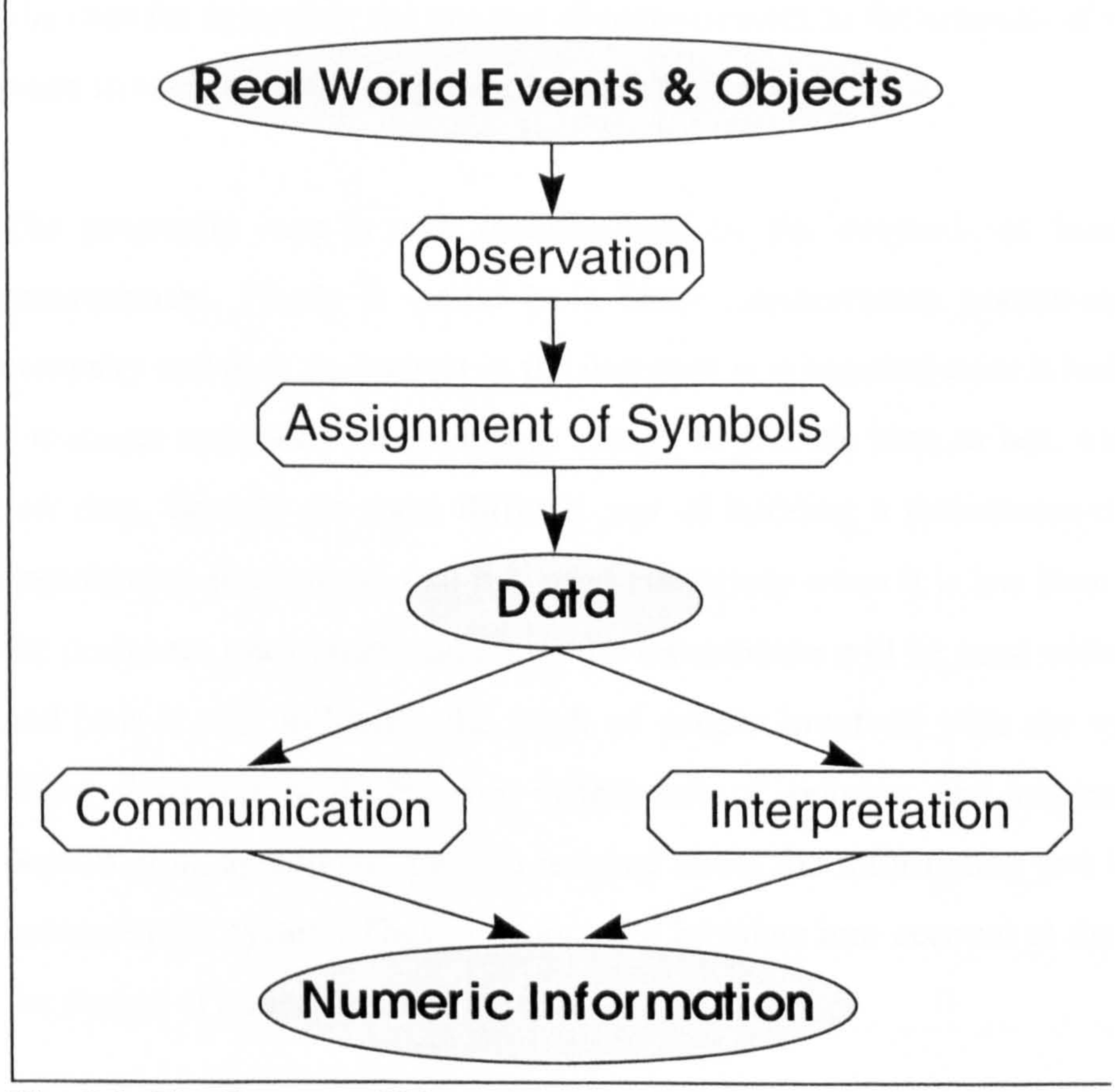

Fig. 9.1. The Process of Measurement according to the Soft Systemic approach

9.1.2. Information Generation

The Soft Systemic approach does not have to commit to such rigorously generic rules as the traditional approach since it is concerned with the generation of information for a specific audience. As such the only rule that governs the assignment of numbers to observations in the Soft Systemic approach to measurement is that it is meaningful to the specific audience for which the information is being generated. Consequently the rules for assigning numbers need not necessarily be empirical or objective, as long as they are agreed and those using the information commonly understand their meaning. Hence the power of the Soft Systemic approach is that through ending with information and not data generation it allows practitioners to build flexible and idiosyncratic measurement systems, whilst still following the principles of a theory of measurement. The case for extending the process of measurement to the creation of information can be made in two areas, the pragmatic and the theoretical.

The pragmatic case is well demonstrated by the demands of business performance measurement. Firstly it would be a brave measurement practitioner who entered a company and took no interest in the way data was reported once it had been created. For a manager requires a measurement system to provide him, or her, with information not raw data. Equally the most difficult part of building a measurement system within an organisation is to ensure that it is used effectively when it is has been completed. Hence the designers must understand how the information will be used within the organisation and how it will influence the work of people involved with the systems of interest. Often designers will discover differences of opinion and expectations within the organisation, agreement must be reached about the information that is needed from the measurement system. These factors must be taken into account at the very beginning of the design of a measurement system.

From a theoretical standpoint the most important aspect of the need to include information generation within the measurement process is its use as a means of validating a measurement system. The problem with saying that measurement does not have to be objective or empirical is that we loose the traditional means by which to validate measurement i.e. to say how accurate it is. This is not a massive blow for there is much that it is unsatisfactory with the statistical tests of accuracy traditionally used to validate measurement, as Churchman (1959) wrote:

> *"We have tried to develop general measures of accuracy at the cost of their meaningfulness in specific contexts."*
>
> Churchman (1959) p.92

Churchman (1959) went on to call for the development measures of accuracy based on the usefulness of the information in measurements. Ackoff (1995) covers similar ground when he described information as data processed to be useful. Hence the usefulness of information generated by a measurement system can be the means by which it is validated. This is one of the implications which extend from the principles of the Soft Systemic approach revealed in the next section, namely that measurement should be primarily validated by it usefulness and not primarily by its accuracy.

Once the case has been made for validation through utility, it becomes necessary for the measurement process to include the generation of information. This method of validation offers greater flexibility to measurement practitioners since they can make use of measures for which statistical means of validation are not applicable. For example, it is difficult to assess the statistical validity of customer complaints in relation to the feelings of all customers. However such measures can generate useful information for managers. By including information generation into the definition of measurement it is possible to measure, whilst still using a theoretical framework, in measurement situations where the traditional approach breaks down.

One final feature of the new definition of measurement is that it requires the generation of *numeric* information. This may seem an obvious point but it is an important one since Churchman (1959) defined the function of measurement as:

> *"The function of measurement is to develop a method for generating a class of information that will be useful in a wide variety of problems and situations."*
>
> Churchman (1959) p.84

It may be argued that numeric information is indeed a 'class of information', however the definition proposed in this thesis maintains that the class of information must be numeric. It concurs with Churchman (1959) that measurement must be useful and hopefully in a wide context. However the strength of the Soft Systemic approach proposed later is that measurement does not have to be applicable in a wide variety of problems and situations. According to the Soft Systemic approach proposed here measurement only has to be useful in terms of the context of the system of interest it is measuring, from this comes the flexibility to cope with the idiosyncratic demands of complex measurement situations.

9.1.3. Traditional vs. New definition

In the discussion above allusions have been made to the difference between this definition and the traditional definition of measurement. It is worth reviewing these differences before concluding the analysis of the new definition. Through out this thesis the informal definition of measurement offered by Finkelstien (1982, 1994) has been taken as representative of the traditional approach:

> *"Measurement is the process of empirical, objective assignment of numbers to the properties of objects and events of the real world in such a way as to describe them."*

Finkelstein (1982) p.2

The most obvious difference is that the traditional approach is a shorter process than the new one since it finishes with the generation of data and not information. As has been described above the lack of the generation of information has implications for the means by which a measurement system can be validated. The traditional approach may only use accuracy where as the Soft Systemic approach may use accuracy or usefulness. Finally, the rules for assignment of numbers to observations also differ. The traditional maintains that the assignment process must be objective and empirical, the new approach maintains that it must be meaningful to the users of the measurement system.

9.1.4. Summary

This section of the chapter has introduced a new definition of measurement that has been demonstrated to be significantly different to the definition of the traditional approach. The key features of the new definition are that it is a process and that it generates information. The importance of the information generating aspect has been identified in relation to the number assignment process and the means of validation of measurement. Consequently the new definition of measurement has been shown to allow greater flexibility within measurement approaches. This flexibility is crucial to meet the demands of complex measurement situations and central to the Soft Systemic approach to measurement outlined in the next section.

9.2. Principles of a Soft Systemic approach to Measurement

This section of the chapter proposes a set of principles that govern a Soft Systemic approach to measurement. It should be remembered that it is the aim of this thesis to provide guidance for the creation, or adaptation, of real world measurement systems and so much of the analysis of the principles is from this pragmatic viewpoint. In each case the principle is analysed in terms of its consistency with Systemic thinking and also in terms of the implications for the practice of measurement. The principles of a Soft Systemic approach to measurement are:

- Measurement is a process for generating numeric information
- Measurement situations are complex and varied
- Measurement is a purposeful activity
- Measurement systems reflect a world view
- Measurement systems influence behaviour
- Measurement systems should be participative
- Measurement systems should be holistic

Before the analysis of these principles it is might be useful to review the definitions of some of the terms used within the analysis.

- *Measurement Situation* – A measurement situation is the context in which a measurement practitioner must build, or adapt, a measurement system and in which the measurement system must then operate. It can be categorised according to its quantitative/qualitative and active/passive nature.

- *Measurement System* – A measurement system is the system of measures, analytical tools, interpretation tools, reporting structure and all people

involved with the measurement process. The aim of a measurement system is to provide numeric information about the behaviour of a particular system of interest.

- *System of Interest* – This is the system, the behaviour of which, the measurement system is measuring.

9.2.1. Measurement is a process for generating numeric information

The first principle of the Soft Systemic approach to measurement is that it understands measurement according to the new definition of measurement that was introduced in this thesis. The preceding section of this chapter analyses the definition in detail. To reiterate briefly, the use of this definition is important since it allows a significantly more flexible approach to measurement than the traditional definition. The flexibility broadly arises from the aspect of the definition that views measurement as a numeric information generating process. The work of Churchman (1959) was quoted as evidence in support of this concept in the literature of Systems Science.

The inclusion of the information into the process of measurement allows greater freedom in the rule for assigning numbers and the means of validating measurement. The greater freedom in these two aspects is a key feature of the Soft Systemic approach to measurement. It is the ability to refer to the end-users of the measurement process that enables the Soft Systemic approach to deal with the complexity of measurement situations. In purely practical terms it allows practitioners to perform measurement, such as surveys, which in the past would not have been considered as measurement, and hence for which there was no theory or set of principles to guide practitioners. Thus it enables the measurement practitioner to take account of the idiosyncratic nature of every measurement situation whilst still operating within the rigour of a theory based approach

9.2.2. Measurement Situations are Complex & Varied

That measurement systems are complex and varied requires that careful thought be given to the environment in which the measurement system will operate, and the nature of the complexity in that environment. From this it extends that different sorts of measurement approach will be applicable to different types of measurement situation. Hence a decision as to the most suitable approach must be made before any measurement can be performed.

Previous chapters demonstrated that measurement situations are complex and varied. In this work a Systems thinking approach was used to guide an investigation into the complexity of measurement situations. It was argued that measurement situations are complex and a number of generic causes of measurement complexity were identified, their influences were described in terms of four categories. These categories were developed into a classification of measurement situation/contexts that can be used to identify measurement contexts in which a Soft Systemic approach would be most beneficial.

The implication for measurement theory of viewing measurement situations as complex and varied is a shift from a singular and restricting approach to a more pluralistic and encompassing approach. The traditional approach to measurement has been singular in nature since measurement is only possible in certain clearly defined situations. It does not recognise that measurement can be carried out in any way other than an empirical and objective one. The traditional approach views all measurement situations as only those within which it is possible to be empirical and objective. The Soft Systemic approach views measurement as possible within all situations. Different contexts need different principles in order that the measurement approach can cope with the complexity within them. Hence the approach has shifted from one that defines the situation in which measurement may be applied, to one where the situation defines the sort measurement approach that may be usefully applied. This shift allows for

measurement to be far more encompassing of different contexts and the complexity within them.

In more pragmatic terms there are two direct influences on the measurement practitioner. Before even beginning to build a measurement system the practitioner must evaluate the measurement situation and then assess which measurement approach is most suited to that situation. Hence the practitioner must answer two questions:

1. What sort of measurement situation is this?
2. What measurement approach is most suitable?

Both these questions are best answered by making use of the classification system presented earlier in the thesis. The first question can be addressed by an analysis of the nature of the complexity within the measurement situation to classify it as quantitative/passive, quantitative/active, qualitative/passive, or qualitative/active. In turn this classification will enable the practitioner to address the second question, by choosing the measurement approach that is most suited to this category of situation. More detail of this process is given in the discussion of the measurement practitioner framework (SSPMF) presented in the next chapter.

9.2.3. Measurement is a Purposeful Activity

The principle that measurement is a *purposeful* activity owes much to the work and language of Checkland (1981). He emphasised the distinction between teleological and teleonomical activities or systems. According to Checkland 'teleonomy is the neutral word based on the notion of serving a purpose' (Checkland (1981) p.119), where as teleology implies the exercise of human will in terms of the conscious selection of alternatives in order facilitate certain ends. Checkland (1981) simplified this distinction into purposive (teleonomical) and purposeful (teleological) activities:

> *"I use the word 'purposive' when the meaning is the neutral 'serving a purpose', and '**purposeful**' when conscious human activity is involved."*
>
> Checkland (1981) p.119

Hence the implication is that measurement is an activity that involved the conscious selection of alternatives in order to facilitate a certain end. This concept sits well alongside the work of Churchman (1959) where he investigated measurement from the point of view of a decision-making activity. Here he investigated a number of areas that are key to any measurement process and revealed that within each the measurement practitioner faces a decision between two opposite but desirable ends. From this it is possible to imply that measurement is indeed a purposeful activity, according to Checkland's (1981) definition.

Since Churchman (1959) identified the need for human decision makers in the measurement process, it follows that the way in which they make decisions will have an impact on the measurement process. We have already stated that they will decide in terms of helping to cause a certain end or objective. In theory then it is possible that the decision maker may be an objective influence on the measurement system, deciding according to an articulated objective. This would still allow measurement to be described as an objective process. However it is difficult to see how the decisions would be taken without some reference to the idiosyncratic ethical and moral characteristics of the decision-maker. This being the case it would not be possible to describe the measurement process as an objective one, for as Ackoff (1986) wrote in relation to objectivity:

> *"is believed to require the exclusion of ethical and moral judgements from inquiry and decision-making. Objectivity so conceived is not possible."*
>
> Ackoff (1986) p.123

So from the above it can be argued that measurement is a purposeful activity that involves some conscious decision-making, consequently it may not be described as an objective process. Therefore if measurement is viewed as a purposeful process it is excluded by the traditional definition of measurement. So it can be argued that traditional measurement theory has viewed measurement as very much a *purposive* activity, since it does not take account of any issues that require conscious decision-making on the part of human actors. On the other hand the Soft Systemic approach does recognise the presence of decisions and conscious human selection in the measurement process and hence views measurement as *purposeful*.

If measurement is a purposeful process what are the implications of this for metrology? As stated already the purposeful nature of measurement implies decision making this implies that the process cannot be truly objective. Therefore purposeful measurement cannot fall within the traditional definition of measurement. That measurement is purposeful is also important to the validation of the Soft Systemic approach to measurement. For it is the conscious thought as to the purpose and direction of measurement that enables an assessment to be made of the usefulness of the measurement. If measurement has a recognisable and articulated purpose then is it is possible to validate measurement with respect to how useful it is at furthering that purpose. Hence validation in the Soft Systemic approach is based on an assessment of the effectiveness, or usefulness, of the information yielded by the measurement system.

Both Churchman (1959) and Ackoff (1981) touch on the idea of measurement that is validated through its utility. Ackoff (1981) covers this point in a discussion on the effectiveness of performance indicators. He links effectiveness of indicators to how well they correspond with the real system, however he maintains that it is only possible to subjectively assess how effective the performance indicators are. In which case he asks why not just use the judgements of performance themselves? In fact much business

performance measurement is indeed judgement, and one of the main aims of this thesis is to provide a theoretical framework to encompass such measurement.

Arguably, the most important element from Ackoff (1981) is that he raised the question of whose judgement should be used to validate the performance measures. In so doing he introduced another element to the measurement process, the need to be aware of the human actors and their roles within a measurement system. Hence any measurement system that uses purpose and utility/effectiveness as its validation method must take account of the human actors involved within the system. Therefore the measurement approach must identify and understand the influence of actors within the measurement system and the system of interest.

The implications for the measurement theory and approaches to measurement discussed raise a number of pragmatic issues for the measurement practitioner to deal with. The first issue must be to identify and articulate the purpose of the measurement system. The designer of the measurement systems must have an appreciation of the wider purpose of the system of interest, and the specific purpose of the measurement system. Issues such as what information should be generated, how much of it should be passed on, and to who are all questions that a measurement practitioner must answer.

In order to deal with the issues above the practitioner must turn to those people involved with the measurement system. He or she must have an appreciation of the roles that different human actors play within the measurement system. They must identify the appropriate people to decide what the purpose is, whether the information is effective/useful, etc. They must understand what information the measurement system is required to generate, for whom and how it should be presented in order to meet its purpose. The practical framework presented in the next chapter of this thesis asks practitioners to identify which people within the measurement system are playing

certain roles. It then provides guidelines for solving the issues by linking them to the judgements of certain roles.

Viewing measurement as a purposeful activity means that the measurement practitioner must ask themselves the following questions:

1. What is the purpose of the measurement system?
2. Who should decide the purpose of the measurement system?
3. Who assesses the effectiveness of the measurement system to meet its purpose?
4. What information needs to be collected to fulfil the purpose of the measurement system?
5. What information needs to be provided, to whom and in what form in order to fulfil the purpose of the measurement system?

9.2.4. Measurement Systems Reflect a Worldview

Checkland (1981) states that there must exist some *worldview or weltanschauung* which makes human activity systems meaningful, a worldview is:

> *"the image or model of the world which makes this particular human activity system a meaningful one to consider."*
>
> Checkland (1981) p.319

It was proposed above that measurement is a purposeful activity that involves human actors; it is therefore a human activity system. Since worldviews are a matter of perception one would never be able to say that all actors involved with a measurement system view it according to the same worldview. That measurement systems are perceived in different ways is to be expected, however it may be argued that a measurement system will reflect some single worldview through which the designer

made *meaningful* the purpose of the measurement system. Hence the very measures themselves will reflect a way of perceiving the measurement system, this concept is best demonstrated using an example.

Suppose one wished to measure the customer service performance of a railway company, the worldview of what customer service is becomes crucial. On the one hand customer service can be perceived as the ability of the rail company to get customers to their destination on time and in comfort. On the other hand customer service can be viewed as to do with the customers' perceptions of reliability, ease of use, quality of staff, etc. Using the first worldview a measurement system would most likely consist of measures such as the number of trains that reached the destination on time, the number of cancellations, the number of broken w.c.s, lights, windows, heaters on carriages etc. However using the second worldview the measurement system would look very different. Measures would take the form of customer surveys into reliability, staff attitude etc; use would be made of such areas as complaints data and mystery shopping. Therefore the worldview favoured by the designer can have a large influence on the type of measures and hence the kind of measurement system that is created. Indeed the worldview of the designer will have an influence on every decision that must be made in relation to the development of the measurement system.

Given that measurement systems will reflect a worldview it is important that this is recognised and accounted for in the building process. Otherwise the unarticulated worldview of the designer will be the one reflected in the measurement system. Hence the designer must appreciate the worldview of other actors within the measurement system, especially those who are responsible for determining the purpose and effectiveness of the measurement system. From all this it is clear that the process of determining what worldview is reflected in a measurement system is a political process and that the social context of the measurement system must be considered. In areas such as business performance it may be relatively easy to identify the worldview that should

be reflected i.e. that of the manager, or that stated in the company mission and vision statements. However in other areas of measurement the social context may not be so clear and therefore a Soft Systemic approach to measurement must encourage practitioners to be C*ritical* in their thinking:

> *"Critical reflection - to reflect upon the relationship between different organisational and societal interests... "*
>
> Flood & Jackson (1991) p.2

One may say that Critical Systems thinking advises us that a measurement approach should take account of the socio-political nature of the system of interest. In terms of a Soft Systemic approach to measurement this concept would seem to be reflected in the need for measurement practitioners to identify the different worldviews of actors involved with the system of interest. Also as stated above an open process for choosing the worldview to be reflected in the measurement system must be followed. Ulrich (1983) wrote that this process should not be biased to any one particular view before the process has started:

> *"It is only by giving an equal status to the different rationalities of the involved and the affected that we can prevent the former from making themselves the judges who define measure of improvement."*
>
> Ulrich (1983) p. 290

Ulrich's (1983) concern was mainly to do with the predominance of those involved with the system over those affected by the system. This concern is addressed in the measurement framework presented in the next chapter where emphasis in placed on including those affected in the list of actors involved. It seems worthwhile to emphasise that the construction of a measurement system does not have to be an open democratic process. For example, in business measurement there is likely to be an owner of the

system who has ultimate control of the decisions i.e not a democratic process. Critical System thinking shows us that however the decision is taken it is important to appreciate the rationalities, worldviews, of everyone involved and affected by the system of interest. Also that however the decision is taken it must be taken in an open way so that the political nature of the system is identified and appreciated by the designers.

The principle that measurement systems reflect a worldview does not differ radically from the traditional approach to measurement. Traditional metrology places emphasis on the empirical and objective nature of measurement, in a sense this demand can be seen as the imposition of a certain worldview. Where the Soft Systemic approach differs is that is allows measurement to be performed when the worldview reflected in the measurement system is not based on an empirical and objective model of the world. The Soft Systemic approach provides greater flexibility in application since it seeks to cope with the complexity of measurement in social contexts where there may be conflict and diversity with regard to worldviews.

The possibility of conflict between worldviews is an important aspect for the measurement practitioner to consider. If conflict does exist this can introduce a similar influence into the system of interest. For example in a business organisation if the corporate strategy and vision of the firm is not reflected by the measures the measurement system may influence behaviour away from the strategy. Equally the practitioner must seek to appreciate how those who will use it will receive the measurement and what their expectations are. For these reasons it is important that the practitioner investigates the following issues:

1. What are the worldviews of those involved (including those affected) with the measurement system?
2. What should be the worldview reflected in the measurement system?

3. Are there any conflicts between the worldview reflected in the measurement system and others held by actors within the system of interest?

9.2.5. Measurement Systems can Influence Behaviour

That measurement can influence the behaviour of a system of interest is one of the fundamental principles of the Soft Systemic approach to measurement. From this principle stems much of the complexity that the traditional approach finds difficult to cope with. Furthermore it is recognition of this aspect of measurement that represents a major theoretical difference with the view of measurement advocated by traditional metrology.

Previous work in this thesis covers the influence of measurement on behaviour in great detail with examples, so only a brief review is offered here. It was proposed that measurement had a *preceding* influence on the behaviour of a system of interest i.e. before the output of any numeric information. This influence was described as an *active* measurement situation, as opposed to a *passive* one where there is no *preceding* influence on behaviour. Two types of active influence were described single and double loop measurement influences, the difference being whether the mental models of actors have changed.

Metrology places crucial emphasis on the objective nature of measurement. However if measurement is accepted to have a *preceding* influence on the behaviour of its system of interest it cannot be objective. Here then is a dichotomy between the Systemic and Traditional approach to measurement, it is impossible to accept that measurement influences behaviour and to accept that measurement must be objective. It is for this reason that this thesis has introduced a classification of measurement contexts in order to guide practitioners as to which approach is most useful in what types of situation.

Even if the traditional approach were to relax the need for objectivity, perhaps into an aspiration of objectivity, it would still run into difficulties. The influence on behaviour necessitates that the measurement approach must strive to appreciate such aspects as the worldviews that exist within the system of interest and the impact of the measures on them. Hence there must be an emphasis on the actors within the system, something that the traditional approach takes little account of.

The implications of the behavioural influence of measurement are as fundamental for the measurement practitioner as for the metrologist. Practitioners have to make a judgement as to whether measurement within their particular context is likely to have an impact on the behaviour of the system. In a situation where it is anticipated that measurement will have an influence on behaviour, practitioners have no choice but to investigate the human aspect of the system of interest and the purpose of the measurement system. Practitioners will need to gain an appreciation of the likely change that the measures will bring. How will the influence of measurement manifest itself in the system of interest? What form will the changes have on the overall behaviour of the system? Will it be temporary or permanent i.e. single or double loop influence? Is the change one that corresponds with the purpose of the measurement system and the purpose of the system of interest?

It should be noted that the behavioural influence of measurement is not just a measurement issue but also a management one. For measurement can influence the success or failure of other management processes that may not be specifically to do with measurement. Russell Ackoff (1994) discussed such a situation in relation to the success of TQM programs and the influence of measures and incentives:

> *"If these measures are left unchanged, whatever else is done, behaviour will not change significantly, and those changes that are made will not last long."*
>
> Ackoff (1994) p.106

Ackoff (1994) stressed the need for measurement systems to reinforce the desired behaviour of the system of interest. It is vital that the behavioural influence of the measurement system is aligned with the overall objectives of the system of interest. Hence the worldview reflected in the measurement system must be considered in relation to its influence on the behaviour of the system. Practitioners must appreciate whether it will be in conflict of harmony with the agreed purpose of the systems of interest.

In order to build a measurement system that takes account of its influence on the very behaviour that it is striving to measure, measurement practitioners must ask themselves the following questions:

1. Is the measurement system likely to have an influence on the behaviour of the system of interest?
2. Who are the human actors in the system of interest, what are their worldviews?
3. What are the purposes of the measurement system and the system of interest?
4. How will the influence of measurement manifest itself in the system of interest?
5. What form will the changes have on the overall behaviour of the system?
6. Will change be temporary or permanent i.e. single or double loop influence?
7. Is the change one that corresponds with the purpose of the measurement system and the purpose of the system of interest?

9.2.6. Measurement Systems should be Participative

"Participants in design processes cannot help but put their ethical and aesthetic values into the designs they produce."

Ackoff (1994) p.79

> *"Participation, which is a form of self-determination, is itself a major source of satisfaction."*
>
> Ackoff (1994) p.78

The two quotations from Russell Ackoff (1994) shown above reveal the two crucial aspects of the principle that measurement systems should be participative. Firstly, that widespread participation in the measurement system design process facilitates the capture of the richness of views and attitudes in the system of interest. Secondly, that participation in the measurement process maximises the potential to influence the behaviour of actors within the system of interest.

Reference to the work of Ulrich (1983), in preceding sections, reinforces the concept that measurement should be participative. He called for designers to give equal status to the rationalities of those involved and those affected by the systems of interest when designing performance measures. The only way to do this is by involving them in the design process and giving credence to their contribution. Ackoff (1994) echoed this approach when he calls for an emphasis on consensus in the design process, where decisions do not result in the impositions of ideas onto a minority by a majority. He drew the distinction between agreement in practice and agreement in principle, going to argue that consensus is complete agreement in practice:

> *"Agreement in practice is agreement to act; it does not require that the approved action is taken by all to be the best in principle."*
>
> Ackoff (1994) p.81

Ackoff (1994) formalised his ideas for participation in the design process with his concept of *Interactive idealised design*. Far from an objective process he called for the inclusion of the participants' ethics and aesthetics in the design process. He encouraged processes to reduce constraints in order to capture as much of these values as possible.

Originally Ackoff (1994) formulated the concept *interactive idealised design* in relation to improving the quality of work life. He then extended the idea to *Consumer Idealised Design* that involves consumers in the design process of their ideal service or product. The concept of idealised design fits very well with the efforts of this research to ensure participation in the design of measurement systems.

Ackoff (1994) identified two types of idealised design processes, those that are bounded and those that are unbounded. Bounded ideal systems assume that the environment of the system of interest cannot be altered. He went on to say that bounded ideal design system should be technologically viable, operationally viable, capable of learning, and adapting. In an unbounded ideal system the designers may change the environment, since none of the constraining influences are taken as permanent.

Most often a measurement system's ideal design processes will be bounded since measurement systems are linked to the system of interest. In this sense the system of interest can be viewed as a constraining influence in the environment of the measurement system. However some of the action research work associated with this project has found it possible to include both unbounded and bounded stages to a measurement design process. For example, when designing a customer service measurement system customers and staff have been asked to design their ideal system without constraints. Hence the process begins with an unbounded ideal design stage. The next stage introduces some limiting factors and asks participants to prioritise their design in light of these constraints. This second stage may be considered a bounded design stage. The output from the second stage is then used to influence what is measured and how.

The second quotation from Ackoff (1994) shown at the beginning of this section reveals how participation in the design process can increase satisfaction. *Idealised system design* ensures participation in the design process, however action research for this

project has shown that participation should be more than just at the design stage. The participation of actors within the system of interest in the measurement process yields rewards. The satisfaction arising from the element of self-determination is carried over from the design process into the everyday operation of the measurement system. Not only does this help satisfy actors it also increases ownership of the measurement system. For if actors are responsible for the measurement process they are more likely to trust and act upon the information received from it.

Measurement systems built over the course of this action research project have been in the area of business performance. The vast majority of these measurement systems have involved the participation of front line staff in the measurement process. For the most part they are responsible for collecting data usually in the form of questionnaires or interviews with customers. This has the effect of creating ownership of the results and the purpose of the measurement system. In most cases the measurement system was built in order to assist the organisation improve performance in a certain area, by providing relevant information. Research has shown that participation in measurement of the staff involved with that area of performance has helped the environment in which performance improvements must be made. For example, often the data collection process involves staff talking to customers about their performance for the first time. This interaction breaks 'them and us' attitudes between staff and customers, it forces staff to be accountable for the performance of the company as a whole, and in turn staff want to take responsibility for customers. They move from providers for customers to customer champions. Consequently, thanks to participation in the measurement process, measurement systems can drive performance improvement by providing information that is owned by staff, and can support performance improvement by creating an atmosphere where change and improvement is welcome amongst staff. One might term these intrinsic effects as opposed to the extrinsic effects resulting from the measurement output.

The implication of participative measurement processes is that it is not an objective activity. Hence it would not be appropriate for such processes to be considered as measurement according to the traditional approach. The involvement of staff in the data collection often reveals concerns over the validity of measures since data is open to bias or falsification. This concern is true and would be crucial if measures are to be validated according to their accuracy or truth, as in the traditional approach. However the Soft Systemic approach advocated validation through the effectiveness of the measurement system. If it is satisfying those who are assessing it effectiveness so be it. If there is a serious problem with falsification it is likely that this is the result of some cultural influence in the system of interest that should be addressed. Therefore it may be argued that the measurement system has been effective since if had identified this cultural issue that is likely to affect the performance of the whole system of interest.

All the above means that the measurement practitioner should consider the following issues:

1. Who should be involved in the design of the measurement system?
2. Should the ideal design process be bounded or unbounded?
3. If bounded what are the constraining factors?
4. Who should be involved in the measurement process?
5. What might be the intrinsic influence of the measurement system?

9.2.7. Measurement should be Holistic

Holistic is an oft used term which has come to mean many things to different people. To Systems thinkers holism is the core element of their thinking and represents a way of approaching a problem of situation. Checkland (1981) describes the way in which the systems paradigm is holistic:

*"It is holistic, but not in the usual (vulgar) sense of taking in the whole; systems concepts are concerned with wholes and their hierarchical arrangement rather than with **the** whole."*

Checkland (1981) p.14

So in a Soft Systemic approach to measurement it is vital that consideration is given to the whole system of interest. Measurement practitioners should have some sense of how the measurement system and its system of interest fit into the hierarchical notion of a larger system, its wider system, and its environment. Many of the measurement principles outlined above imply an holistic approach since they cannot be appreciated without such consideration. However it is important to stress the point as a stand alone principle.

9.3. The Soft Systemic approach vs. Traditional Approach to Measurement

Throughout the sections above attention has been drawn to areas where the Soft Systemic approach differs from the traditional approach to measurement. This section seeks to draw such comparisons together, in order to clearly differentiate between the two approaches.

Initially the most striking feature of the contrast between the traditional and Soft Systemic approach to measurement is the difference in their definitions of measurement. Both agree that measurement is a process, but they differ as to what kind of process. The traditional approach to measurement concludes with the generation of data. The measurement of the Soft Systemic approach ends with the generation of numeric information. This difference between end points of the measurement process is crucial to the rules by which numbers may be assigned, and to the means by which measurement may be validated.

According to the traditional approach to measurement numbers may only be assigned according to rules that are empirical and objective, often in practice this dictates the use of fundamental measures, or those directly derived from them. When the measurement process ends with the production of information the rules no longer have to be generic and specific to every kind of measurement situation. Consequently the Soft Systemic approach to measurement is able to say the assignment rules only need make sense to the people who receive the information generated by the measurement system, i.e. be understood in a common way. Hence the Soft Systemic approach enables measurement practitioners far greater freedom in the creation of a measurement system's number assignment rules. However this flexibility in a specific measurement situation is

achieved at the cost of the transferability of measurements between different situations, which is a strength of the traditional approach.

Traditionally measurement has been validated by means of statistical tests of *accuracy/truth*. The Soft Systemic approach allows the use of *effectiveness* as a way of measurement validity. The only way that effectiveness may be used in this way is if the measurement process ends with information generation, since information may be described as data that is useful. Another implication of the Soft Systemic approach's validation through effectiveness is that measurement is a purposeful activity. This would seem to contrast with the traditional emphasis on objective measurement. Equally validation by means of effectiveness implies the participation of actors within the measurement process. Once again the participation of actors has negative implications for the objectivity of the measurement process.

It can be seen that one of the key differences between the Systemic and traditional approaches to measurement is the objectivity of the measurement process. The Soft Systemic approach cannot be objectives since it views measurement as participative, purposeful and as having an intrinsic influence on behaviour. It seeks to understand the worldview that is reflected in measurement system and recognise this in the building process. It strives to anticipate the influence that the measurement system will have on actors within the system. It seeks to ensure that this influence reinforces the purpose of the system of interest. In these ways the Soft Systemic approach not only recognises that measurement is not objective but builds on these subjective properties to use measurement in a new way. The Soft Systemic approach seeks to use measurement to influence as well as to measure change, it is proactive.

It may be argued that the traditional approach places emphasis on a being a generic approach that may be applied to all measurement situations. Hence the traditional approach generates measures that are transferable across all measurement situations, for

this reason the process must be objective, empirical and the rules for numbers assignment must be rigid. The Soft Systemic approach places greater emphasis on the idiosyncratic nature of measurement situations and hence values flexibility of rules and emphasises common understanding within a particular context. It recognises that some measurement situations cannot be usefully dealt with via generic rules. Consequently it aims to build measurement systems that take account of the unique complexity of a given measurement situation, but will only provide measures that are relevant to the particular measurement context. In conclusion it may be said that the traditional approach is reactive and values transferability across all measurement contexts, whereas the Soft Systemic approach is proactive and values flexibility within particular measurement contexts.

9.4. The Soft Systemic approach & New Measurement Complexity

In a previous chapter of this thesis four broad classifications of measurement contexts were identified and analysed. Part of that analysis suggested that the traditional approach to measurement is ideally suited to the passive-quantitative category. However it was also shown that properties of each of the other three categories are in conflict with some of the tenets of the traditional approach. Hence the complexity in the other categories seemed to warrant the use of a new and different approach to measurement. The Soft Systemic approach to measurement was developed in response to the demands of the complexity in these situations. This section of the chapter reviews those demands and assesses how well the Soft Systemic approach deals with them.

The classification framework looks at two broad natures of the measurement situation, whether it is qualitative or quantitative and whether it is active or passive. Each of these natures is based on a set of properties, the ability of the Soft Systemic approach to deal with the complexity arising from these properties is investigated below.

9.4.1. Quantitative / Qualitative Measurement Complexity

9.4.1.a. The presence of conflicting worldviews

The Soft Systemic approach encourages measurement practitioners to investigate the worldview of actors within the measurement system in relation to the purpose of the measurement system. It recognises that a measurement system will reflect some worldview. Consequently it makes the identification of such a worldview a transparent part of the design process. It also seeks to ensure that the reflected worldview and the purposes of the measurement systems and the system of interest are all aligned.

9.4.1.b. The nature of understanding

Different kinds of measurement system will yield different kinds of information. The traditional approach tends to build measurement systems that provide information that feed a mathematical model used to predict future behaviour. In some sorts of situations it is not possible to measure with the degree of accuracy that this approach requires. However it is still possible to collect numeric data and use it to create understanding based on the general trends and patterns of behaviour in a system. This can be termed a qualitative understanding of the system. The Soft Systemic approach is able to cope with more complex situations where only a qualitative understanding is possible. This ability stems from the definition of measurement in which the measurement process includes information generation. Hence when using a Soft Systemic approach one must ask what information is required and what kind information is possible. In this way the Soft Systemic approach encourages practitioners to consider the demands for information and make a decision as to which kind of measurement will provide information most suitable to the purpose of the measurement system.

9.4.1.c. Type of measures

Quantitative measures are those that can be derived from fundamental measures, qualitative measures are those that cannot. When using quantitative measures the practitioner can make use of a set of commonly agreed standards that exist prior to the design of a measurement system. However this shared knowledge does not exist in the case of qualitative measures. Hence the use of qualitative measures requires the practitioner to create an agreed and commonly understood set of measures with the actors of the measurement system.

The Soft Systemic approach tackles the complex task of creating shared understanding by involving actors within the measurement system's design and operations processes. In line with the principle that measurement should be participative actors are involved in deciding what should be measured and how. Also the same principle encourages

participation in the data collection process, this in turn helps to increase understanding of the measures. Hence the emphasis placed on participation by the Soft Systemic approach to measurement helps to create the shared knowledge needed for the use of qualitative measures.

9.4.2. Active / Passive Measurement Complexity

Measurement systems can have an influence on behaviour just by being present in the system of interest; accordingly they are either active or passive in nature. This influence can be of a temporary or permanent nature, depending on whether any change has occurred in the mental model of the actors in the system of interest. That measurement may influence the very behaviour that it is trying to measure adds a large degree of complexity to any measurement situation. This feature of measurement is largely ignored by the traditional approach. When identified it has been viewed negatively as a source of error and any response has been to try to eliminate such influences.

The Soft Systemic approach recognises that many measurement systems will have an influence on the behaviour of a system, particularly in social systems. Having recognised the behavioural influence of measurement the Soft Systemic approach seeks to use the influence. Rather than try to eliminate the effect it is encouraged where it supports the purpose of the measurement system. Hence it may be said that the Soft Systemic approach responds to the complexity of active measurement contexts by expecting the behavioural influence and proactively shaping it to the purpose of the measurement system.

9.5. Principles & the Key Soft Systemic measurement themes in the Literature

At the end of the Systems literature review four key themes were identified as being common across the Systems literature. These key measurement themes are:

1. Use of subjective / qualitative measures
2. Recognition that measurement systems exist for the sake of the systems they are monitoring
3. Participatory design of measurement systems
4. Critical awareness of the effects of measurement

It was argued that themes represented the basic starting point for the task of articulating a Soft Systemic approach to measurement. Since the principles of such a Soft Systemic approach have now been revealed it is worthwhile to analyse them in terms of each of the key measurement themes from the Systems literature.

9.5.1. Use of subjective / qualitative measures

The use of subjective, or qualitative, measures is permitted by the new definition of measurement proposed in the Soft Systemic approach. This definition describes measurement as a process for generating numeric information. Unlike the traditional approach it does require measurement to be empirical and objective. Therefore the use of subjective / qualitative measurers can be legitimately described as measurement. Furthermore recognition that measurement situations are complex and varied implies that in some contexts objective and empirical measurement is not possible. Consequently in some measurement situations subjective / qualitative measures are the only ones possible.

The emphasis that the Soft Systemic approach places on measurement as a purposeful activity and the recognition that measures reflect some worldview also requires those practising a Soft Systemic approach to endorse the use of subjective / qualitative measures. Finally the principle that measurement be holistic ensures the use of such measures. Since one can argue strongly that ignoring subjective / qualitative measures in favour of a concentration on purely empirical and objective measures is a reductionist approach. Such an approach is bound to lead to a reduced appreciation of the complexity of the systems being monitored compared with that possible also using the Soft Systemic approach to measurement.

9.5.2. Recognition that measurement systems exist for the sake of the systems they are monitoring

The principle of the Soft Systemic approach to measurement that describes measurement as a purposeful activity deals with this theme. Implicit in the concept of a measurement system having a purpose is that measurement must actively serve some purpose. The purpose of the measurement system will be a function of the purpose of the system of interest. For the most part the purpose of a measurement system is to provide information to further the goals of the system of interest. Hence it may be seen that measurement systems are dependent on the system they are monitoring to give them purpose.

In the Soft Systemic approach the measurement system is also dependent on the system it is monitoring for validation. Since the primary means of validation is its utility to the system of interest. Also, the principle that measurement systems influence behaviour ensures that practitioners take account of the primary role of the systems of interest. Under the Soft Systemic approach to measurement practitioners expect behavioural influences and take steps to ensure that they are not in conflict with the objectives of the system of interest. The objectives of the system of interest are put above those of the measurement system.

9.5.3. Participatory design of measurement systems

The need for measurement systems to be participatory in nature is a principle of the Soft Systemic approach to measurement, so it is clear how this theme is reflected in the approach. However, were this not enough by itself, each of the other principles implies the need for measurement to be participative. Indeed the Soft Systemic approach goes further than the theme from the literature and states that measurement should be participative both in design and operation.

9.5.4. Critical awareness of the effects of measurement

There are three principles that take direct account of this theme. The first is the principle that measurement situations are complex and varied. Following from this it necessary to consider the nature of each measurement situation. Hence some critical investigation into the complexity of every measurement context is required by the Soft Systemic approach. Secondly, if one recognises that measurement has an influence on behaviour, specifically in terms of a *preceding* influence, then one must take account of this influence and strive to appreciate it effects. Thirdly, the principle that measurement be holistic requires that practitioners take account of the relationship between the measurement system, system of interest, and the environment. These three principles ensure that practitioners following the Soft Systemic approach to measurement have a critical awareness about a measurement system and its interface with the wider system.

9.5.5.Summary

The analysis above reveals that all of the key measurement themes from the Systems Literature have been incorporated in the principles of the Soft Systemic approach to measurement proposed in this chapter. The theme of participation has been incorporated directly into one of the principles of the approach, however it is also implied by some of

the other principles. The other themes have been shown to be implied as a consequence of the seven principles that govern a Soft Systemic approach to measurement.

9.6. Soft Systemic Principles and the Lessons from Case-study One

Chapter eight describes the application of the key themes of soft systemic measurement at PFS a financial services company. From this work six key lessons were identified. This section of the chapter reviews the principles of the Soft Systemic approach with respect to those lessons. The lessons are:

1. The use of qualitative / subjective measures presents little difficulty to real world business performance measurement practitioners.
2. The practitioners recognised that measurement was a purposeful activity, and found the emphasis placed by the Soft Systemic approach on articulating the underlying objectives of measurement both new and useful.
3. If measurement is to be used in a purposeful and proactive way to influence behaviour, the objectives of the measurement must be articulated clearly and loudly enough to create a general appreciation of them amongst all involved in the development of the measurement system. Otherwise the new measurement system will reflect the default worldview/culture of the organisation.
4. An unguided participatory process of building measurement systems would naturally produce measures that supported the current dominant, or default, behaviours of a social system. The participatory development process needs to reinforce the other Systemic themes so that the default influences would be balanced by the influence of the articulated objectives of the measurement system and a rich appreciation of the measurement context.
5. Critical awareness should extend past an appreciation of the influence that measurement may have on the behaviour, to include an appreciation of the context in which the measurement system will operate.

6. People involved in the development of the measurement need to be aware that they are using a Soft Systemic approach. Therefore the Soft Systemic approach must produce a practical means by which practitioners can implement it, and appreciate that they are doing so, without having to be fully cognisant of the theory and principles that govern such an approach.

As would be expected from an application of the measurement themes most of the lessons are to do with the application of a Soft Systemic approach to measurement. Hence they are more relevant to the practical framework introduced in the next chapter. However there are some points worth raising about the lessons in relation to the Soft Systemic principles of measurement introduced in the thesis.

The first lesson confirmed that qualitative / subjective were in common use within the business community, and that there was no need to convince business performance measurement practitioners of their usefulness. Equally the idea that measurement is a purposeful activity was something that the practitioners at PFS seemed to recognise implicitly, however they had not considered fully the implications of such a concept. Since these points were both important to and reflective of the experiential knowledge held by the practitioners at PFS there inclusion on the list of principles of the Soft Systemic approach to measurement was reinforced.

The third and fourth lessons contribute to the principle that measurement should be participatory, but for the most part are lessons to do with the application of a Soft Systemic approach to performance measurement (see chapter ten). The fifth lesson adds weight to the principle that measurement should be holistic. The lesson is that practitioners must consider the behaviours and influences in the whole measurement context in order to best appreciate the effect of measurement. The final lesson is in itself a call for a practical framework to guide practitioners wishing to use a Soft

Systemic approach to performance measurement. The Soft Systemic Performance Measurement Framework (SSPMF) presented in the next chapter answers this call.

9.7. Chapter Summary

The main aim of this chapter was to introduce the principles that govern the Soft Systemic approach to measurement developed as part of this research project. The first task of this process, and the first principle of the Soft Systemic approach, was to introduce a new definition of measurement. This definition states that 'measurement is a process for generating numeric information'. It contrasts with the traditional definition of measurement in that it includes the generation of information; traditionally measurement ends with the creation of data. The emphasis on information generation allows greater flexibility in the rules governing number assignment. Also it enables the measurement to be validated according to its effectiveness to users.

Having discussed the new definition of measurement and its implications for the process of measurement the principles of the Soft Systemic approach to measurement were introduced. Having been introduced each one was analysed in terms of its root in Systems literature, its relation to traditional metrology, and any implication for measurement practitioners:

1. Measurement is a process for generating numeric information: this is the new definition of measurement, the key feature of which is that the measurement process ends not with the generation of data but of information.

2. Measurement situations are complex and varied: drawing on the work which identified and categorised complexity in measurement situations. A recognition that measurement can be done outside of contexts where it is possible to be objective and empirical. Practitioners must address the following issues:
   - What sort of measurement situation is this?
   - Which measurement approach is most suitable?

3. Measurement is a purposeful activity: That measurement is purposeful has implications for the objectivity of a measurement process and opens the possibility for validation through effectiveness. Practitioners must address the following issues:
    - What is the purpose of the measurement system?
    - Who should decide the purpose of the measurement system?
    - Who assesses the effectiveness of the measurement system to meet its purpose?
    - What information needs to be collected to fulfil the purpose of the measurement system?
    - What information needs to be provided, to whom and in what form in order to fulfil the purpose of the measurement system?

4. Measurement systems reflect a worldview: hence an element of critical thinking is introduced to the design process. The process for identifying and selecting an appropriate worldview must be transparent and participative. Practitioners must address the following issues:
    - What are the worldviews of those involved (including those affected) with the measurement system?
    - What should be the worldview reflected in the measurement system?
    - Are there any conflicts between the worldview reflected in the measurement system and others held by actors within the system of interest?

5. Measurement systems can influence behaviour: the behavioural influence on measurement must be expected and directed. The influence occurs preceding reporting of any output from the measurement system. Once again this influence is in contradiction with the idea that measurement ought to be objective. Practitioners must address the following issues:

- Is the measurement system likely to have an influence on the behaviour of the system of interest?
- Who are the human actors in the system of interest, what are their worldviews?
- What are the purposes of the measurement system and the system of interest?
- How will the influence of measurement manifest itself in the system of interest?
- What form will the changes have on the overall behaviour of the system?
- Will change be temporary or permanent i.e. single or double loop influence?
- Is the change one that corresponds with the purpose of the measurement system and the purpose of the system of interest?

6. Measurement systems should be participative: actors must be involved with the design of the measurement system if they are to form a common understanding and believe in its use. They should also be part of the operation of the measurement process that assists in measurement ownership and action. Practitioners must address the following issues:
    - Who should be involved in the design of the measurement system?
    - Should the ideal design process be bounded or unbounded?
    - If bounded what are the constraining factors?
    - Who should be involved in the measurement process?
    - What might be the intrinsic influence of the measurement system?

7. Measurement systems should be holistic: consideration must be given to the whole of the measurement system and how it fits with the system as a whole i.e. how it matches the purpose of the system of interest, what effect the information may have

outside of the immediate system of interest, what interactions may occur between it and the environment etc.

Having introduced and discussed the principles of a Soft Systemic approach to measurement the overall approach was contrasted with the traditional approach. This analysis concluded that the two approaches were fundamentally different. It was argued that the traditional approach places value and emphasis on generic rules that produce measures that are transferable across all measurement contexts. In contrast to this the Soft Systemic approach was shown to be more proactive and value flexibility within specific measurement contexts.

The Soft Systemic approach was then analysed in terms of the demands of the more complex measurement situations identified in the pervious chapter. The quantitative / qualitative and active / passive nature of measurement was reviewed in light of the principles of the Soft Systemic approach. It was shown that these principles encouraged the measurement practitioner to recognise and deal with the demands of these complex measurement situations.

Finally, the Soft Systemic approach to measurement was analysed in terms of the four key Soft Systemic measurement themes from the Systems literature. It was found that each of these themes was incorporated into the Soft Systemic approach as a consequence of one or more of the seven principles. Also the lessons learned from the application of the key themes in case study one were reviewed in relation to the principles.

This chapter introduced a new definition of measurement and a set of principles to govern a Soft Systemic approach to measurement. These principles were discussed in terms of their heritage in the Systems literature and implication for traditional measurement theory and practise. The Soft Systemic approach was then found to be

fundamentally different from the traditional approach, was shown to respond to the demands of complex measurement situations, and to have incorporated the common measurement themes from the Systems literature and their application in the real world.

Chapter Ten: *Practical Framework for Soft Systemic Performance Measurement*

10.0. Introduction

The main emphasis of this chapter is to provide practical assistance to those seeking to follow a Soft Systemic approach to measurement. In order to do this, a framework is introduced that draws upon the categorisation of measurement complexity and the principles guiding a Soft Systemic approach to measurement principles, both areas of work presented earlier in this thesis. The framework was developed as a means by which to link the theoretical lessons learned in this research with the day-to-day tasks facing measurement practitioners. However it must be stressed that the framework is in no way meant to be a prescriptive approach, rather is seeks to present issues for which only the practitioners can provide appropriate responses.

The chapter starts with a description of the purpose of the framework and some guidelines on when and how it should be used. The framework itself is then introduced.

10.1. Purpose of the Soft Systemic performance measurement Framework

In an ideal situation, measurement practitioners would be encouraged to think through the nature of measurement complexity and identify some principles for dealing with such challenges. In other words, they would perform the analysis that has been the project of this research. However, it is not only unrealistic to expect practitioners to do this, it is also unlikely that many have even the time or inclination to read the analysis presented in the earlier chapters of this thesis. Such is especially the case in the area of business performance measurement that is the main concern of this thesis. Therefore it is necessary to provide some guidance as to how to follow a Soft Systemic approach to measurement in a practical form. It is the aim of the framework presented in this chapter to so do.

It is a strong temptation, particularly in the area of business performance, to turn the lessons learned from the early part of this work into some kind of systemic measurement methodology. Hence the deliberate choice of the word *framework* to describe the practical guidance presented later. Whether it is the intention of its creator or not, and most often it is not, a methodology is often turned into a prescriptive activity when applied. Consequently, the critical and reflective aspects essential to the challenge of complex situations are lost in practice. These two aspects are crucial to the Soft Systemic approach to measurement, therefore the framework must above all ensure they are transferred from principles to practice. The challenge of a contemporary Systems thinking approach must be to empower actors to appreciate and respond to the complexity of their own system of interest.

Empowerment implies the handing over of power and hence the transference of power from one party to another. Often this transferral is considered in a political sense where

power is equated with control, and empowerment is closely linked with the emancipation of actors traditionally without power in a system of interest. However, it should be remembered that power is a dual aspect concept, not just about control but also about information or knowledge:

> *"**empower** -... **1** authorize, license. **2** give power to; make able."*
>
> Oxford Complete Wordfinder (1993) p.481

Hence empowerment does not have to be about conflict and the transfer of control from one set of actors to another. Rather, empowerment can arise from all actors in the system gaining a greater appreciation of the complexity of their system of interest. In this case empowerment comes from learning and knowledge. Here empowerment is about *making* people better *able* to deal with the challenges facing them through a richer appreciation of their situation. Thus it is the aim of the Soft Systemic Performance Measurement Framework (SSPMF) to empower people in measurement situations, i.e. to make actors more able to deal with the complexities of their particular measurement situations.

The framework aims to fulfil the role described above through drawing practitioners attention to a series of issues that they should consider. The framework does not provide answers to these issues but seeks to ensure that practitioners have a greater appreciation of their measurement situation. This appreciation arises from the response prompted by consideration of the issues. The framework provides generic issues that should be considered by measurement practitioners, but only those people directly involved with the measurement situation can formulate the best detailed response to those issues. In this way the SSPMF draws on the principles of the Soft Systemic approach to measurement and combines them with the idiosyncratic nature of the particular measurement situation receiving attention.

10.2. Cycles of the Soft Systemic Performance Measurement Framework

The Soft Systemic approach to performance measurement could be said to be concerned with three areas; the categorisation of the measurement situation, the appreciation of complexity of the measurement situation, and the measurement process itself. The interrelationships between these three are shown below (see fig. 10.1.).

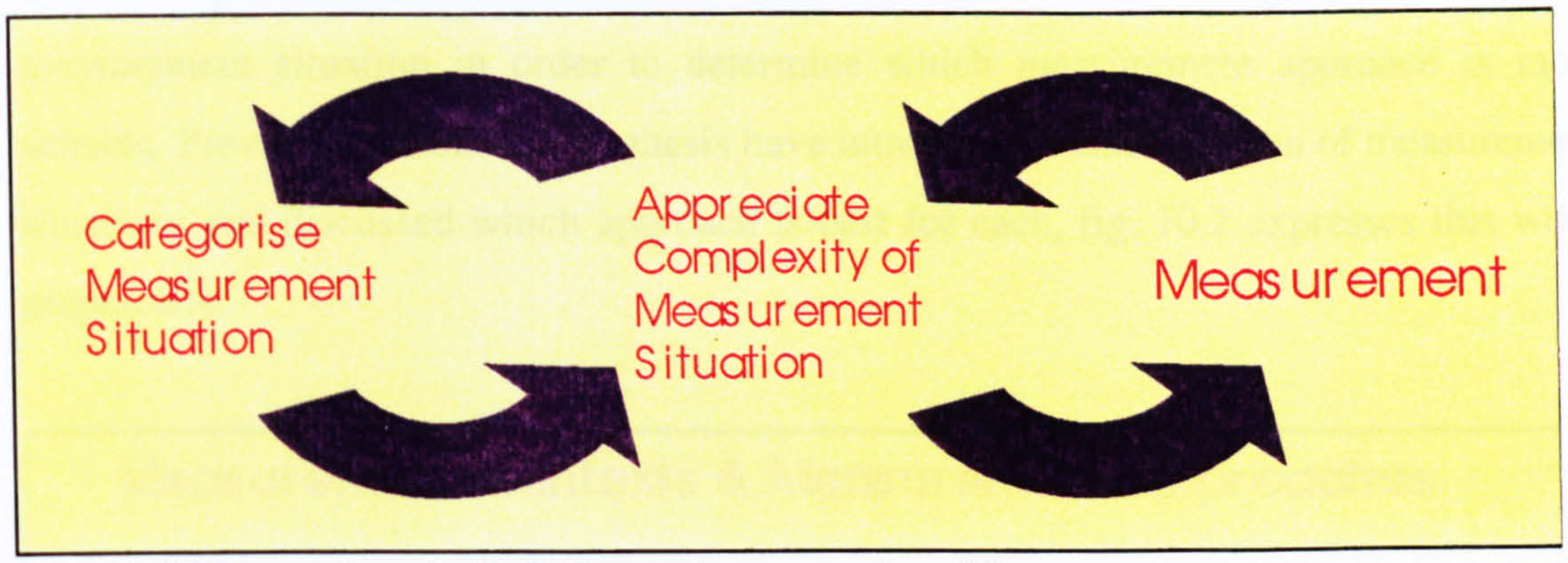

Fig. 10.1 The cycles of a Soft Systemic approach to Measurement

It is important to note that the all three areas are in a continuous feedback cycle. This cycle should not be seen as a linear process that practitioners work through from start to finish. The aim is that practitioners can enter the cycle at any point and in doing so will begin to consider and learn about the other areas in the cycle. The SSPMF is primarily aimed at helping practitioners categorise and appreciate measurement situation. The next sections show how the framework can assist in these areas.

10.3. Categorisation of the Measurement Situation

The Soft Systemic approach to measurement has been developed for certain types of measurement situations. It does not seek to replace the traditional approach, rather the Soft Systemic approach seeks to compliment the traditional approach by dealing with complex measurement situations. Therefore it is important that users of the Soft Systemic performance measurement seek to make some categorisation of the measurement situation in order to determine which measurement approach is most suitable. Previous sections of this thesis have introduced a classification of measurement situations and discussed which approach is best for each, fig. 10.2 expresses this work graphically.

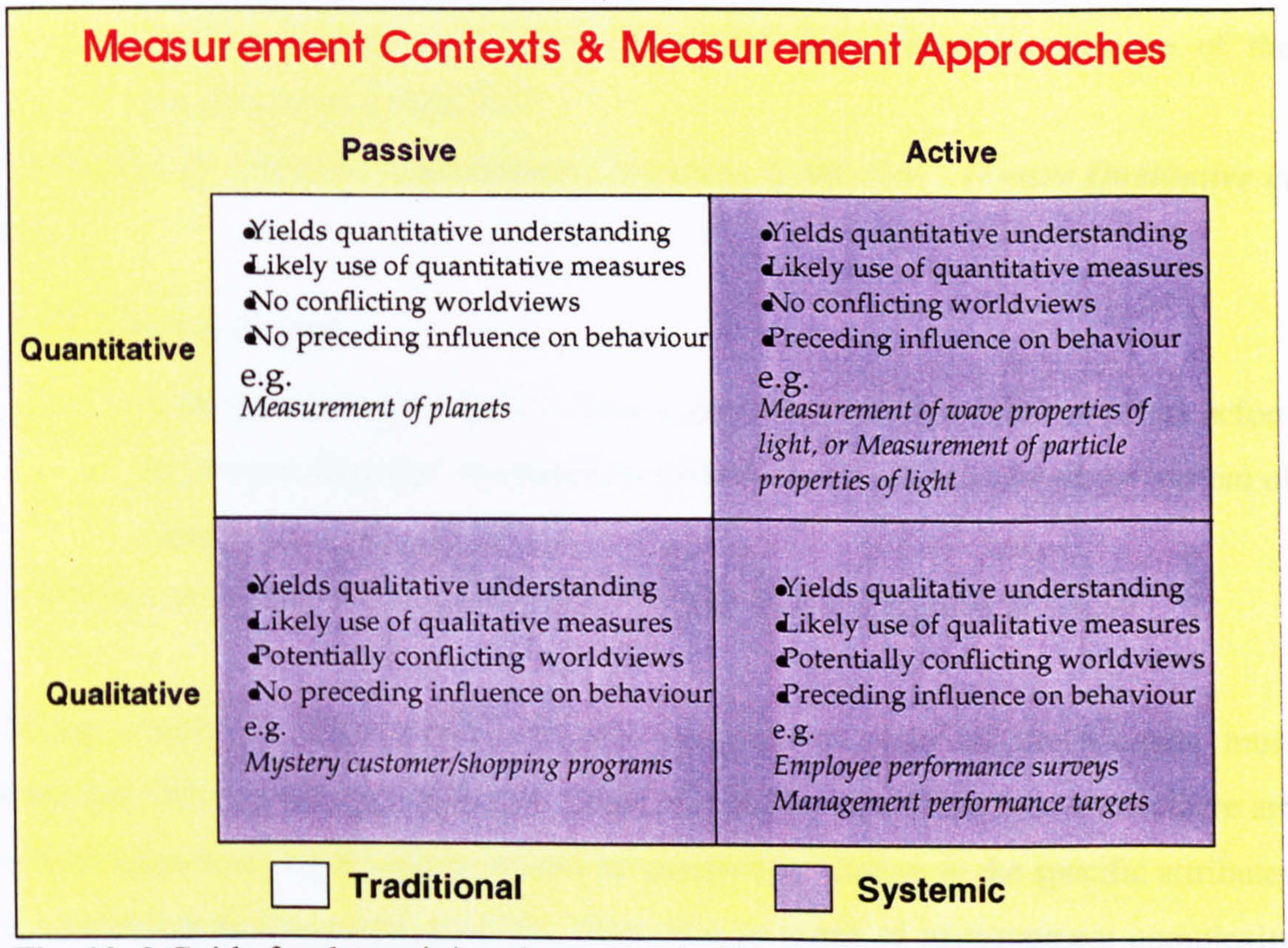

Fig. 10. 2 Guide for determining the most suitable measurement approach.

Practitioners must make an assessment of the qualitative or quantitative nature of the measurement and try to anticipate if the measurement system will have an active or passive influence on the behaviour of the measurement system. This activity reveals the cyclical nature of the SSPMF because practitioners must begin to gain some appreciation of the measurement situation before categorisation. However equally important is that practitioners are aware of the category of the measurement situation before they seek to gain a fuller appreciation of that complexity. When determining the categorisation practitioners must consider the following questions:

Qualitative / Quantitative Nature:

1. Are the measures likely to be derived from fundamental measures?
2. Is the output from the measurement system likely to lead to information that is linear, where cause and effect relationships are easily identified?
3. Is there a single and shared worldview that makes the purpose of the measurement meaningful?

*If **YES** then the situation is **Quantitative** in nature, if **NO** then it is more **Qualitative** in nature.*

Active / Passive Nature:

1. Is the measurement likely to have a preceding influence (i.e. an effect before any output from the measurement system) on the behaviour of the system of interest being measured?

*If **YES** then the situation is **Active** in nature, if **NO** then it is **Passive** in nature.*

Having established the category of the measurement situation practitioners must determine the measurement approach to follow. Like the rest of the framework there are no hard rules here and all advice should be assessed in relation to the specific attributes of a particular measurement situation. That said, in terms of measurement complexity Quantitative / Passive situations and Qualitative / Active situations may be considered as opposite end of the spectrum. Quantitative / Passive situations are the least complex

and are the measurement context in which the traditional approach to measurement was developed, hence the traditional approach is most useful in this category of situation. On the other hand Qualitative / Active situations are the most complex type of measurement context, the Soft Systemic approach has been developed to respond to the challenges of such complexity. Hence in Qualitative / Active situations the Soft Systemic approach to measurement is likely to be most useful.

To continue with the analogy of a spectrum of measurement complexity, Quantitative / Active and Qualitative / Passive measurement situations may be considered to occupy the middle of this spectrum. For this reason it is difficult to make any generic statements as to which measurement approach would be most suitable. However it is clear that it would be very difficult to do empirical and objective measurement in such situations. Since active situations contradict the objective nature of measurement and quantitative situations contradict the empirical nature of measurement. Hence it is necessary to strive for an appreciation of the complexity of the measurement situation that can be gained from the Soft Systemic approach. Perhaps it may not be necessary to consider all the issues in the Systemic performance framework, but some will be very relevant.

10.4 Appreciation of the Complexity of the Measurement Situation

The SSPMF identifies five main areas of complexity in measurement situations. Within each of these areas the framework steers practitioners into giving consideration to different aspects of the measurement complexity. It does not aim to tell practitioners how to deal with such complexity, rather its purpose it to increase the practitioners appreciation of the measurement complexity. In so doing, the practitioner is able to make more informed decisions concerning the most effective way to perform measurement within that particular context. These five areas of measurement complexity are: People/Roles; Worldviews; Behavioural Influence; Purpose; Measures and Measurement Process.

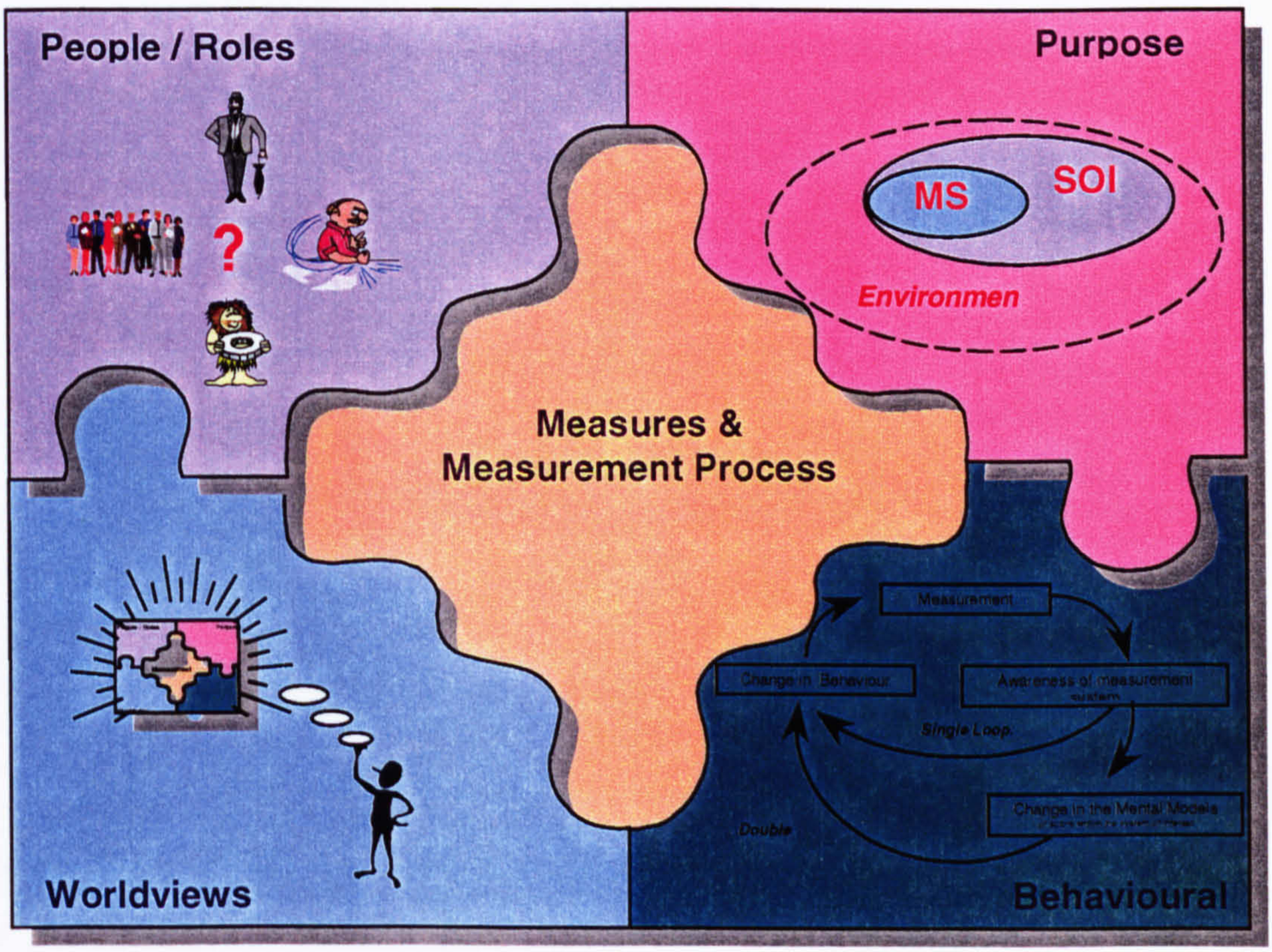

Fig. 10.3. The Framework Jigsaw

The SSPMF *jigsaw*, shown in fig. 10.3, shows the four aspects of measurement complexity and gives an impression of their interrelated nature. The jigsaw is a graphical reminder to practitioners that they must consider the whole picture of a measurement system, not just the measurement process itself. Furthermore they should strive to appreciate how all the different pieces fit together in order to gain a fuller picture of the measurement system. For ease the next section look at these four aspects separately, however when dealing with specific issues in each area the interconnected nature of measurement systems becomes apparent.

10.4.1. People / Roles Issues of Complexity

The Soft Systemic approach to measurement places great emphasis on heeding and responding to the complexity that arises from the presence of human actors in measurement systems. The framework seeks to assist practitioners understand better this complexity by introducing four generic roles through which human behaviour in measurement systems may be analysed. It must be stressed that individual behaviour within a measurement system is impossible to predict but the framework draws on common behaviour/roles that might be expected to exist. These common behaviours have been identified throughout the case studies that have made up the action research element of this project. The framework encourages practitioners to identify that actors fit most closely to these roles, recognising that individuals may play more than one role. These four roles are shown in fig. 10.4. and discussed below.

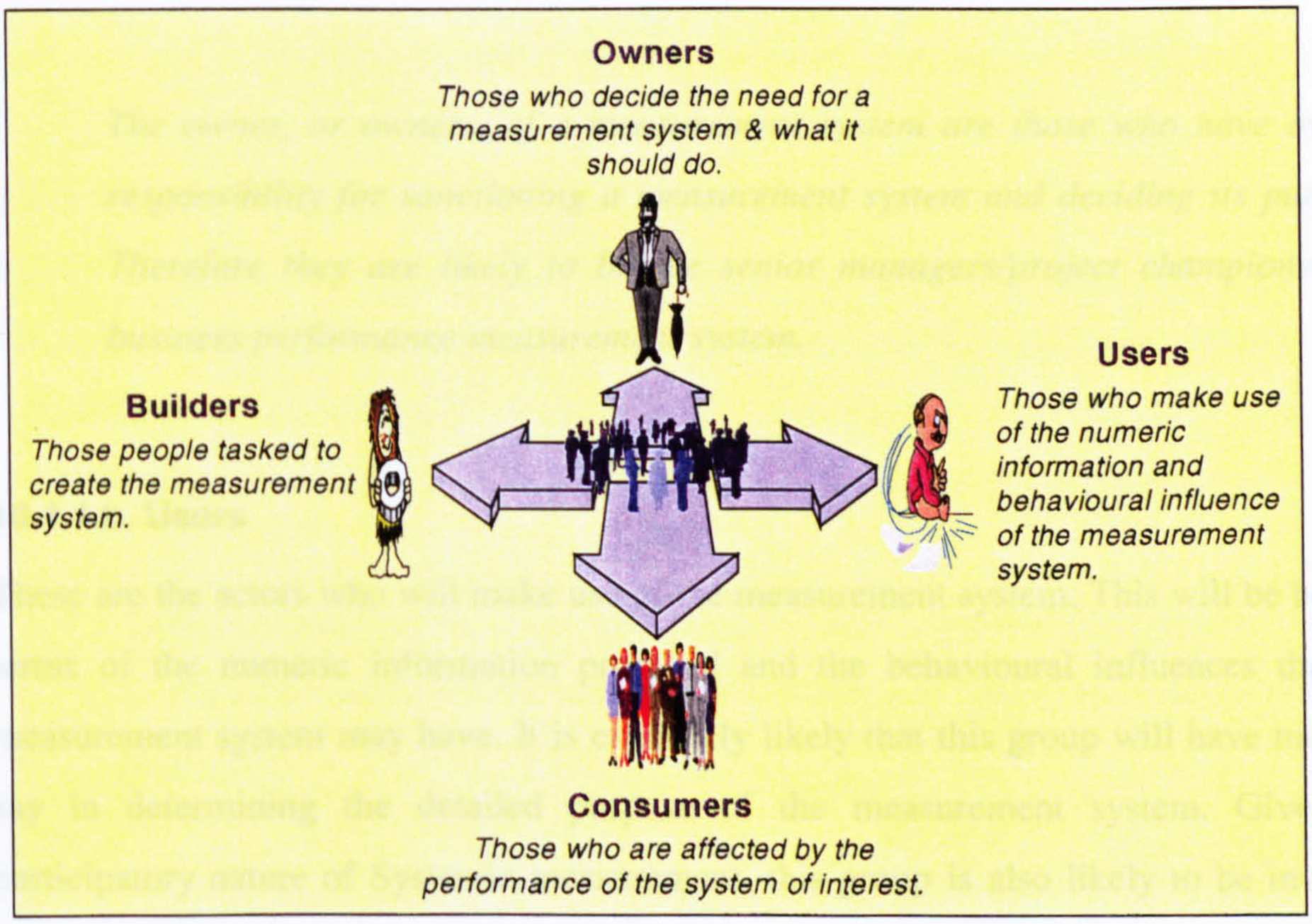

Fig 10.4. Generic Roles in Measurement Systems

10.4.1.a. Owners

This concept owes much to the term also used by Checkland (1981) in his CATWOE analysis of a system of interest. He identifies the owner of a system as those who can 'modify or demolish the system' (p.318). Hence it may be seen that the essential feature of the *owner* role is that they influence the continuance of the system.

In practical measurement terms this means the owner is one who identifies the need for measurement and is most likely to decide its purpose. It is worth noting the difference between deciding and determining the purpose of the measurement system. In business performance measurement systems, it is likely that there will be a single person ultimately responsible for deciding the purpose of the measurement system. However it is likely that other actors will be involved in determining what that purpose should be. Owners are defined as:

> *The owner, or owners, of a measurement system are those who have overall responsibility for sanctioning a measurement system and deciding its purpose. Therefore they are likely to be the senior managers/project champions in a business performance measurement system.*

10.4.1.b. Users

These are the actors who will make use of the measurement system. This will be both in terms of the numeric information provided and the behavioural influences that the measurement system may have. It is extremely likely that this group will have much to say in determining the detailed purpose of the measurement system. Given the participatory nature of Systemic measurement, this group is also likely to be involved with the design of the measurement system and the data collection aspect of the measurement process. Depending on the purpose and scale of the measurement system

it can stretch from the top to the very bottom of an organisation, assuming a hierarchical structure. Users are defined as:

> *The users are those who make use of the information and behavioural influence of the measurement system. In business performance measurement systems they may stretch from boardroom to the front line.*

10.4.1.c. Consumers

Consumers are those who are affected by the performance of the system of interest whose behaviour, or some aspect of, the measurement system is measuring. Often this group will have an influence in the design of the measurement system. Also they may be involved with the measurement process where measurement of their opinions is required.

The *consumer* concept is similar to the *customer* concept in Checkland's (1981) CATWOE system description. Checkland (1981) describes customers as 'the beneficiary or victim of the system's activity' (p.313). Hence, it may be seen that customers' are in sense *consuming* the activity of the system of interest. Describing this group as consumers negates the need to introduce some kind of value judgement by describing them as victims or beneficiaries. It also guards against confusion since the term customer is widely and loosely used in business. Consumers are defined as:

> *A consumer is a person who consumes the performance of the system of interest. In business performance measurement they are often internal or external customers.*

10.4.1.d. Builders

The *builders* of the measurement are those tasked to build the measurement system. They may be from inside the organisation or from without. There is likely to be some cross over between the *user* and *builder* roles in the measurement system, as users are often builders or vice versa. In terms of this research project they are often the group referred to as measurement practitioners and would be the group making most use of the SSPMF. Builders are defined as:

> *The builders are those tasked to create the measurement system. In terms of business performance measurement they may be internal to the business system of interest, such as potential users of the measurement system. Otherwise they may be external consultants from another department or an external organisation.*

10.4.2. Purpose Issues of Complexity

Having initially identified which actors most closely reflect the generic roles identified in the SSPMF practitioners should begin to determine the purpose of the measurement system. As with many of the issues covered in the framework, consideration of the purpose will lead to greater appreciation of actors' roles in the measurement system. Under the non-prescriptive Soft Systemic approach, questions as to the purpose of the measurement system inevitably lead to questions as to who should determine and who should decide that purpose.

Issues to do with purpose must be tackled at different levels since a measurement system will have a global purpose i.e. to assist improvement of customer service, however at a more focused level detailed purposes must be determined such as what specific information should be given to particular users. Only when the purpose has been identified at every level can consideration be given as to whom should assess the

effectiveness of the measurement. It is crucial that these actors are identified and a means of assessing effectiveness of the measurement system in meeting its purpose at their level is also identified.

- **What is the purpose of the measurement system?** When considering the purpose of the measurement system this question is obviously the starting point. It is important to stress that the purpose must be identified at the different levels of the measurement system. The purpose identified at every level of the measurement system must be consistent with the global purpose i.e. that the purposes at the focused level must support the global, high level, purpose.

- **What is the purpose of the system of interest?** Just as the purpose of the measurement system must be consistent at every level so must consideration be given to the relationship between the purpose of the system of interest and the measurement system. One must stress that the Soft Systemic approach recognises that measurement has a large influence on the behaviour of the system of interest. Consequently the measurement practitioner should be aware of the purpose of the system of interest and the role of the measurement system in supporting this purpose. For example, if the purpose/objective of a business were to pursue rapid growth then a measurement system that places emphasis on cost control would be in conflict with the purpose of the system of interest. Practitioners must be aware of such potential conflicts in their own measurement system and so must have an appreciation of the purpose of the system of interest.

- **Will the environment have an influence on the measurement system?** As part of ensuring the measurement practitioner has a full appreciation of the measurement system attention should be paid to the environment. In business performance measurement terms this may be the overall strategy of the division, company or group. It may also involve an appreciation of the business environment such as

forthcoming regulation, future business trends, trans-organisational or trans-industrial benchmarking standards, business awards etc.

- **Who should decide the purpose of the measurement system?** This question will be answered in different ways according to the type of measurement situation. The Critical systems school of thought would emphasise the *emancipatory* (Jackson & Flood (1991)) aspect and call for maximum involvement and representation in the decision process in social systems. In business performance measurement systems the decision is likely to be taken by a single decision-maker, or a small group of key individuals. The framework tends to identify such people as the *owners* of the measurement system since they identify the need for it and its purpose.

- **Who should determine the purpose of the measurement system?** This is an area where theory and practice may be closer together since even in business performance measurement systems consultation is to be expected. *Owners* may seek, or instruct builders to seek, advice from other parties as to the global purpose of the measurement system. It is necessary that a common understanding of the purpose of the measurement system is identified; consultation is an effective way of creating this.

- **What information needs to be collected to fulfil the purpose of the measurement system?** Once the global purpose of the measurement system is determined and decided the numeric information required to support this purpose would become clearer. In one sense discussion of the information requirement is a discussion of the detailed purpose of the measurement system. This discussion should begin to determine the actual data that must be collected and how it should be collected.

- **What information needs to be provided, to whom and in what form in order to fulfil the purpose of the measurement system?** Having identified the type of

numeric information needed to support the purpose of the measurement system the detail must be considered. The Soft Systemic approach believes that measurement includes the generation of information, not just data collection. Therefore measurement practitioners need to appreciate what type of information is relevant to different *users* and how that may best be expressed/reported to support the purpose of the measurement system.

- **Who assesses the effectiveness of the measurement system to meet its purpose?** The effectiveness of the measurement system must be assessed at every level at which it reports. Most usually a business performance measurement system will have a number of well defined reporting levels. Within each of these levels the opinion of a group of users should be sought as to the effectiveness of the measurement system in fulfilling its purpose. In this way one does not have to rely on the measurement system to validate itself.

10.4.3. Worldview Issues of Measurement Complexity

In Systems terms much of the original work on this subject is attributed to Checkland (1981) he described a worldview as:

> "*the image or model of the world which makes this particular human activity system a meaningful one to consider.*"
>
> Checkland (1981) p.319

Hence a worldview is our way of seeing the world that makes what we are doing meaningful. For example if the purpose of a measurement system is to measure customer service, one's worldview might be that such measurement is a crucial marketing tool learn more about customers. However one might also view the same measurement tool as a means of monitoring a customer service training program, a way

to allocate performance relayed pay, or even a means of controlling staff. So a number of worldviews may exist in business performance measurement situations, indeed this is one of the aspects which categorises it as qualitative in nature with respect to the classification of measurement complexity.

Practitioners must seek to identify the various worldviews associated with the measurement system for two reasons. This is important to identify any conflicts between different worldviews held by actors, and to agree a common understanding of the purpose of the measurement system and an associated worldview. Not all actors will agree with this single interpretation, but all actors should understand that such a single interpretation does exist and hence they will share similar expectations of what the measurement system is for. Therefore one of the tasks of the measurement practitioner is to make explicit a single worldview that makes the purpose of the measurement system meaningful. The single interpretation of purpose and associated worldview should be reflected in the measurement system. One of the Systemic principles is that measurement systems reflect a worldview. Hence when building the measurement system practitioners should try to evaluate their design in terms of the single worldview identified for the measurement system.

- **What are the worldviews of those involved with the measurement system?** Measurement practitioners must strive to identify the worldviews of actors involved with the measurement system. How this is done will depend very much on the measurement situation and whose worldview is being sought. Often discussions with senior managers (owners) of the measurement system about the purpose and information required will give the builder an appreciation of their worldview. On a larger scale workshops/focus groups may be done with users and consumers to identify their worldviews.

- **What should be the worldview reflected in the measurement system?** Since the measurement system will reflect some worldview it is important that this worldview is made explicit and actively managed. In business performance measurement situations it is likely that the *owners* of the measurement system will decide which worldview is reflected. Once the decision has been made, the builders must strive to refer every technical decision they make about the measurement system to the worldview. They must ensure that measures strive to reflect the world through the eyes of that worldview.

- **Are there any conflicts between the worldview reflected in the measurement system and others held by actors within the system of interest?** It must be stressed that not all actors will agree with and share this worldview, however they should all be aware that it exists and what it is. The previous statement is especially the case where there is a direct conflict between different worldviews, for example some may view the same measurement system as either an empowering or controlling tool. Where this conflict exists the builder must make sure that everyone is aware of the single agreed worldview. Also the builders should take account of this worldview when thinking about the behavioural influence of the measurement system.

10.4.4. Behavioural Influence Issues of Complexity

When discussing these issues practitioners should be aware that measurement has two types of behavioural influence. The most obvious is the influence that arises from the numeric information generated by the measurement system. This kind of influence is to be expected and such influence will be considered when reflecting on the purpose of the measurement system. The second type of behavioural influence is the *preceding* influence, the recognition of which is a principle of the Soft Systemic approach to measurement. Such *preceding* influence is produced by the measurement system before

any output of information. It the *preceding* influence of measurement that the issue below seeks to appreciate.

- **Is the measurement system likely to have a preceding influence on the behaviour of the system of interest?** The presence of a preceding influence is the determinant of the active nature of a measurement system. Practitioners need to have some idea as to whether a preceding influence will exist. As always this will depend on the particular measurement situation, however it has much to do with the participatory nature of the measurement system. The more that actors are included in the design and data collection processes the greater the chance that the measurement will exert a preceding influence on the system's behaviour.

- **How will the influence of measurement manifest itself in the system of interest?** Again the way a preceding influence will manifest itself will be particular to a given measurement situation, however it will also depend on which actors are included in the design and data collection process. For example if frontline users are involved in the data collection process of a customer service measurement system, the preceding influence will manifest itself in the form of increased frontline/customer interactions. Furthermore, those interactions will be in the form of discussions about customer service. Once the manifestation of the preceding influence has been identified, it is possible to try to anticipate changes to the overall behaviour of the system.

- **What form will the changes have on the overall behaviour of the system?** Having identified how the preceding influence will manifest itself, one is in a position to anticipate the influence on the overall behaviour of the system of interest. For example the increased interactions between frontline staff (*users*) and customers (*consumers*) in which customer service is discussed might influence both groups behaviour. Staff might begin to take more responsibility for customer service issues resulting in a shift to bottom-up championship of customer issues. Also staff are

more likely to trust, buy into and use the information generated by the measurement system because they are responsible for collecting the data.

On the other hand the customers might begin to change their behaviour, for example they might be asked about areas or levels of service they had not considered before and now expect service at this level. Equally through the interaction they might build up a stronger relationship with the business and hence be more loyal. Alternatively they might wait to see if their comments/feedback is acted upon and if not become less satisfied because they have been ignored, in this case it would be better not to measure customers opinion. The different possibilities above emphasise the point that the only people who can make any useful speculation as to the overall affect are those who are part of the measurement system.

- **Will change be temporary or permanent i.e. single or double loop influence?** Having identified that preceding influences may create change to the overall behaviour of the system of interest the longevity of that change is interesting. The challenge of preceding influences to measurement practitioners is to acknowledge, recognise and manage them. To do this one must try to appreciate whether they create a temporary or permanent change. The model for describing preceding influence identifies two types. Single loop preceding influences are temporary in nature; they are the sort of change in behaviour which arises from an expected inspection. Double loop preceding influences occur when the mental model of an actor is changed. Hence the change is more permanent in nature, such as a question about a certain area or level of customer service that alters a customer's expectation of service henceforth.

- **Is the change one that corresponds with the purpose of the measurement system and the purpose of the system of interest?** Discussion as to the potential overall changes to behaviour that result from preceding influences is an issue for

management. True they may impact on the objective nature of measures but more importantly, in the Soft Systemic approach to measurement, they have to do with the purposes of the system of interest and measurement system.

If one recognises that the preceding influence will change overall behaviour in some way, it is vital to ensure that it does so in a way that supports the purpose of the measurement system and the system of interest. For example, if the measurement system were to act as a control on the behaviour of staff it is not appropriate to empower them to collect all the data, the temptation for falsification would be too great. On the other hand, if the measurement is to be used as part of customer service improvement program, empowering staff to collect data will have beneficial and supporting effects. As with may other elements of a measurement system it is important to make sure that the *preceding* influence is aligned, as far as possible, with the purpose of the measurement system. Where possible conflicts exist the builder should strive to create a measurement system that minimises their effect.

10.4.5. Measures & Measurement Process Issues of Complexity

This area of measurement complexity is to do with the more technical aspects of building the measurement system and then operating it. It covers such issues as: who should build the measurement system; how the design process should be approached; and how the data should be collected.

- **Who should build the measurement system?** When identifying people to build the measurement system there are two primary aspects to consider. The group need to have some experience or knowledge of dealing with complex measurement situations. However, equally important is that the group of builders have some members with a good experience of the particular system of interest. In most cases the *owners* of the measurement system will decide who should build it. If people

external to the system of interest are used it is vital that their knowledge is supplemented by *users* with the idiosyncratic knowledge about the system of interest. If the builders are all internal to the system of interest it is vital that they make an effort to abstract themselves from the system in some sense in order to better appreciate its measurement complexity.

- **Who should be involved in the design of the measurement system?** The Soft Systemic approach to measurement places great emphasis on participation in the design process, particularly when determining qualitative measures. The idealised design process (Ackoff (1994)) is a useful way of capturing the aesthetic values of participants. Hence the issue for the builders is to identify who should be included in the idealised design process. This decision will for the most part hinge on the purpose and information required from the measurement system. There are no definite rules for who should be included but usually it will be the *consumers* and *users*.

- **Who should be involved in the measurement process?** A key principle of the Soft Systemic approach to measurement is that preceding influences exist and that these influences should be proactively managed to help fulfil the purpose of the measurement system. To continue with the example of a customer service measurement system, the involvement of the frontline staff in data collection may have beneficial effects on customer service performance. In this case, builders may create a measurement system that maximises this beneficial influence through involving as many users of the information in the data collection process. However, if the measurement system is means of controlling performance, or perhaps rewarding staff, the emphasis may be on minimising the possibility of falsification and hence staff involvement in data collection. Similarly, if a railway operating company is interested in measuring punctuality it will record the arrival time of trains, however if it is interested in customer perception of service it will have to ask

customers *(consumers)* for their opinion. Hence the issue of whom to include in the measurement process is much to do with the purpose and the existence of potential preceding influences.

10.5. SSPMF and the Lessons from Case-study One

Case study one (chapter eight) revolved around the application of the Soft Systemic measurement key themes in a real world business performance measurement situation at PFS. Most of the six lessons learned from the case study were to do with the application of a Soft Systemic approach and hence the lessons have been a strong influence on the development of the SSPMF. This section of the chapter reviews these lessons and reveals how they are reflected in the SSPMF. The lessons from the case study are:

1. The use of qualitative / subjective measures presents little difficulty to real world business performance measurement practitioners.

2. The practitioners recognised that measurement was a purposeful activity, and found the emphasis placed by the Soft Systemic approach on articulating the underlying objectives of measurement both new and useful.

3. If measurement is to be used in a purposeful and proactive way to influence behaviour, the objectives of the measurement must be articulated clearly and loudly enough to create a general appreciation of them amongst all involved in the development of the measurement system. Otherwise the new measurement system will reflect the default worldview/culture of the organisation.

4. An unguided participatory process of building measurement systems would naturally produce measures that supported the current dominant, or default, behaviours of a social system. The participatory development process needs to reinforce the other Systemic themes so that the default influences would be balanced by the influence of the articulated objectives of the measurement system and a rich appreciation of the measurement context.

5. Critical awareness should extend past an appreciation of the influence that measurement may have on the behaviour, to include an appreciation of the context in which the measurement system will operate.

6. People involved in the development of the measurement need to be aware that they are using a Soft Systemic approach. Therefore, the Soft Systemic approach must produce a practical means by which practitioners can implement it, and appreciate that they are doing so, without having to be fully cognisant of the theory and principles that govern such an approach.

10.5.1. Lesson One

The use of qualitative / subjective measures is a common feature of business performance measurement, however there is not always a great deal of understanding, within measurement situation of the implications of using such measures. Hence, the challenge for the SSPMF in relation to this lesson is to encourage practitioners to consider the implications of using qualitative measures when they are often comfortable and already experienced with the use of such measures. The SSPMF encourages practitioners to do this through giving thought to practical issues it identifies in relation to their specific measurement situation. It does not seek to promote a debate about the validity of such measurement, rather it accepts that such measures are commonly used and therefore seeks to guide practitioners in the most effective use of such measures.

10.5.2. Lesson Two

That measurement is a purposeful activity was no revelation to the practitioners at PFS. They, like many other business performance measurement practitioners, recognise that their measurement activities are done not just to find out more, but to use this information to change performance in some way. A deeper set of objectives exists behind most measurement activity, whether those objectives are to disprove a theory or

change performance. Given the subjective nature of social systems, such as business systems, a clear understanding of the purpose of the measurement is critical for the measurement system to be effective. In-depth probing of the underlying objectives of measurement, and how the measurement system will meet those objectives is not always something that business performance practitioners have done. Indeed when time was spent at PFS doing this the practitioners found it much easier to make decisions during the building of the measurement system. Through consideration of the roles, objectives and worldview within the measurement situation the SSPMF encourages practitioners to give good consideration to the purpose of the measurement system and the objectives of the system of interest. The SSPMF enables practitioners to gain a better appreciation of the measurement situation that will enable them to build more effective measurement systems within their specific measurement situations.

10.5.3. Lesson Three

A key lesson of the PFS study was that it was not enough just to identify the purpose of the measurement system. In addition, that purpose must be articulated to those involved in the measurement situation, and their reaction to it must be considered. The SSPMF seeks to address this in two key ways. Firstly, it encourages practitioners to identify not only those involved with the measurement situation but also the role they play in it. Hence, it is possible to discuss the purpose of the measurement system with those involved, or at least representatives of those who play the typical roles in a measurement situation. Secondly, the SSPMF encourages practitioners to investigate and seek to appreciate the worldviews of those involved with measurement situation. During this process the purpose of the measurement system will at least be articulated to those involved in the measurement situation, and some will be involved in the articulation of the purpose of the measurement system. The SSPMF also encourages practitioners to ensure that a common purpose for the measurement system is identified and articulated, even if not all involved with the measurement system agree with it. In this way, the

SSPMF encourages the articulation of a common purpose to all those involved with measurement system.

10.5.4. Lesson Four

A principle of the Soft Systemic approach to measurement is that the process should be participative. The work a PFS followed this principle and as a result found that much of the measurement system built reflected the current culture of the organisation, which was contrary to the articulated purpose of the measurement system. Hence, the lesson learnt was that the participatory process must be guided, or structured, in some way to ensure that Soft Systemic principles are reflected in the method. The SSPMF is in itself an attempt to do this, since it presents to practitioners practical issues based on the Soft Systemic principles. The SSPMF also seeks to ensure that all those involved with the measurement system are aware of the articulated purpose of the measurement system, hence they will have a common frame of reference to use during any participative process.

10.5.5. Lesson Five

The Soft Systemic approach calls for practitioners to develop a critical awareness about the effects of measurement on the behaviour of their system of interest. The Soft Systemic principles translate this concept into recognition that measurement can influence behaviour. Furthermore, if practitioners are to hope to appreciate the possible influence that measurement might have on the behaviour of a system of interest they must have as rich an appreciation of the measurement situation as possible. Specifically, an appreciation of the worldview of those involved with the measurement system. The SSPMF helps the practitioner to do this by identifying a set of generic roles for people within measurement situations, it then asks the practitioner to consider the worldviews of the people involved in the measurement system. In this way, the SSPMF assists practitioners to gain an appreciation of the complexity arising from the people involved

in the measurement system. This enables practitioners to best seek to appreciate the possible influence the measurement may have on the behaviour of the system of interest.

10.5.6. Lesson Six

The final lesson learnt from the PFS work was that those that had knowledge of the Soft Systemic principles were able to appreciate the complexity of the measurement situation more fully. However it was equally clear that not all practitioners, yet alone all those involved with the measurement situation, would have the time or inclination to review the Soft Systemic principles and their implications. Hence the challenge of this lesson was to provide a means by which the practical benefits and implications of the Soft Systemic approach to measurement could be achieved without having to be fully cognisant of the theory and principles that govern such an approach. The SSPMF, that is a pragmatic framework for practitioners, is the answer to this challenge.

10.6 Chapter Summary

The overall aim of this chapter has been to introduce the Soft Systemic Performance Measurement Framework (SSPMF). This framework has been developed to assist measurement practitioners to further appreciate the complexity of measurement situations. It seeks to do this not by asking practitioners to follow a prescribed approach. Rather a set of cycles was identified along which practitioners should travel in order to gain the fullest appreciation of the complexity of a measurement situation (fig.10.1). These cycles were:

1. Categorise measurement situation
2. Appreciate complexity of measurement situation
3. Measurement

The classification of measurement situations, presented earlier in the thesis, was made use of and a number of pragmatic questions were elaborated to assist practitioners with the classification of measurement situations. Further guidance was then given as to what kind of measurement approach is most appropriate to each measurement situation (fig.10.2).

The 'framework jigsaw' was introduced to draw attention to five areas for practitioners to consider:

1. People/Roles issues
2. Purpose issues
3. Worldview issues
4. Behavioural influence issues
5. Measures & Measurement process issues

The framework encourages practitioners to consider the unique nature of their specific measurement situation and provide their own solutions to that complexity. The framework is a means by which practitioners can evaluate their own measurement system. Having done this it hopes to leave them in a more informed position from which to build a measurement system that best meets the challenge of their particular situation.

Having introduced the framework the last section of the chapter showed how the lessons learnt from the first case study (PFS) had been translated into the SSPMF.

Chapter Eleven: *INITIAL VALIDATION OF THE SOFT SYSTEMIC PERFORMANCE MEASUREMENT FRAMEWORK IN CASE STUDY ACTIVITY*

11.0. Introduction & Situational Analysis

This chapter reviews work carried out at Network SouthCentral (NSC) in which the Soft Systemic Performance Measurement Framework (SSPMF) was used, and in doing so seeks to provide an initial validation of the framework. This assessment was made in terms of two criteria:

- Whether the measurement system created would meet the objectives of the real world business performance measurement situation;

- Whether the use of the SSPMF brought benefits to the measurement situation, above what would have been achieved without its use.

In previous chapters it has been asserted that the Soft Systemic approach to performance measurement would be beneficial to business performance measurement. According to the new classification of measurement contexts proposed in this thesis business performance measurement can generally be categorised into two types of measurement situation. The two categories are the qualitative/passive and qualitative active measurement situations, the two projects reviewed in this chapter represent one of each of the categories. The work at NSC involved two individual projects both in the area of customer service. One project was a review and updating of the NSC Customer Correspondence Systems (qualitative/passive), and the other was the design of a Customer Recovery Index (qualitative/active).

Network SouthCentral was one of the twenty-five Train Operating Units (TOU) established by the 1993 Railways Act (HMSO, 1993). Each TOU was responsible for operating train services in a defined geographical area, in the case of NSC this consisted of services south of London down to the Sussex and Hampshire coastline. The Railways Act paved the way for the privatisation of parts of the UK railway network, consequently NSC was undergoing a process of radical transformation as it prepared for eventual privatisation. As part of the strategy to meet the challenge of competing as a private business they concentrated their efforts towards becoming a customer focused organisation that provides excellent customer service. Whereas before NSC managers were expected to manage the business with regard to efficiency, effectiveness and safety, now their business objectives all aimed to delight their customers.

Network SouthCentral were keen to ensure that they were targeting operational processes that were of most importance to their customers, and that they were monitoring their performance in these areas through key performance indicators. To do this they recognised the need to increase their understanding of customer requirements and how their internal processes were meeting those customer needs. There was little doubt that the top level management of NSC Commercial Division had adopted an active strategy of Customer Focused Quality, as evident in the NSC vision statement:

> *"By marketing activity and customer led behaviour, to attract, maintain and retain customers."*
>
> SouthCentral Commercial Division, Internal Document 1 (1993)

If NSC were to successfully achieve their vision through *marketing activity* they had to have an intimate knowledge of their customers' requirements. If they were to differentiate through *customer led behaviour* they must satisfy, and wherever possible delight, their customers with their standard of service. Therefore to *attract, maintain and retain* customers their mission was to increase customer satisfaction by continuously improving

the level of customer service at NSC. To implement this strategy NSC recognised that they needed to have a good knowledge of the performance of service providers and the way this performance is perceived by their customers. Hence their measurement systems must provide three things:

- Information about the current levels of NSC Customer Service & Satisfaction and the way customers perceive the service
- Information about changes in the levels of NSC Customer Service & Satisfaction and the way customers perceive the service
- Effective communication of this information throughout NSC.

During one of the initial meeting with the NSC Commercial Executive group they were asked to identify the key attributes of any measurement system. The factors that they decided upon are shown in figure (11.i.).

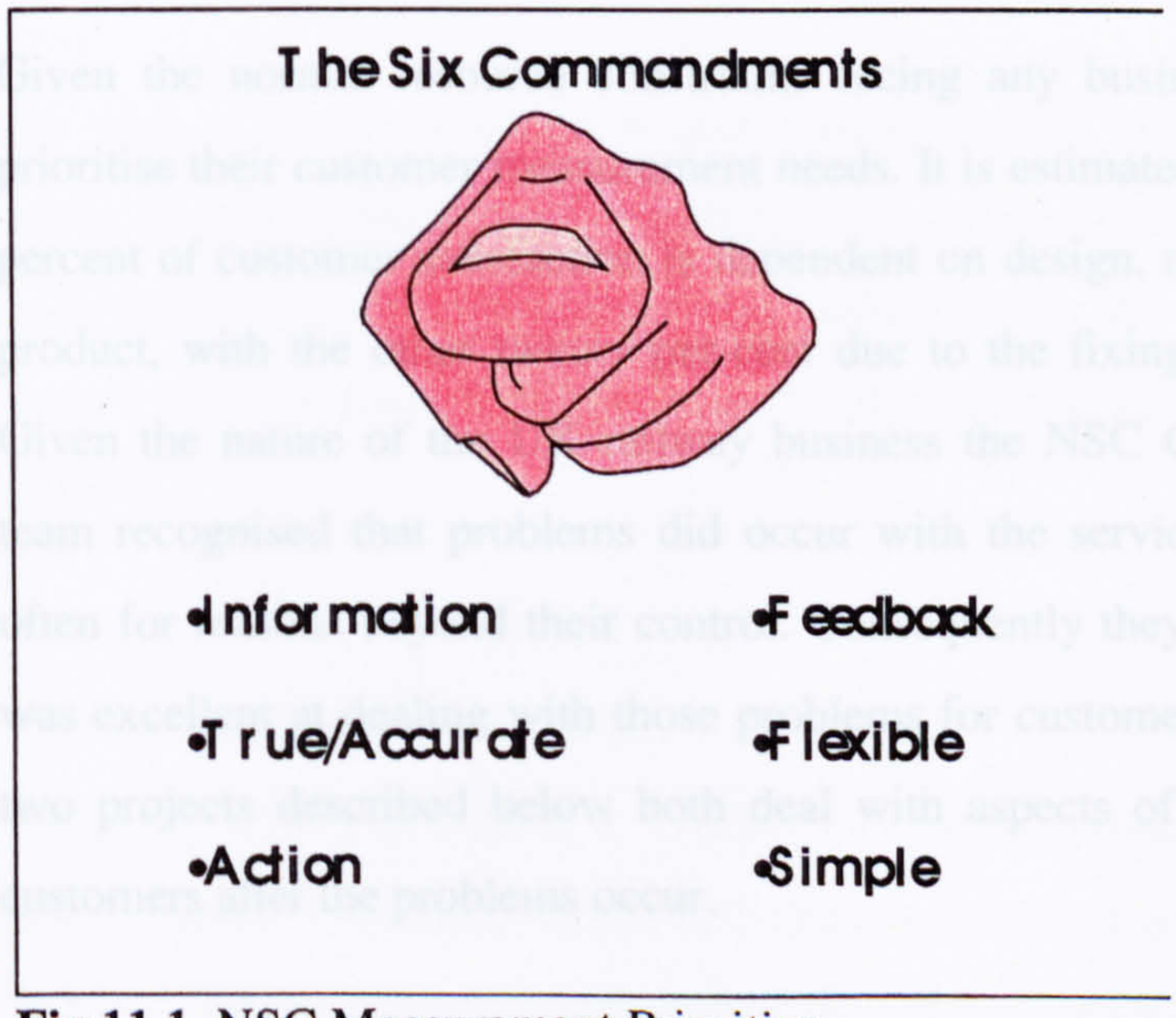

Fig.11.1. NSC Measurement Priorities

The first attribute is perhaps the most important; a measurement system must provide information and not just data. It is an important distinction that the function of most mangers is to interpret information they receive into operational action, it is not their function to interpret raw data. The need for information is mirrored in the requirement that the measurement systems should inspire action. NSC wanted their measurement systems to identify gaps in their customer service and to help them prioritise their actions by indicating the importance of different aspects of service to the customers.

Once action had been taken they wanted to assess the effects of that action, hence the need for a feedback channel in the system. Naturally they wanted the information to be as accurate as possible and simple, thereby ensuring that the data was easy to collect and that it was easy for all NSC service providers to understand and believe the information that would be used to manage their service effort. They wanted the measurement systems to be flexible so that they could be used as general performance measurement systems, but also as a means of focusing attention on specific areas.

Given the normal resource constraints facing any business organisation NSC had to prioritise their customer measurement needs. It is estimated (Adamson (1993)) that eighty percent of customer satisfaction is dependent on design, manufacture and delivery of the product, with the other twenty per-cent due to the fixing of problems after they occur. Given the nature of the UK railway business the NSC Commercial Division executive team recognised that problems did occur with the service provided to their customers, often for reasons beyond their control. Consequently they were keen to insure that NSC was excellent at dealing with those problems for customers once they had occurred. The two projects described below both deal with aspects of providing excellent service to customers after the problems occur.

11.1. Case study – NSC Customer Correspondence System

11.1.1. Introduction & Situational Analysis

The Customer Relations department managed the NSC customer correspondence system. It transformed the written customer correspondence into complaints codes that were stored in a database. This data was accessed at the end of every four-week period and compiled in the form of a Customer Services Report that was distributed to the senior management team and business area managers. The objectives of the system were twofold and were not being met:

- To use the coding systems to turn the customer data into customer satisfaction information;

- To use the report to turn that customer satisfaction information into actionable information for NSC managers.

The aim of the case study project was to review and update the current customer correspondence system using industry norms outlined in the work of Adamson (1993) and applying the SSPMF. The project was undertaken by the author without the support of a project team, as such it differs from the Recovery Index project where a team used the SSPMF.

11.1.1.a. 'As-is' Assessment

Adamson (1993) described a vision of customer relations departments as part of an organisation's marketing effort, delivering a customer retention marketing strategy. He believed that customer relations in the UK and Europe can be characterised by a four stage evolutionary growth pattern, see fig(2.ii).

Stage one is primarily interested in survival. The department is stagnant, customers are mainly dealt with by letter, and when customers do try to telephone the lines are engaged and the department inaccessible. All this means there is a significant delay before customers will receive an answer yet alone a solution. There is small database that probably lists names, addresses and some general complaints codes. Letters are word-processed but beyond this there is very little computerisation. The department makes almost no contribution to running the business and is for the most part ignored by other areas of the organisation.

Four Stages Of Customer Realtions Growth

Reactive → **Proactive**

1) Stagnant	*2) Developing*	*3) Acceleration*	*4) Take-Off!!*
• Inaccessible by phone • Delay • Minimal computerisation • Little contribution	• More complaints over phone • Time lags cut • Enhanced computer support • Some management reporting	• Large degree of computerisation • Company wide strategy of customer care • Invites complaints • Change in departmental culture	• Recognition of value of data • Customer consultants • Very well publicised helpline

Tarp Europe Ltd.

Fig.11.2. Four stages Of Customer Relations Growth

At stage two, the customer relations department is developing. More complaints are handled over the phone and there is increased computer support. This results in a cut in back logs and there is some management reporting by the department based on primitive preventative analysis.

Stage three can usually only be triggered by a large investment in computer support and the integration of the department into a general strategy of customer care. The department makes it easy for customers to complain. Managers spark a change in culture by focusing on measures of satisfied customers as opposed to the old administration and productivity measures.

At stage four the department is taking-off. The rest of the organisation recognises the importance of the data and information it produces based on very sophisticated preventative analysis techniques. The customer services department takes a role in decision-making by acting as internal customer consultants, and the real customers are aware of a well publicised help line.

When reviewed against Adamson's (1993) model the customer relations department of NSC was essentially at the stage two level of growth, however some of the characteristics of stage three were evident. As in stage two increasing numbers of complaints were dealt with over the phone, time lags were being cut and there was some increased computer support to help with data analysis. There was also a spreading acceptance of the customer service reports by the rest of the organisation, however further progress in this area was a key issue for the new measurement system.

Having done an initial 'as is' assessment the approach shifted to that encouraged by the SSPMF. The framework, as more fully described earlier in the thesis, seeks to alert measurement practitioners to issues within measurement situations thereby prompting a greater appreciation of the measurement situation. Armed with this greater appreciation, practitioners will be able to build measurement systems that support their objectives more effectively.

The SSPFM specifically aims to help practitioners to categorise the measurement situation, using the classification system introduced early in the thesis, and to appreciate the complexity of the measurement situation. The SSPFM does not have a linear process with a start and an end point that practitioners should follow, rather it is better described as a cycle (see fig 10.1) into which practitioners may enter at any point. In the case of the Customer Correspondence System, given that the initial measurement system was already in place and that the 'as is' assessment has been completed, it was decided to begin this application of SSPFM by categorising the measurement situation.

11.1.2. Categorise the Measurement Situation

The categorisation of measurement situations introduced earlier in this thesis reviews the measurement situation in terms of their qualitative / quantitative nature, and their active / passive nature. The SSPFM prompted the following questions with regard to the Customer Correspondence System measurement situation at NSC.

11.1.2.a. Qualitative / Quantitative Nature:

1. Are the measures likely to be derived from fundamental measures?

2. Is the output from the measurement system likely to lead to information that is linear, where cause and effect relationships are easily identified?

3. Is there a single and shared worldview that makes the purpose of the measurement meaningful?

The measurement situation was categorised as qualitative in nature for the following reasons:

1. Members of the Customer Relations team classified the correspondence using a set of codes. This classification process was by no means an objective process since the team were required to make judgements about which code, or codes, most closely reflected the content of the correspondence. Under the existing measurement system at the end of the month the number of times each code had been reflected in the total correspondence processed that month would be added up. These figures would then be reported throughout the organisation. Hence, just that process of 'adding up' could be argued as being derived from fundamental measure. However if the measurement system was to provide an indication of customer satisfaction, as articulated in the initial objectives, an element of

customer perception would have to be introduced thus further reducing any link with fundamental measures.

2. With regard to the second question, one of the objectives for the revamped measurement system was that is should provide information about customer satisfaction. Hence the data collected would be used as a way of improving customer satisfaction, the cause and effect relationships between the customer correspondence datum and customer satisfaction was complex and far from easy to identify.

3. The third question asks about the existence of a single and shared worldview that makes the measurement meaningful within the measurement situation, this was not the case. There seemed to be confusion around whether the role of the measurement system was simply to track the number and causes of customer correspondence, or whether it was to be seen as a dynamic indication of customer satisfaction and should therefore be used in day to day business decisions. The complexity arising from this confusion was identified as an area that would need more attention during the 'appreciate' activity of the SSPMF.

11.1.2.b. Active / Passive Nature:

1. Is the measurement likely to have a preceding influence (i.e. an effect before any output from the measurement system) on the behaviour of the system of interest being measured?

There were two aspects of the customer correspondence system that meant it's capability to exert a preceding influence on behaviour would be negligible. Firstly, NSC collected the data reactively from correspondence. Secondly, a small team carried out the process of analysing the datum centrally. Both these aspects meant that there was

little opportunity to influence behaviour during data collection thereby creating a preceding influence within the measurement situation. Given this, the active / passive nature of the customer correspondence system is best reflected by the 'passive' category.

The entry point to the SSPMF for the NSC customer correspondence system was to categorise the measurement situation. The analysis above reveals why the customer correspondence system was categorised as a Qualitative / Passive measurement situation, one in which a SSPMF would help practitioners (see fig 10.2). Having categorised the measurement situation the SSPFM was used to gain a fuller appreciation of the complexity of the measurement situation.

11.1.3. Appreciate the Complexity of the Measurement Situation

The SSPMF prompts practitioners to review four key influences on the complexity of the measurement situation, as well as the measures and measurement process itself. Altogether, these five areas are shown in the jigsaw diagram (see fig 10.3) and reviewed in more detail in an earlier chapter (see section 10.4.). The following shows the appreciation of the complexity of the customer correspondence system measurement situation that was attained using the SSPMF at NSC. It should be noted that the effort to gain a greater appreciation of the complexity at NSC was done in terms of the whole measurement situation. It did not deal with all the people/role issues and then move to all the purpose issues, rather there could be learning about more than one of the five areas at any one time. The whole process was an iterative one based around the whole set of issues to do with measurement complexity identified in the SSPFM. However for the task of writing up the investigation the complexity areas are shown separately.

11.1.3.a. People / Roles Issues of Complexity

The framework asks practitioners to think about the people involved in the measurement situation in terms of these generic roles: owners, users, consumers, and builders.

- **Owner:** Identification of the owner of the NSC customer correspondence system proved to be an interesting task. Until very recently the customer correspondence system had had a low profile within NSC, it had been seen as an operation that had very little effect on the rest of the company. As such it had been left very much to be the responsibility of the manager of the Customer Relations department who, under these circumstances, would have been identified as the owner of the measurement system. However the main reason that NSC had decided to revamp the customer correspondence system was because the Commercial Director wanted to use the measurement system as a dynamic and frequent indicator of customer satisfaction. Indeed, it was the Commercial Director who originally briefed the author on the

project. As such, it could be seen that owner of the customer correspondence system had shifted from being the Customer Relations Manager to the Commercial Director, furthermore that this had been a recent shift.

- **Users:** The users of the measurement system are those who will use the information output from the measurement system and those most likely impacted by any behavioural influences from the measurement system. Just like the ownership of the measurement system seemed to have shifted given the wider role mapped out for the customer correspondence system, so too had the members of the user group. In the past the users largely consisted of the Customer Relations manager and her team and a very similar group who were involved in customer complaints at the British Rail level. With the arrival of the new Commercial Director, and the emphasis he was placing on the customer correspondence system the user group for the revamped measurement system had increased. It was intended that two key groups would use the output from the measurement system in order to help them run the business: the senior management team and the Regional Business Managers. Meeting the needs of the widened group users represented a significant challenge for the new customer correspondence system.

- **Consumers:** The consumers of the measurement system are those who consume the performance of the system of interest, often the internal or external customers of a business. Once again when probing this issue it became clear that there would be a shift of emphasis between the initial and revamped customer correspondence system. In the past, the measurement system was viewed as a way of monitoring complaints and providing some upward reporting to British Rail. The measurement system placed emphasis on showing that customer correspondence was being responded to by NSC, hence the consumers of the measurement system were those involved in the management of complaints / correspondence for NSC and British Rail. The revamped customer correspondence system would be viewed as an

indicator of customer satisfaction and would be used to improve the customer service provided by NSC. In this scenario it is the customers of NSC who are the consumers of the measurement system. So the emphasis of the measurement system could be seen to have shifted from a small set of internal customers to those making use of NSC's services, the external customers.

- **Builders:** The final group that the SSPFM seeks to identify are the builders of the measurement system. NSC wished the revamped customer correspondence system to be in place as quickly as possible, and they were concerned that the Customer Relations department was very busy and beginning to fall behind in processing (coding and answering) all the customer correspondence. It was also believed by the Commercial Director that an external person would best be able to review the existing customer correspondence system and design the revamped one. For these reasons NSC tasked an external consultant, the author, to do most of the work with advice from the Customer Relations Manager.

The key learning from the investigation into the complexity surrounding people and roles was to make more obvious the fundamental shift from existing to revamped measurement system. There would be a new owner, an enlarged and more demanding user group, and a shift of emphasis onto the external customer. It was clear that these groups must have input to the design of the new customer correspondence system.

11.1.3.b. Purpose Issues of Complexity

A reading of the section above makes it clear that it is impossible to identify the roles/actors within the measurement system without making reference to the purpose of the measurement system. Hence there was a large degree of linkage between the issues probed under each heading. The SSPMF identifies eight key issues that should be considered when seeking to appreciate the complexity to do with the purpose of a

measurement system. These are reviewed below in terms of the NSC customer correspondence system.

- **What is the purpose of the measurement system?** The purposes of the revamped customer correspondence system were twofold:

1. To use the coding systems to turn the customer data into customer satisfaction information

2. To use the report to turn that customer satisfaction information into actionable information for NSC managers.

The first issue to note was that these two purposes were significantly different to the current purpose of the measurement system. Currently, the data was being used primarily as a reporting tool to ensure that NSC was responding to customer correspondence. The new measurement system was to deliver information about customer satisfaction and to ensure that this information would be actionable for NSC managers. Specifically, the information had to be actionable for two key groups, the senior management team and the Regional Business Managers. However it was also felt that the information should be accessible to the service providers at the frontline, so some way should be found to present the information to them in a meaningful way. Finally, it was felt that the information should be fed back to the customers, this was an insight from the identification of this group as the new consumers of the measurement system.

- **What is the purpose of the system of interest?** The purpose of the system of interest could best be articulated with reference to the NSC mission statement 'to attract, maintain, and retain customers' (see section 11.0). The purpose articulated for the new customer correspondence system would help to serve this system by

providing information about the satisfaction of customers and clues as to how to improve satisfaction. It was interesting to note that the current measurement system had a different system of interest that was centred on the effective management of customer complaints across the whole of British Rail. The new customer correspondence system would still have to provide information to satisfy the demands of the original system of interest, however the main purpose was now to support the primary objectives of NSC as a whole. Therefore the new measurement system would be much more closely aligned with overall priorities of NSC.

- **Will the environment have an influence on the measurement system?** The environment was always a factor at NSC because the business was so open to influences beyond its control. It was identified that often customers would correspond about aspects of the service that were outside the direct control of NSC. For example, customers may complain about a long delay due to a broken rail, or perhaps cancellations due to striking signal staff, both such aspects were the responsibility of other areas of British Rail. However, it was decided that since it was NSC customers being affected and that NSC took responsibility for customer recovery in these situations it was important the measurement system deliver information about this. Although this might appear to be an obvious conclusion, it was an issue that had been hotly debated through out NSC. There was an attitude amongst some staff that if NSC had not directly caused a problem for customer they had no responsibility to help fix it, and if they did help customers should be grateful regardless of the attitude with which that help was provided. Consequently, the issues surrounding this aspect led to a clear articulation that NSC owned the experience of its customers; and that it was responsible for doing everything it could to relieve the problem initially; and to take steps, in partnership with those responsible, to reduce the likelihood of it happening again.

Another aspect of the environment was that the source for the data was the customer correspondence. NSC had no control over the amount of correspondence provided by customers, sometimes this may be high and potentially it could be low. Consequently, it was recognised that a massive surge of correspondence might have the ability to swamp the measurement system, and so must be planned for. Also it was noted that customers might stop writing, hence NSC decided to make plans to encourage customer correspondence.

- **Who should decide the purpose of the measurement system?** It could be argued that in this sense business systems are less complex than other types of social systems because there is usually an easily recognisable decision maker in business systems. At NSC this person was clearly the Commercial Director, it was he that identified the need for a revamped customer correspondence system and set the initial direction for the new measurement system.

- **Who should determine the purpose of the measurement system?** Although the power of the Commercial Director to decide the purpose of the measurement system was clear, the SSPFM prompts the question who should determine the purpose of the measurement system, even if they are not the ones to decide its purpose? There were three opinions that needed to be sought on this matter, those of the Customer Relations Manager, the senior management team, and the Regional Business Managers. There was no common view across these groups that largely resulted from the different types of worldview held by member of these groups. Issues to do with the differing types of worldview are reported later during the discussion of worldview complexity.

- **What information needs to be collected to fulfil the purpose of the measurement system?** Having begun to build a clearer appreciation of the purpose of the revamped customer correspondence system the question arises: what

information needs to be collected to fulfil the purpose of the measurement system? There were two key areas of information that needed to be collected. The first was that the correspondence needed to be collected as normal, and this information needed to be coded. The second area was that some kind of importance weighting of the codes would be needed, based on the opinion of customers. Having a system that incorporated a weighting of codes would allow NSC decision-makers to make trade-offs aimed at aspects of service that mattered most to their customers. It would also makes it easier to detect problems that have a large impact on customer satisfaction, due to the precedence the system would give to those codes with larger values.

- **What information needs to be provided, to whom and in what form in order to fulfil the purpose of the measurement system?** Using SSPMF it became apparent that the information produced would be drawn from coding and weighting the customer correspondence. This information would be combined to provide a single source of information that would be communicated to the relevant parties within NSC and the wider system of interest. The single source would be created using the following simple equation:

$$\mathbf{V = Q \times W}$$

V = Value

Q = No. Of Correspondence Received

W = Customer Importance Weighting

Having determined what information needed to be provided it was necessary to determine to whom it should be provided. The SSPMF asks practitioners to identify the user group, this question seeks to identify what information the *users* need to be provided with. Two groups of users were identified; the traditional users who were those involved with reporting the customer correspondence data upwards to BR and the wider system of interest; and the new users the NSC senior management team

and Regional Business Managers. The traditional users would receive the numbers of correspondence in each code as usual. The issues lay around designing the reporting process for the new user group.

The RATER (Zeithaml, Parasuraman, & Berry (1990)) system of classifying customer service was standard knowledge at NSC and it was sensible that as many of the customer satisfaction measurement systems as possible should be centred on this model. Hence it was decided that the codes would be classified under the five RATER headings. The information from the customer correspondence system would then be incorporated in the monthly NSC Customer Service Report. This report was authored by the Customer Services manager and circulated to the NSC senior management team and Regional Business Managers at the end of every month. It was the main tool by which information about quality of service was provided to the key decision-makers within NSC. It was believed that incorporating the information from the customer correspondence system into the Customer Service Report would provide the necessary status to the information.

Within the general heading of Customer Service Reports there were ten business area sections and one HQ / overall summary section. The Regional Business Managers received the section for their own area and the summary section. Discussion with the new user groups revealed that they were most interested in trends in customer service, rather than a backward looking static picture of last month. Therefore, in terms of the customer correspondence system it was decided that on each report there would be graphs that showed the trend over the last twelve periods for each of the RATER classifications within that area. In addition a number of key issues would be highlighted in a summary for each section. Regional Business Managers would also be provided with a list of the letters received concerning issues in their area and their associated RATER classification so that they can have access to them if they so wish.

This was later strengthened to reflect a desire to involve Regional Business Managers in responding directly to their customers.

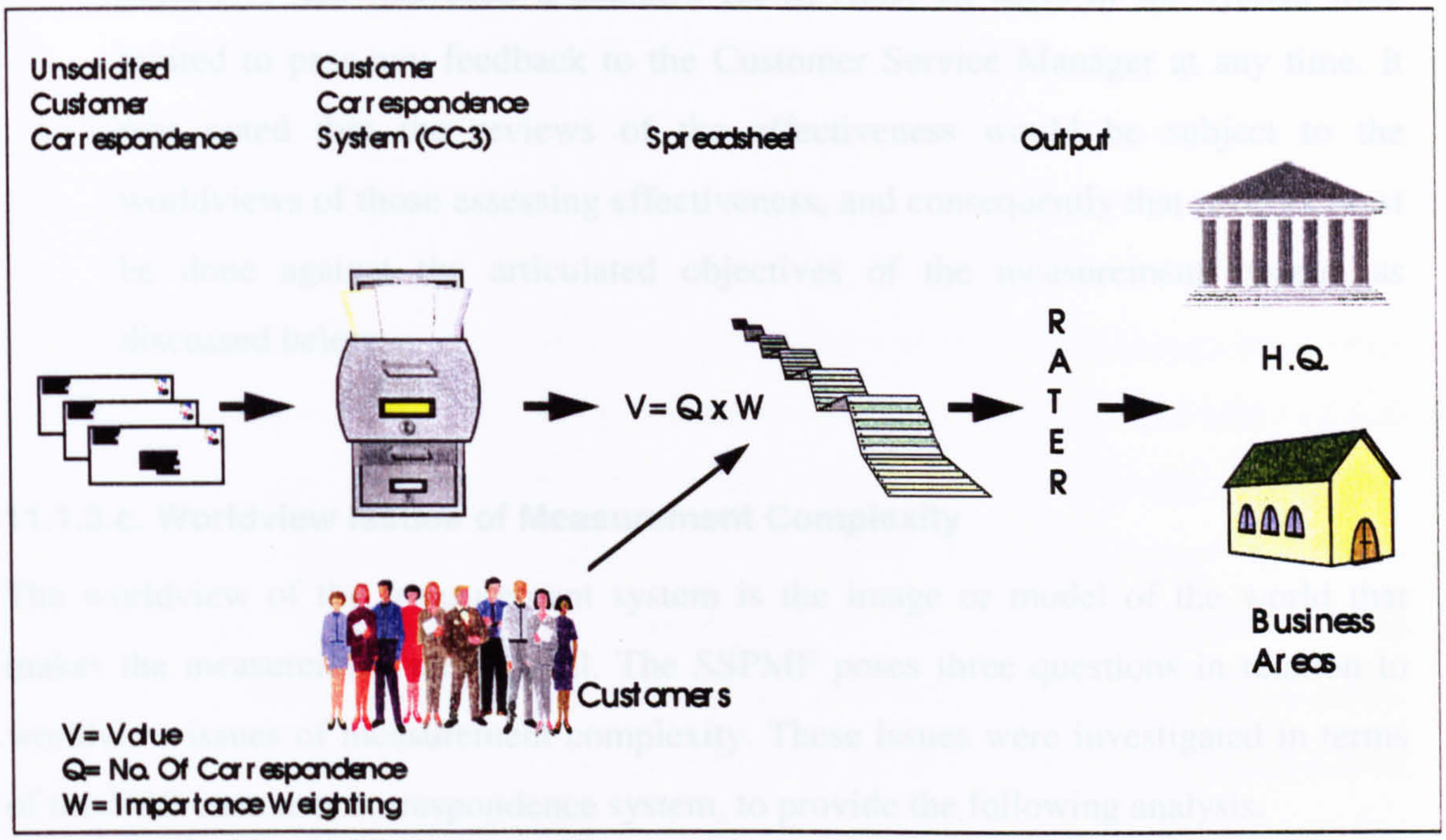

Fig.11.3. The New NSC Customer Correspondence System

The whole customer correspondence system for the new users is displayed in the figure above. Given the clarity around this process the SSPMF poses one last question when seeking to appreciate purpose issues of complexity in a measurement situation: who assesses the effectiveness of the measurement system to meet its purpose? The SSPMF suggests that the measurement system must be assessed at every level to which it reports.

In the case of the NSC customer correspondence system the traditional users were receiving the same information as usual and had their own quality assurance process to ensure their objectives were being met. The new user groups consisted of the senior management team and Regional Business Managers. It was agreed that the builders would formally approach them for feedback after the first month, the first quarter and the first six months. After six

months the owner of the measurement system, the Commercial Director of NSC, would carry out a review of the new customer correspondence system against the objectives that had been articulated for it. Also, all users of the system were invited to pass any feedback to the Customer Service Manager at any time. It was noted that the reviews of the effectiveness would be subject to the worldviews of those assessing effectiveness, and consequently that reviews must be done against the articulated objectives of the measurement system, as discussed below.

11.1.3.c. Worldview Issues of Measurement Complexity

The worldview of the measurement system is the image or model of the world that makes the measurement meaningful. The SSPMF poses three questions in relation to worldview issues of measurement complexity. These issues were investigated in terms of the NSC customer correspondence system, to provide the following analysis.

- **What are the worldviews of those involved with the measurement system?** In general it was possible to identify three kinds of worldview held in relation to the customer correspondence system. The different groups involved with the measurement system did not necessarily hold these worldviews, rather they could be detected across the different groups.

1. The first worldview was the one expressed by the Commercial Director, some members of the senior management team and some of the Regional Business Managers also shared it. This group largely viewed the customer correspondence system as an indicator of customer satisfaction. They wanted the 'voice of the customer' to be heard throughout NSC and so were keen that the profile of the customer correspondence system was raised. Hence, output from the customer correspondence system would be used to guide day-to-day decisions. Before doing this they recognised the need to ensure that the output was a closely linked

to customer satisfaction as possible, and that is came in a form that inspired action. Underlying their emphasis on customer correspondence system, was a belief that regardless of whether NSC had caused a problem or not it the primary responsibility was on NSC to solve it for their customers. This group felt that NSC owned the total customer experience even though they were not responsible for providing the whole experience.

2. The second group, made up of some members of the senior management team and perhaps the majority of the Regional Business Managers, also believed that the customer correspondence system was a good source of customer satisfaction. However, they did not really share the belief that NSC owned the whole customer experience. So they supported the idea that measurement system should be revamped to provide a clearer indication of customer satisfaction. However, they did not believe that much of the output from the customer correspondence system could ever inspire action at NSC. They believed that since much of the information provided was about areas outside of their direct control it was not their job to, or they were not able to, take action to improve the service for the customer. Hence they tended to view the customer correspondence system as something of interest, but not something that would influence their everyday decision-making.

3. The final group consisted of people largely involved with the existing customer correspondence system, particularly the members of the Customer Relations Department. They tended to view the measurement system from the perspective of its original purpose. Hence, they viewed the customer correspondence system as very much a way to manage the customer correspondence process. Their primary concern was actually responding to the letters, and so they viewed the measurement system as a by-product of this. Whereas the other groups were primarily interested in the output from the system, this group were primarily

interested in the data collection process. Their main objective was to make the coding process as efficient as possible, and they were not overly concerned with what happened to the output of the customer correspondence system.

- **What should be the worldview reflected in the measurement system?** The Commercial Director was the owner of the measurement situation and he was keen that the measurement should function according to his general worldview. He recognised that there was a group that did not believe that NSC owned the whole customer experience, and wanted to use the customer correspondence system as one means of influencing their thinking. So the worldview that the builder sought to reflect in the measurement system was the first one described above.

- **Are there any conflicts between the worldview reflected in the measurement system and others held by actors within the system of interest?** There was no real conflict between those that were primarily interested in the data collection process and the other two groups. The only conflict that did exist was around the area of the customer correspondence system providing actionable output, and hence what role the output should play in the day-to-day operation of the business. This conflict really stemmed from the split between those that believed NSC owned the whole customer experience and those who did not.

If one believed that NSC owned the customer experience, then all the output from the customer correspondence system would be relevant and so would be useful to one's day to day business. On the other hand, if one believed that much of the output would be irrelevant to one's day-to-day business, then the customer correspondence system would not be a tool that one paid particular attention to. Nor would one expect to spend a lot of time discussing the output from it at meetings or using it to help make decisions. This differing of worldviews in the area of ownership of the customer experience, and hence the role of the output from the customer

correspondence system is a theme had direct relevance for the potential behavioural influence of he measurement system.

11.1.3.d. Behavioural Influence Issues of Complexity

The SSPMF prompts questions in this area so that practitioners will consider the active or preceding influence that a measurement system can have on the behaviour of actors within it. This is as opposed to the passive influence that is caused by the output of the measurement system, and generally considered during discussion around identifying the information needed to support the purpose of the measurement system.

- **Is the measurement system likely to have a preceding influence on the behaviour of the system of interest?** In terms of the customer correspondence system at NSC there was little scope for preceding behavioural influences because the data collection process was reactive i.e. initiated by the customer, and carried out by a small and specialised team in the head office. Despite the small scope for preceding influence on behaviour, it was felt that the measurement system might be used in some way to influence those members of the senior management team and Regional Business Managers who did not endorse the concept that NSC owned the whole customer experience.

- **What form will the changes have on the behaviour of the system?** As discussed above there was little scope for the preceding influence to change the behaviour of actors within the measurement situation. However, as the senior management team and the Regional Business managers began to discuss how they would use the customer correspondence system, it provoked debate around the area of customer ownership. Hence the measurement system bought into the open the views of people, and enabled NSC to formulate an official line on whether they did or did not own the whole of the customer experience. As a matter of policy NSC did endorse

the concept that it owned the whole of the customer experience. As a consequence of this it also became policy, even before the revamped customer correspondence system was operational, that far greater attention would be paid to the output from the correspondence system. Hence managers, some of whom were sceptical about ownership of the customer experience, would be looking to the revamped customer correspondence system to help them deliver what the new policy was asking of them. This had the effect of placing high degree of positive and negative expectation on the measurement system.

- **Will the change be temporary or permanent?** Discussion of the role of the measurement system had created a new policy with regard to customer ownership for NSC, and raised the profile of the customer correspondence system amongst the senior management team and Regional Business Managers. The change in policy was a necessary one given the environmental changes affecting NSC i.e. the shift to privatisation. The SSPMF would view this as a permanent change because the shift required some managers to fundamentally shift the way they perceived the job of NSC.

The higher profile of the customer correspondence system was potentially only a temporary influence, since it was mainly brought about by both positive and negative expectations of whether the measurement system would be able to provide information that supported the policy shift. Given this situation, some thought was given to how to maintain the profile of the measurement system once the initial interest had dissipated. Consequently it was agreed that:

1. The output from the customer correspondence system would be segmented according to the NSC business regions; in this way Regional Business Managers could be responsible for the experience of customers starting their journeys in their areas.

2. The output from the revamped customer correspondence system would be an important item on the meetings of the senior management team and the Regional Business Managers, both when they met as a team and when they met individually with the Commercial Director.

3. Finally, it was felt that the Regional Business Managers needed some way of reinforcing the concept that they were responsible for customers living, or starting their journeys, in their areas. Consequently it was agreed that each period the Regional Business Managers would have to personally respond to some items of correspondence received from customers in their region.

- **Is the change one that corresponds with the purpose of the measurement system and the purpose of the system of interest?** Overall there were very few preceding influences on the behaviour of actors involved within the measurement system. Indeed the only significant influence were those created proactively in order to bolster the profile of the customer correspondence system amongst the senior management team and the Regional Business Managers. Consequently the changes arising from the preceding influences supported the articulated purpose of the measurement system and that of the system of interest.

Given the initial categorisation, using the SSPMF, of the customer correspondence system as generally qualitative and passive in nature, it was not surprising that there were few preceding influences on behaviour. Those that did exist was proactively created to help support the purpose of the measurement system.

11.1.3.e. Measures & Measurement Process Issues of Complexity

The fifth area of complexity that the SSPMF prompts the practitioners to ask questions about is the more technical aspects to do with the building and operating of the

measurement system. Attempts to appreciate the complexity of the measurement situation in relation to these questions are tackled by the SSPMF through questions about three areas: who should build, who should design, and what the data collection process should be. An initial understanding of the measurement situation revealed, that the reactive nature of the customer correspondence system would place restrictions on what the design of the data collection process could actually be.

- **Who should build the measurement system?** This question was not so critical in the NSC customer correspondence system because the project was a relatively small one, smaller than both of the other case study projects described in this thesis. Also NSC had stipulated from the beginning of the project that the author would be responsible for most of the work to design and implement the revamped correspondence system. This decision had arisen thanks to the desire to implement the new measurement system quickly, the pressure of work on the Customer Relations department, and a desire to have some one independent of NSC lead work on the development of the new measurement system. However, it was recognised that someone with good knowledge of the customer correspondence system would be required to be closely involved with the building of the revamped measurement system. The Customer Relations Manager was given this role given her intimate knowledge of the current customer correspondence system.

- **Who should be involved in the design of the measurement system?** The Customer Relations department would still be responsible for the day to day operation of the measurement system, and so it was important that the manager had a large degree of input to the design so that she would 'own' the revamped customer correspondence system. This decision initiated thinking around one of the other questions of the SSPMF, who should be involved in the design of the measurement system? The framework suggests that two key groups to be considered with respect to this area are the *users* and *consumers*. The key users of the revamped customer

correspondence system would be the senior management team and the Regional Business Managers. This group were involved in the design process, since they were consulted and discussed amongst themselves what the purpose of the measurement system was, and how the output from it should be used. Their involvement helped create a general and shared understanding around what the customer correspondence system was for. It should be noted that not all members of the user group agreed with the purpose of the measurement eventually articulated. But importantly, the SSPMF prompted questions to be asked that surfaced differences of opinion thereby allowing an openly articulated purpose to emerge.

The second key group that needed to be involved in the design process was the consumer group. In the case of the customer correspondence system this was the customers of NSC. One of the biggest problems for the current correspondence system was the codes did not reflect the priorities of customers, there was no sense of value attached to codes. This meant that all complaints were assumed to affect customer satisfaction in the same way. Both common sense and research rejected this assumption, so it was decided that the new system must take account of the seriousness of the type of complaint as well as the frequency. In other words, a weighting that represented the importance of that service aspect to the customer should be attached to each complaint code. The best way to determine what these codes should be would be to ask the customers i.e. involve the consumers in the design of the measurement system.

Historical search into the past data was a guide as to the sort of values that customers attach to codes. However, it was important to ask the opinion of the customers themselves. Three methods of carrying out this type of research were considered; focus groups, mail questionnaires, and face to face surveys with customers. Of the three the best option for NSC seemed to be the last one because it had the following advantages:

- Provided a 100% return rate, once customers had agreed to complete it
- Source of informal information, that could be fed back into the business
- Provided immediate and direct control over the sample group
- NSC would be seen by their customers to be interested in their views, even by those not actually surveyed.

Hence the consumers of the measurement system, the customers of NSC, provided input to the design of the measurement system through the face-to-face surveys. In one sense this input begins to answer the third question that the SSPMF asks in this area, who should be involved in the measurement process?

The SSPMF suggests that, practitioners consider the purpose of the measurement system together with the possibilities of any preceding influences, and hence identify any opportunities to proactively influence the behaviour of actors within the measurement system. These opportunities would then indicate who would be involved in the data collection process. However, it has already been stated that the Customer correspondence system was a reactive data collection process and so there was no opportunity to include others in the process.

On initial inspection it was felt that the coding of the correspondence, once it had been received, could have involved a greater number of groups than the small headquarters team, but further investigation revealed that this was not practical. Firstly, the coding required a certain expertise with regard to the meaning of the codes, and an agreed way of interpretation. Both of which are easier to create and maintain in a small and central group as opposed a large and diverse one. Secondly, the level of correspondence about certain areas was reported upwards throughout

British Rail, and the quality assurance procedures would not allow a large and dispersed group to be responsible for coding correspondence. Hence the only group that could be responsible in the data collection process was the NSC Customer Relations team.

Given the reactive and restrictive nature of the NSC customer correspondence system, many of the issues that the SSPMF normally raises with regard to the measures and measurement complexity found in a measurement situation were relatively simple to deal with. The decision as to builders had been agreed before the project began. The design involved the key groups identified by the SSPMF, the users and consumers. And the Customer Relations team proved to be the only group that could be involved in the data collection process.

11.1.4. Measure

The final aspect of the SSPMF cycle is to measure. The first stage of the actual measurement cycle for the NSC customer correspondence system was to deal with the complaints codes. The first issue was that the large number of complaints codes made the process of interpretation very complex. It also increased the time taken to process correspondence thereby adding to the backlog. On investigation it became apparent that some of the codes were very similar, and so they were combined into single new codes. These were confirmed against the needs of the traditional users to ensure the measurement system still me their objectives. The remaining codes were then classified under the RATER headings in preparation for the reporting format of the sections in the Customer Service Report determined in the *appreciate complexity* stage of the SSPMF.

The next step was to identify the customer importance weighting for each code. As reviewed in the *appreciate complexity* stage of the SSPMF there were a number of methods available to capture these weights. One way was to look at the past data and attach an importance value to the code based on the number of historical complaints.

Another, perhaps better, way was to communicate with the customers asking them to rank the codes according to levels of importance. This could be done through questionnaires or focus groups; questionnaires were selected as the most appropriate means.

Originally it was intended that the questionnaire would make use some form of Interpretative Structural Modelling techniques, to rank all the codes in order of importance. However, it was decided that it would be more realistic, and hence more beneficial, to design a questionnaire that let customers accord an importance value (1-6) to each code/aspect of service. This method did not force customers to make an arbitrary choice between two codes by asking which is more important. Instead it ensured that customers took a more holistic view of their service experience and allowed codes to be accorded the same importance. The survey took the form of a set of four questionnaires with twenty-five questions on each. Each of the questions assessed one of the service aspects represented by the complaints codes.

If the correspondence system was to reflect the views of the majority of NSC customers the survey sample had to mirror the profile of the NSC customer base. This information was gained from recent NSC Customer Profiling/Analysis reports and through discussions with the marketing department. Surveying took place over two weeks on NSC trains and at NSC stations. The survey had to take place at different times of the day, on differing types of journey and at differing stations.

Once the data had been collected it was introduced into the customers correspondence system. This meant that every code had a weighting attached to it that represented the importance that NSC's customers attributed to that aspect of service. In technical terms, this meant that at the end of each period the record files from the CC3 database system were down loaded onto a spreadsheet. The spreadsheet contained the weighting for the codes and their RATER classifications. The data in the spreadsheet was then used to produce the charts that formed the essential part of the sections in the Customer Service

Report. The charts would then be analysed by the Customer Service Manager, who would identify key issues overall for NSC (HQ section of Customer Service Report) and then for each regional business area of NSC (ten regional sections of the Customer Service Report). The output from the customer correspondence system would form part of the Customer Service Report and that was circulated to senior management team and the Regional Business Managers at the end of each month. Also attached to the report sent to the Regional Business Mangers would be a number of specific items of correspondence that they were to directly respond to with the customer involved.

11.1.5. Review

The work at NSC involving the customer correspondence system was reviewed here to show an initial validation of the SSPMF in qualitative / passive measurement situations. The assessment can be viewed in terms of two criteria:

- Whether the measurement system created would meet the objectives of the real world business performance measurement situation

- Whether the use of the SSPMF brought benefits to the measurement situation, above what would have been achieved without its use

At the beginning of the project NSC identified two objectives for the customer correspondence system, these were not being met: to use the coding systems to turn the customer complaints data into customer satisfaction information; to use the report to turn that customer satisfaction information into actionable information for NSC managers. The aim of the project was to create a customer correspondence measurement system that would meet these objectives.

The first objective was to turn customer data into information about customer satisfaction. The key element to this was to gain a better appreciation of which aspects of the service were most important to customers. Hence the complaint codes by which the data was collected were assessed by customers and given weightings according to their relative importance. In this way the data collected about customer complaints was turned into a source of information about customer satisfaction, thereby meeting the first of the objectives set by NSC for the measurement system.

The codes were classified into customer service dimensions using RATER so that they could be reported across NSC using a common framework. This would ensure that all customer satisfaction information was reported in terms of a single framework, thereby

adding a degree of clarity to an area that had been impenetrable to many at NSC. Also the project ensured that the customer reports were sent to the Regional Business Managers and the senior executive team in such a format so as to make it easy for them to identify specific areas in which to take action. These efforts ensured that the customer satisfaction information provided was actionable by NSC managers, thereby meeting the second of the objectives set for the measurement system.

The second criteria for the validation of the SSPMF was that it provides benefits to the measurement situation, above those that could reasonably be expected to achieve without the use of the framework. Given the nature of action research it is difficult to point to conclusive facts when performing such an evaluation. However, it is possible to identify benefits that seem to be the direct result of using the SSPMF. The key areas of benefit that seem directly attributable to the use of SSPMF are discussed below.

One of the benefits of using the SSPMF is immediately apparent when the objectives of the measurement system are reviewed. The second objective calls for the measurement to provide actionable information for NSC managers. This objective sets the measurement system the challenge of directly inspiring a specific behaviour in the NSC managers and hence ensures that the measurement system must be viewed as a purposeful activity. This purposeful view of the measurement system precludes the objective standpoint of the traditional approach to measurement. Hence following a Systemic approach to measurement enabled the measurement practitioners to emphasise the overall purpose of the system, to create management actions that improve customer satisfaction. One can argue that without the emphasis that the SSPMF places on recognising the influence measurement can have on behaviour such an objective might have traditionally been considered outside of their scope of measurement activities.

The other key benefit of using the SSPMF was the appreciation of the worldviews of the key actors within the measurement situation. The fundamental issue that was identified

during the work on the customer correspondence project was the question of customer ownership. It became apparent that a significant number of the NSC managers did not believe that they were responsible for the total customer experience. Given this attitude amongst a key group of actors the measurement system would never have been able to meet its objectives, regardless of the technical ability of the measurement system to provide the required information about customer satisfaction to managers.

The emphasis that the SSPMF places on building an appreciation of the measurement situation and more specifically on the worldview and objectives of the actors within it enabled this key barrier to be identified. It is doubtful that the attitude of managers would have come to light early enough to be taken account of during the creation of the measurement system if it had not been for the SSPMF. Therefore if the practitioners had not been using the SSPMF it could be argued that the measurement system would not have been able to meet its objectives.

From the above it becomes apparent that the customer correspondence system project does satisfy the validation criteria for the SSPMF. Firstly the measurement system created did meet the two objectives identified for it by NSC. Secondly, it is reasonable to argue that if the SSPMF had not been used the customer correspondence system would not have been able to meet those objectives.

11.2. Case study – NSC Recovery Index

11.2.1. Introduction & Situational Analysis

This case study project describes the application of the Soft Systemic Performance Measurement Framework in a qualitative / active measurement situation. The framework was used in the building of a customer recovery index at Network SouthCentral. Crucially it differed from the Customer Correspondence system project because it involved team use of the SSPMF. The case study shows how use of the framework provided the project team with practical and valuable appreciation of the measurement situation. Furthermore how this appreciation alerted the recovery team to potential benefits and conflicts, consequently shaping the way the measurement system was built.

At the time of this project Richard was Customer Service Manager at Network SouthCentral (NSC), a train operating division of Network SouthEast that in turn was a division of British Rail. Richard reported to the commercial director and received his business objectives from him. Every year each of the commercial director's direct reports would be give a special project/business objective to achieve. The case study below, which demonstrates the Soft Systemic performance measurement framework in action, was Richard's special business objective for the year. The objective was:

"To build a customer service recovery index, and then reduce it by 25%."

Customer service recovery is the action that a business takes when it fails its customers in some way. In the case of Network SouthCentral (NSC) the company did not have control over the rolling stock, signalling or track. Consequently often there would be train failures of some kind e.g. derailments, broken trains, signal faults, broken track etc. Whilst these may not have been the fault of the company it was their customers left

waiting at stations or stranded on platforms. Naturally such train service failures caused customer considerable dissatisfaction, however if a service failure is handled skilfully and correctly, in the eyes of the customers, not only can satisfaction be minimised it can also lead to increased satisfaction. This is the art of service recovery. The next sections review the project in terms of the areas and issues that make up the SSPMF.

11.2.2. Categorise Measurement Situation

The categorisation of measurement situations introduced earlier in this thesis reviews the measurement situation in terms of their qualitative / quantitative nature, and their active / passive nature. The SSPFM prompted the following questions with regard to the Customer Recovery Index measurement situation at NSC.

11.2.2.a. Qualitative / Quantitative Nature:

1. Are the measures likely to be derived from fundamental measures?

2. Is the output from the measurement system likely to lead to information that is linear, where cause and effect relationships are easily identified?

3. Is there a single and shared worldview that makes the purpose of the measurement meaningful?

The measurement situation was categorised as qualitative in nature for the following reasons:

1. The Customer Recovery Index would have to ask customers for their opinion of the service during the recovery operation. Given that NSC were interested in the perceptions of their customers there would be no possibility of using fundamental measures, or those derived from them, in the measurement system.

2. Similar to the NSC Customer Correspondence system the Customer Recovery Index was measuring in the area of customer satisfaction. Hence the data collected would be used as a way of improving customer satisfaction when the service had gone wrong. However, the cause and effect relationships between satisfaction with customer recovery operations and

overall customer satisfaction, was only understand at a very high level and was by no means easy to identify.

3. Unlike the customer correspondence system at NSC the Recovery Index had never existed before, so there were no firmly reinforced worldviews of what the measurement system was for. However there were some differences in worldview in terms of the role of NSC in customer service recovery. These were further discussed during the *appreciate* cycle of the SSPMF.

11.2.2.b. Active / Passive Nature:

1. Is the measurement likely to have a preceding influence (i.e. an effect before any output from the measurement system) on the behaviour of the system of interest being measured?

Unlike the customer correspondence system, which had a passive nature and reactive data collection process, the data collection process for the Customer Recovery Index would have to be proactive in nature. From the start of the project it seemed more than likely that the frontline staff would be involved in the data collection process. Also no specific measurement, or reporting, with regard to service recovery had been done by NSC before. Consequently the Recovery Index would send a strong message to all those involved in service recovery as to what was important in recovery situations. Given these two aspects, it became clear that the Recovery Index was more that likely to have a preceding influence on the behaviour of the system of interest, and so should be categorised as an active measurement situation.

Reviewing the answers to the questions above, it was clear that the Recovery Index would most accurately be classified as a qualitative/active measurement situation. In this category of measurement situation the traditional approach to measurement has least to offer, and so the SSPMF was used.

11.2.3. Appreciate Complexity of Measurement Situation

The SSPMF presents issues that practitioners should consider during the appreciate cycle of the framework. These issues are grouped under the headings people/role, purpose, worldview, behavioural, measures and measurement. Each of these groupings was investigated in terms of the NSC Recovery Index, as reviewed below.

11.2.3.a. People/Role Issues

- **Owners:** There were two people who could be said to be the owners of the customer service recovery index. The most obvious owner was Richard the customer services manager, since it was he who was responsible for the creation of the measurement system. He was also the person who would be making many of the decisions concerning the development of the measurement system. However the commercial director was also an owner, since he was the person who identified the need for the measurement system and would be approving the ultimate design of the measurement process.

- **Users:** The users of the customer recovery index would be the NSC staff. There were two broad types of users; the senior management team (including the commercial director), the regional business managers, the customer service manager, and his recovery team; the second group of users were the frontline service providers, the staff who were actually dealing with customers during and after train service failures.

- **Consumers:** The consumers of the service recovery index are those affected by the recovery performance of NSC. In this case the customers who experienced train service failure. Therefore any customer who travelled with NSC was potentially a consumer of the customer service recovery index.

- **Builders:** Richard, the customer services manager, assembled a team to build the recovery index. The team consisted of users of each type i.e. management and frontline staff, a member of the headquarters support team who would be responsible for the data once it had been collected, and a measurement expert. The team of builders was representative of the key groups involved inside NSC. It also contained those with the idiosyncratic knowledge and experience of customer recovery at NSC, and those with knowledge of dealing with such complex measurement situations.

11.2.3.b. Purpose Issues

- **What is the purpose of the measurement system?** The purpose of the measurement was twofold:

  1. To measure NSC customer service recovery performance *(build a customer service recovery index...)*
  2. To assist NSC improve its customers service recovery performance *(...then reduce it by 25%).*

- **What is the purpose of the system of interest?** The purpose of the system of interest was to provide the best possible customer service recovery when train service failures occur. In this way it was hoped to turn dissatisfied customers into less unhappy or even satisfied customers. This would only be possible through excellent customer service recovery performance, hence one of the design issues would be to determine what excellent recovery at NSC would be.

- **Will the environment have an influence on the measurement system?** It was always recognised that most train service failures would not be the fault of NSC. In this sense the measurement would in some way be influenced from the environment.

However the index was primarily to measure recovery performance once a failure had occurred, this area fell almost entirely within the responsibility of NSC.

In fact the environment had a major influence on the viability of the measurement system later in the project, however this will be discussed later.

- **Who should decide the purpose of the measurement system?** In this project there was not much doubt as to who would decide the global purpose of the measurement system. The commercial division was a very hierarchical organisation most important decisions were taken by the director's direct reports, and then not without his prior approval. Hence the director and the customer services manager were very much the decision makers. This was a situation in which the *owners* of the measurement system decided most aspects.

- **Who should determine the purpose of the measurement system?** At the global level the commercial director at the very beginning of the project had decided the purpose of the measurement. He determined two clear purposes; to measure/monitor customer service recovery performance; and, to assist efforts to improve service recovery. Having determined the global purpose a recovery team was assembled, this group was responsible for determining the detailed purpose. The group consisted of potential *users* (manager & frontline) and those with measurement experience.

- **What information needs to be collected to fulfil the purpose of the measurement system?** Information needed to be collected that would give the customers' perception of the service recovery operation, and enable people at the frontline to take action to improve recovery next time it occurred. So the customers would have to be asked to score the performance, this would involve some kind of survey being handed out at the end of the recovery operation. Also this survey must be

amalgamated into a single measure, because the measurement system had to be a single index.

The other aspect of the measurement was to ensure that action was to taken to improve customer recovery. One aspect of this was to ensure that the measurement related to specific action that frontline staff could take i.e. assisting with alternative travel arrangements, or making sure that all customers were fully informed about any delays. When the project team spoke to frontline staff it became clear that many of them felt that they did provide a high level of customer recovery service, and that customers would be angry however good they were. Whilst this might be true to some extent, it became apparent that a gap existed between staffs' own perception of their performance and the customers' perception of the same experience. Hence it was decided that another aspect of the measurement system, would be to ask frontline staff to measure their own performance at the end of the recovery operation. In this way staff could be confronted with this gap so that they would understand what the customers' expectation were, and realise what action they must take to meet, or exceed, it.

- **What information needs to be provided, to whom and in what form in order to fulfil the purpose of the measurement system?** The results for the measurement needed to be provided at two levels. At the tactical level those responsible for providing recovery actions in the local area would receive the detailed reports, showing scores for all questions. This would enable them to identify areas that needed attention, and actions that they would do differently next time. At the strategic level the senior management team needed to have the headline report i.e. the scores grouped into categories. These would enable them to monitor service recovery performance across the company as a whole and over time.

- **Who assesses the effectiveness of the measurement system to meet its purpose?** Initially and perhaps wrongly the recovery group felt that it was more important to get the recovery index up and running before spending much time discussing how to measure its effectiveness. Given the nature of the initial project brief there was a temptation to view an improvement in the index as evidence of the effectiveness of the measure. On top of concerns over this rather self-fulfilling means of measuring effectiveness, some members of the recovery group felt that they would be in the best position to assess the effectiveness of the measurement system. Since they had been responsible for building it the measurement practitioners within the group did not consider this the ideal situation. This experience at NSC only reinforced the necessity of giving consideration to this issue as an integral part of the measurement system. Subsequent events overtook the recovery index before the issue became pressing.

11.2.3.c. Worldview Issues

- **What are the worldviews of those involved with the measurement system?** On the surface there did not seem to be radical differences between the worldviews of the actors within the measurement system. Most actors would have agreed that measurement was necessary to improve customer service recovery, and that customers service recovery improvement was a good thing. There only seemed to be one real difference to this worldview and the frontline staff generally held it. They felt that since train failures were not the fault of NSC they should not have to deal with irate customers. They also felt that the source of customer dissatisfaction was not their recovery service, but the initial train service failure. There was also some mistrust of the very concept of measurement, since in the past it had been used as a controlling influence on the behaviour of frontline staff. Hence HQ managers may have seen measurement as an empowering tool, but frontline staff needed to share and experience this change in attitude.

- **What should be the worldview reflected in the measurement system?** It was decided that the measurement system should officially be seen as a way of improving customer service recovery, and that consequently it should be a tool that empowered frontline staff as much as possible. These ideas were to be the vision statement by the recovery team built the recovery index, technical decisions should be made with reference to supporting that vision.

- **Are there any conflicts between the worldview reflected in the measurement system and others held by actors within the system of interest?** The measurement tool was to empower frontline for two reasons. Firstly, to make the most of the preceding behavioural influence of the measurement system (discussed below). Secondly, to show frontline staff that the tool was primarily to improve recovery service, and not to control their behaviour. Frontline staff were not in conflict with this empowering view of the world, they just needed to be reassured and eventually convinced. However the area managers did seem to possess a worldview in conflict with the empowering worldview. They agreed that measurement should drive service improvement, but felt that improvement could only be achieved through them. They did not believe frontline staff would be able to take primary responsibility for determining how to improve recovery service. They felt improvement would only arise from their direction. Furthermore they felt that to provide the feedback directly to frontline staff would be confusing and a waste of resources, especially time. This conflict became more apparent as the project proceeded. Some intensive effort from the project team, and effective championship from the project owners, was needed to bring the area managers to a point where they were at least ready to give the empowering approach a fair chance.

11.2.3.d. Behavioural Influence Issues

- **Is the measurement system likely to have a *preceding* influence on the behaviour of the system of interest?** A major part of the reason for viewing the recovery index as an empowering tool was to make use of the potential benefits of the *preceding* influence on frontline behaviour. It was hoped that by encouraging frontline staff to collect data and analyse any problems directly after the recovery event, they would begin to change their worldview of customer recovery. As stated above, the frontline staff did not feel that service failures and hence recovery efforts were their responsibility. Frontline participation should help staff realise that recovery was a separate issue to service failure, furthermore that they should take responsibility for delivering excellent customer recovery and identifying ways to improve it.

It was also noted that the regional business managers of NSC were slightly uncomfortable with the empowering/participating nature of the recovery index. This antipathy could cause damage to any hope that the project would improve customer service recovery. Consequently efforts were made to explain the measurement approach to the managers, the expected benefits of such an approach, and to get them on side.

It was further noted that by asking customers to give their opinion of recovery service, they would see NSC taking full responsibility for their problems and begin to expect more. Also if they were providing information in order to assist NSC improve recovery service they would expect to see/experience improvements being made. Plus when completing any survey customers were likely to be in a dissatisfied state, so a long and tedious questionnaire would not do anything to improve their mood. The survey would need to be short, presented in the form of an apology for the service failure, and demonstrate how NSC would use the information to improve service.

- **How will the influence of measurement manifest itself in the system of interest?** The beneficial preceding influence on frontline staff is discussed above. The increased participation of frontline staff in the data collection and service improvement process, should lead to their increased understanding about and ownership of the recovery service. This would mean more staff raising issues to do with recovery service with management, and so expecting support, encouragement, recognition, and resources from managers to improve recovery service. Once again then managers needed to be prepared to support and even stimulate such efforts, something they were not used to doing. Also once customers were aware that NSC was taking responsibility for improving customer recovery, they would expect to see results.

- **What form will the changes have on the overall behaviour of the system?** The changes should create a climate of recovery improvement at NSC drive from a number of areas:

  1. The Recovery Index providing numeric information to steer and assess improvement efforts.

  2. The frontline staff feeling responsible for customer recovery and suggesting way to improve.

  3. The customers themselves who are aware that NSC are striving to improve recovery service and will be anticipating results.

- **Will change be temporary or permanent i.e. single or double loop influence?** All of the changes described above, bar one, are more permanent/double loop influences because they involve a change of the mental model of actors i.e. frontline staff &

areas managers change from viewing measurement as a controlling to an empowering tool, customers change their expectation of NSC's recovery service to anticipate improvement. The only influence that is more temporary in nature is the initial irritation that customers may experience when asked to complete a survey at the end of a service failure/recovery situation.

- **Is the change one that corresponds with the purpose of the measurement system and the purpose of the system of interest?** For the most part the changes should have a beneficial impact of customer service recovery improvement that is the aim of the recovery index. Hence they may be said to be supporting the purpose of the measurement system and the system of interest. The only major area of concern was the effect of building an empowering measurement tool on the regional managers. If care was not taken to win the support of this group, the beneficial effects of the recovery index would be dampened and the purpose of the measurement system undermined.

11.2.3.e. Measures & Measurement Process Issues

- **Who should build the measurement system?** The recovery team, which has been described above, were the team that built the recovery index. In the case of this project, there was a mixture of users with the idiosyncratic knowledge of the system of interest and some with knowledge of measurement in complex situations.

- **Who should be involved in the design of the measurement system?** From the very beginning of the project the team were clear that the customers should be the primary force in the design of the measures. It was felt that NSC did not know enough about recovery to identify what should be measured. It was also felt that the project would have extra credibility if it were seen to have consulted fully with customers. Therefore a series of focus group with different types of customers (age/location/leisure/business) were run. In these session customers were asked to

identify what they would expect from the ideal customer recovery organisation. They were also asked to identify priorities within their ideal recovery service definition. The output from these workshops was amalgamated into a Recovery specification that identified a list of service issues to be measured. Whilst customers drove the design of the measures, the recovery team designed the actual mechanics of the measurement system. Paramount to them was to create a measurement system that would most help to improve recovery service.

- **Who should be involved in the measurement process?** As stated above the overriding concern was to use the recovery index to generate improvements. For the reasons stated above it was important to involve frontline staff in the measurement process in order to do this. Often the easiest way to involve staff is to get them to collect data from the customers i.e. do surveys with them. However in this situation the staff would be busy providing the recovery service, and when the situation had been resolved customer would not wish to be detained completing surveys with staff. It was also important that frontline staff would learn that their recovery service was not excellent and identify why i.e. suggest areas of improvement. Therefore the following process was decided:

  1. Customers would receive questionnaires to be filled in at their leisure at the end of the recovery situation, and returned to NSC via stations or post. (To be distributed by frontline staff.)

  2. At the end of the recovery situation, staff would complete a questionnaire that asked them to give themselves a score for each of the issues on the Recovery specification. After each area of questions staff were asked to identify any reasons for low scores.

In this way two groups of are involved in the data collection process. The benefits of involving frontline staff could be achieved by asking them to assess their own performance. It was hoped that this would provide some ideas for improvement, and at least ensure that staff were aware of the recovery specification. Also staff and managers would be able to compare their internal NSC measurement or recovery performance, with what their customers had thought of the same performance. Where gaps existed they would learn that customers expectations differed, and identify way to diminish those gaps.

11.2.4. Measure

When discussing the effect of the environment above it was mentioned that it played a very influential part later in the project. Having designed the measurement system and built the supporting material (questionnaires, worksheets, mailed envelopes etc), the project team faced a final presentation to the commercial director before implementing the scheme in a pilot area. Just as this presentation was about to occur an industrial conflict between British Rail and its drivers began to intensify, one day strikes were introduced two or even three times a week.

It was felt that now would not be a good time for introducing a new empowering project to frontline staff. Furthermore, both staff and management were in a continual mode of crisis management and did not have the time, or inclination, needed to nurture a new project. Also NSC was losing a large amount of revenue as a result of the strikes and no longer felt it could justify the costs (resources and time) of the new project. Consequently the whole project was put on hold. The great irony was that dealing with the 'disruptions due to industrial action', required just the kind of customer recovery service that the measurement system was built to improve.

11.2.5. Review

The work at NSC involving the Customer Recovery Index was reviewed here to show an initial validation of the SSPMF in qualitative / active measurement situations. The assessment can be viewed in terms of two criteria:

- Whether the measurement system created would meet the objectives of the real world business performance measurement situation

- Whether the use of the SSPMF brought benefits to the measurement situation, above what would have been achieved without its use

The initial objective for the measurement system was to create a customer recovery index and then to reduce it by twenty-five percent. In effect the objective is actually two objectives, to build the measurement system and then to influence behaviour in a specified way. The abrupt nature of the end of the project means that it is not possible to validate the SSPMF through these objectives, because the Recovery Index was never put into operation. The first objective was completed because the Recovery Index was built, even if never actually implemented. Furthermore, it is possible to say that the design of the index was specifically created to have the most impact on the frontline staff, who were responsible for delivering recovery efforts to service. So in terms of the first validation criterion, it can be said the SSPMF successfully delivered one of the initial objectives and the inability to meet both was in no way a reflection of the validity of the SSPMF.

The second of the criteria used to assess the initial validity of the SSPMF, was whether its use brought benefits to the measurement situation in addition to those that might reasonably have been expected to happen otherwise. It can be argued that the objective for the index to render a specified change in behaviour is only really meaningful within the context of a Soft Systemic approach to measurement. Once again the emphasis that

the SSPMF places on gaining an appreciation of the measurement situation proved critical to the index. As the worldviews of the actors were investigated, it became apparent that one of the key issues within the measurement context was that the frontline staff perceived their performance in an entirely more positive way than customers perceived it. Staff felt they had done a good job, when at the same time customers did not. So when staff did receive customer feedback it was largely ignored, because they felt that customers would complain whatever they did. This attitude was even more damaging because it produced an attitude that believed customers would never be pleased in recovery situations, so there was little point making an effort to improve the level of service recovery.

Thanks to the use of the SSPMF it was evident that the measurement system must help to reduce the gap between the perception of staff and customers. The need to close this gap was recognised as critical to the success of the Recovery Index, and became a critical feature of the design of the measurement system. It is extremely doubtful that this would have been the case if it the project had not made use of the SSPMF. One of the ways in which the index sought to close this gap was to make it apparent to staff. Hence staff would have been asked to assess their own performance, and to then contrast this with the assessment of made by their customers. It was also believed that if staff were involved in the assessment of their own performance, they would be far more likely to feel responsible for taking steps to improve their own performance. In this way staff would have been direct participants in the measurement process. Capitalising on the behavioural benefits of involving participants in the measurement process is a key aspect and benefit of the SSPMF.

It is not possible to say that the use of the SSPMF was completely validated through its use in the Recovery Index project, because of the abrupt end to the project brought about by the strike. However the measurement system was built, and there is a strong argument that the use of the SSPMF brought a number of benefits to the design of the

index. These benefits would have enabled the NSC Recovery Index to meet its objectives more successfully than it would have done without the use of the SSPMF.

11.3. Summary

This chapter has had two broad objectives. The first has been to provide an initial validation of the Soft Systemic Performance Measurement Framework presented in this research project. The second has been to provide potential users of the SSPMF with examples of where it has been used.

To deal with the second objective first, use of the SSPMF in two different and varied situations has been described. These situation have been different in terms of the classification of measurement situations introduced in this thesis, one qualitative / passive and one qualitative /active. The point was made that these two categories of measurement situations typically represent the needs of business performance measurement. Also the projects varied in that one represented an individual's use of the SSPMF, and the other a team's use of it. Furthermore one involved the use of reactively collected data and one of proactively collected data.

The other objective of the chapter was to offer an initial validation of the SSPMF. This validation was made against two criteria:

- Whether the measurement system created would meet the objectives of the real world business performance measurement situation

- Whether the use of the SSPMF brought benefits to the measurement situation, above what would have been achieved without its use

In terms of the first criterion it was shown that the objectives were fully met in the Customer Correspondence system and that matters beyond the control of the project

caused the Recovery Index to only half meet its objectives. The second criterion asks whether use of the SSPMF yielded benefits additional to those that might otherwise have been achieved. Thanks to the nature of action research it is difficult to conclusively prove this point, however the argument was made in both cases that without the use of the SSPMF the measurement systems would not have been able to meet their objectives.

The benefit of using the SSPMF has been shown in qualitative / passive and qualitative / active situations. These benefits largely come from the difference between the traditional and the Soft Systemic approach to measurement. The traditional approach has been to view measurement as an objective and empirical exercise, something that seems to stand aloof from the complex world that it is often trying to measure. The SSPMF provides practitioners with a tool that views measurement not as separate, but rather as inextricably part of complex social systems. Thus it provides the guidance to practitioners to research and manage the behavioural influences of measurement. It is for this reason that the SSPMF brings benefit to business performance measurement situations for, as has been demonstrated in the two case studies at NSC, the fundamental objective of business performance measurement is to influence behaviour in some way.

Chapter Twelve: *Conclusion*

12.1. Discussion

The section below discusses and assesses the research project in relation to some specific issues, these are:

- The original contribution to knowledge of the research project
- The key areas for further research identified during the research project
- The Critical nature of some aspect of the research project
- The response of Metrology to the research project
- Concluding thoughts

12.1.1. Original Knowledge Contribution

The ultimate aim of any Ph.D. thesis is to provide an original contribution to knowledge. This section does not seek to assess the contribution to knowledge made by the research, however it does seek to identify those areas of the research that are original. In other words, the areas that may be argued to be novel work:

- Systems literature review - the Systems literature has not been reviewed specifically from the perspective of measurement before. Consequently, the review and the key soft systemic measurement themes identified from the literature reviewed may be argued to be an original contribution.

- Classification of measurement - the new measurement classification system introduced in this research is novel in two ways, approach and content. Firstly

its approach, measurement has not been classified in terms of the complexity of its application domain before. Secondly its content, the work upon which the classification is based, the generic causes of complexity in measurement situations, represents an original analysis of complexity in measurement situations.

- A Soft Systemic approach to measurement - nowhere before has the concept of a Soft Systemic approach to measurement been proposed and formulated. The seven principles that guide the Soft Systemic approach to measurement are the first such principles to be proposed.

- A Soft Systemic performance measurement framework - this is novel work for two reasons. Firstly, because it is based on the principles of the Soft Systemic approach to measurement proposed in the thesis. Secondly, because there is no other Soft Systemic framework that has been especially developed to assist practitioners in the area of business performance measurement.

12.1.2. Future Research

This project has sought to address the area of business performance measurement at two levels, the theoretical and pragmatic level. It has provided conclusions in each of these areas from which might stem implications for future research.

The main output of the research project at the pragmatic level is the business performance measurement framework (SSPMF). This framework was developed from the Soft Systemic principles of measurement proposed in the thesis, and from the experiences gained in the case study organisations. A number of possible areas of future research can be identified:

- The framework has been used in the real world but not widely. A logical next step would be to make use the framework in many more companies, and to develop it based on these applications.

- Also it may be possible to identify other social systems, not business ones, where a Soft Systemic approach to measurement and the performance measurement framework may be usefully applied.

- The Soft Systemic principles of measurement could be the basis of a different pragmatic tool for business performance measurement. The performance measurement framework (SSPMF) presented in this thesis is not the only way to translate the principles of a Soft Systemic approach to measurement into a pragmatic tool. Other tools and frameworks could be derived from them.

It may be argued that the work of this research project has an impact, at the theoretical level, on two areas of academic study, namely Systems Theory/Thinking and the area of Metrology.

- **Systems Thinking** - the work of the project has been to propose a new approach to measurement based on Soft Systemic principles. Hence the interpretation of a Soft Systemic approach to measurement and the resulting set of principles presented in this thesis, must be reviewed by the Systems Thinking community. This review may promote debate not only about the validity of the principles proposed here, but also wider issues such as: the content of an alternative set of principles to govern a Soft Systemic approach to measurement; the categorisation of complexity in measurement situations; and the role of measurement in complex problem situations.

- **Metrology** - the research has aimed to fill a gap that exists between measurement theory and business performance measurement practice. In attempting to do this the complex nature of measurement situations has been identified. The project concluded that traditional metrology couldn't cope with the demands of complex measurement situations, and that a new approach was needed that was radically different to the traditional definition of measurement. Hence there is a need for the metrology community to review the demands of complex measurement, and to suggest an appropriate response for practitioners in these areas. It is hoped that this project will inspire debate around such issues.

12.1.3. A Critical aspect of the Research Project

The principles of measurement and the SSPMF identified in this research project fit neatly into the Soft Systems school of thought. However when one steps back to review the overall approach of the research project it is possible to identify aspects that fit with Critical Systems thinking. Flood and Jackson (1991) have this to say of critical systems thinking:

> "*..critical systems thinking demonstrates that earlier systems approaches are all special cases with limited domains of application*"
>
> Flood and Jackson (1991) p.2

Flood and Jackson (1991) argue that a key effort of Critical Systems thinking is to demonstrate that previous systems approaches have limited domains of application. A strong parallel can be drawn between such activity, and the efforts of this research project to show that the traditional approach to measurement has a limited domain of application. This project has shown that some of the key tenets of traditional metrology

are in conflict with the demands of more complex measurement situations, as revealed by the new classification of measurement contexts introduced in chapter six.

Flood and Jackson (1991) go on to describe three 'interrelated intentions' (p.2) of the critical systems endeavour, these being complementarism, emancipation, and critical reflection. Of the three the research presented is this thesis most closely reflects the *complementary* intention. The research reviewed the fundamental concepts of traditional metrology to show that there are only a limited number of measurement situations in which the approach can be properly employed. The SSPMF calls on practitioners to follow a complementary approach, by seeking to appreciate the complexity of measurement situation and to select the most appropriate measurement approach based on that appreciation.

The measurement principles and framework proposed in the thesis are in some respects *critical* in nature. They encourage measurement practitioners to critically investigate the complexity of their measurement situation, much of which comes from attempts to better understand the balance of power and competing worldviews present in the measurement system. However, this critical analysis reflects more closely the activities of a Soft Systemic than Critical Systemic approach. The final aspect of that Flood and Jackson (1991) identify is the *emancipatory* nature of Critical Systems thinking. In this area the research has very little in common with the Critical approach. At best, a participatory approach is called for by the Soft Systemic measurement principles, but this does not fulfil the emancipatory requirements of a Critical Systems approach.

Of the three aspects of Critical Systems thinking identified by Flood and Jackson (1991) one can reasonably argue: that the research presented in this thesis does reflect the complementarist aspect of Critical Systems thinking; however, it does not reflect much of the Critical aspect; and fails to meet the emancipatory aspect that would be expected of a Critical Systems approach. In conclusion it fair to argue that the work presented in

this thesis is predominantly Soft Systemic in nature, yet it is possible to identify aspects of the research that reflect a Critical Systems approach.

12.1.4. The Response of Metrology

The essential challenge of this project has been to reconcile disunity between measurement theory and practice. Measurement has always been applied to new areas, for the most part in the context of scientific study. However, now measurement is being used to provide information not just for scientific study, but also for the purposes of managing human activity systems. The sole purpose of measurement is no longer to validate scientific understanding by creating empirical and objective results. Measurement must also be able to provide information to aid in the appreciation of, and indeed influence, the behaviour of social systems.

The area of business performance measurement, the specific interest of this project, requires this new role of measurement. Practitioners in this field have developed techniques and tools to satisfy the new demands on measurement. Such techniques and tools create disunity between measurement practice and theory, for they are not necessarily empirical or objective. Hence a gap exists, between what business performance measurement practitioners believe to be measurement and what is recognised as measurement according to current metrology. The role of academia must surely be to provide theory to guide practice; otherwise practitioners cannot draw on the collective knowledge of a subject and must rely purely on their own experience. Therefore, if such a gap between practice and theory exits it must be addressed and closed if possible.

Given the gap between measurement theory and practice it is possible to respond in two ways. The first is to discount as measurement any practice that is not empirical or objective. Even if one ascribes to this view, there still exists a lack of theory for such practices. Consequently academia must identify and articulate a relevant theory, even if

it is not measurement theory. The second response to the problem, and the response taken in this project, acknowledges the situation in the real world and seeks to develop measurement theory in such a way as to embrace these non-traditional practices. Perhaps the argument here depends on whether one believes that knowledge may only flow from theory to practice, or accepts, as this project does, that knowledge can flow from practice to theory?

12.1.5. Concluding thoughts

Regardless of the discussion above, the work of this project is still necessary in order to articulate some kind of theory to help guide business performance measurement. In a sense the project started as a game of catch-up; the objective being to articulate the problem in more detail recognising, and drawing upon the pragmatic solutions already being operated in the real world. Having done this the game became one of leapfrog; the objective now being to formulate a response to the problem, based on a Soft Systemic approach, that would guide future practice in the area of business performance measurement. Whether one argues that it is an extension of measurement theory or something else, one can say that this project has successfully closed the gap that existed between real world practice and theory. As a result of which the activities know as business performance measurement now have an accompanying set of principles and a practical framework to guide practitioners in this complex area of measurement.

One might argue with reference to Galileo's directive, that practitioners in the field of business performance measurement had measured that which they believed to be measurable. However much of this practice was deemed immeasurable by traditional measurement theory, hence a gap existed between measurement practice and theory. By articulating a new and Soft Systemic approach to measurement this project closes this gap, making measurable that which was theoretically immeasurable in the area of business performance measurement.

12.2. Conclusions

This final section of the chapter presents the conclusions of the thesis. It serves two purposes:

1. To show how the project has addressed it's research objectives

2. To act as a summary of the main conclusions in terms of those research objectives

At the beginning of this project two generic objectives for the research project and a number of specific objectives were identified. The first was to articulate the nature of the research problem, i.e. to move knowledge of the problem from acknowledging its existence to appreciating it causes. Following from this, the second generic objective was to formulate some response to the problem. All objectives, generic and specific, are now reviewed in light of the information that has been presented in this thesis.

12.2.1. Problem Articulation: The Challenge of Business Performance Measurement

The first overall objective of this research project was to articulate the problem to be investigated. Three specific objectives were identified in order to articulate the research problem:

1. Identification of the measurement challenges primarily within the area of business measurement, and to a lesser extent in other complex measurement situations.
2. Categorisation of the complexity of measurement situations.

3. Critique of the use of the traditional approach to measurement within complex measurement situations.

The experience of the case study projects and the literature review identified a number of specific challenges to measurement (12.2.1a.). From this it became necessary to perform a more rigorous analysis on these specific challenges. Consequently it was proposed that underlying these were a set of generic causes of complexity in measurement situations.

Generic causes of complexity were identified and incorporated into a new classification of measurement situations (12.2.1.b). It was then possible to see how the traditional approach to measurement would cope with the challenge represented by the more complex categories of measurement situation (12.2.1.c). It was found that the traditional approach could not operate in certain categories. Hence the major challenge of the research project was revealed, the creation of a new approach to measurement to deal with such complex situations, such as business performance measurement, based on Soft Systemic principles.

12.2.1.a. Identification of Measurement Challenges

Analysis from the management literature review and from experience at the case-study organisations identified the challenges facing business performance measurement:

- Business performance measurement is an area that presents a greater degree of complexity than has traditionally been associated with the area of measurement.
- Complexity arises from aspects such as the idiosyncratic nature of business systems, the importance of recognising and taking account of human perception and organisational culture, and the affect that measurement has on organisational behaviour.

- In order to cope with the complexity outlined above, management writers suggest the need for a new approach to performance measurement: one that is participative; moves away from the traditional measurement concepts of objectivity and passive observation; and can be translated into an framework for action.

The areas of Chaos theory and Quantum Physics were reviewed since they present hard scientific challenges to measurement, and enabled the project to identify generic causes of complexity in measurement situations:

- The unpredictability inherent in chaotic systems presents problems to the traditional measurement approach. Chaos theory leads us towards a new type of understanding, dynamic understanding. Measurement has a role to play in the process of dynamic understanding, but it must take a new approach that is qualitative, dynamic and holistic.

- Quantum theory has some fundamental challenges for measurement. The idea of cause and effect is undermined, and the concept of ever more accurate measurement leading to greater understanding and hence a decrease in uncertainty no longer applies. The emphasis of a new approach to measurement needs to shift from accurate total descriptions and predictions, to an approach that recognises that cause and effect can be difficult, if not impossible, to trace.

12.2.1.b. Classification of measurement complexity

Although every measurement situation is in some way unique, it is possible to identify a number of generic causes of complexity in measurement situations. It was proposed that underlying much of the complexity in modern measurement situations were a set of common features, these were identified as:

- The presence of a new and more complex model of reality

- The need for measurement to deliver a non-traditional type of understanding
- The influence of measurement on the system being measured

These generic causes of measurement complexity were incorporated into a new classification of measurement situations/contexts. The classification was based on two aspects:

- The Quantitative/Qualitative Nature of the measurement context. This is dependent on three influences: the presence of a conflict of worldviews; the nature of understanding likely to be gained form the output of the measurement system; and the likely type of measures to be used in the measurement system.

- The Passive/Active nature of the measurement context. This is dependent on the influence of the measurement system on the behaviour of the system of interest, preceding the output of numeric information.

- These two aspects were combined into a classification framework of measurement contexts that has four categories: passive/quantitative; passive/qualitative; active/quantitative; active/qualitative.

12.2.1.c. Critique of the traditional approach to measurement in complex situations

The implications of the new classification of complex measurement situations for the traditional approach was investigated:

- It was found that features of both the active and qualitative categories were in conflict with two tenets of the traditional approach, the empirical and objective requirements.

- The traditional approach was found to be best suited to the demands of a passive/quantitative measurement context.

- It was proposed that the other categories of measurement contexts would benefit from a different approach to measurement, such as a Soft Systemic approach.

12.2.2. Problem Response: A Soft Systemic approach to Business Performance Measurement

The second overall objective of this project is to formulate a response to the problem articulated above. The main hypothesis of this project was that a Soft Systemic approach would be better suited to deal with the complex measurement situations. In order to carry out this investigation, a number of specific objectives were identified:

1. Define a Soft Systemic approach to performance measurement.
2. Contrast the Soft Systemic & Traditional approaches to measurement.
3. Show how the Soft Systemic approach is better suited than the traditional approach to the complexity of business performance measurement.
4. Formulate a practical performance measurement framework based on the principles of the Soft Systemic approach to performance measurement.

The first part of the response was to define what a Soft Systemic approach to measurement is. A set of seven principles was proposed to govern a Soft Systemic approach to measurement (12.2.2.a). The Soft Systemic approach was then contrasted with the traditional approach to measurement. It was shown that the two approaches differed: in terms of the fundamentals of overall approach; and in terms of a number of specific areas (12.2.2.b.).

The Soft Systemic approach was reviewed in terms of the causes of complexity prevalent in business performance measurement, and other complex measurement situations. It was shown that the Soft Systemic approach is far better equipped to deal with such complexity than the traditional approach to measurement (12.2.2.c.).

The Soft Systemic approach was translated into a Soft Systemic Performance Measurement Framework (SSPMF), to help guide practitioners engaged in business performance measurement (12.2.2.d). The framework encourages practitioners to

consider some key issues in order to identify their type of measurement situation, based on the new classification of measurement proposed earlier in the thesis. Also, consideration of the key issues enables practitioners to better appreciate, and hence deal with the complexity of their measurement situation. An initial validation of the SSPMF was provided, through two descriptions of the use of the framework in two real world business performance measurement situations.

12.2.2.a. Define a Soft Systemic approach to Measurement

The first part of the research problem response was to define what a Soft Systemic approach to measurement would actually be. The review of the Systems literature identified four common Soft Systemic measurement themes, these presented big challenges to the traditional way of doing measurement:

- Use of subjective / qualitative measures
- Recognition that measurement systems exist for the sake of the systems they are monitoring
- Participatory design of measurement systems
- Critical awareness of the effects of measurement

These common themes were applied in a case study situation, during which a number of learning points were identified. These learning points helped to define and refine the seven principles of the Soft Systemic approach to measurement that have been proposed in the thesis:

- Measurement is a process for generating numeric information
- Measurement situations are complex and varied
- Measurement is a purposeful activity
- Measurement systems reflect a world view

- Measurement systems influence behaviour
- Measurement systems should be participative
- Measurement systems should be holistic

12.2.2.b. Contrast Soft Systemic & Traditional Approaches to Measurement

Having defined a Soft Systemic approach to measurement, it was contrasted with the traditional approach to measurement. The two approaches were shown to differ in a number of areas:

- The definitions of measurement - the traditional approach stops at the creation of data, the Soft Systemic approach extends to the generation of numeric information.

- The rules for number assignment - the traditional approach states that number assignment must be empirical and objective, the Soft Systemic approach relies on common understanding, within the measurement system and the systems of interest.

- Means of validation - the traditional approach emphasises accuracy of measurement, the Soft Systemic approach emphasises effectiveness of measurement.

- The effect of measurement - the traditional approach assumes all measurement to be objective, the Soft Systemic approach recognises that the act of measurement will have an influence on behaviour in social systems.

It was concluded that the two approaches are fundamentally different. It was argued that the traditional approach places value and emphasis on generic rules, which produce measures that are transferable across all measurement contexts. In contrast to this, the

Soft Systemic approach was shown to be more proactive and value flexibility within specific measurement contexts.

12.2.2.c. Show how the Soft Systemic approach is better suited than the traditional approach to the complexity of business performance measurement

It was shown that the traditional approach to measurement could not cope with certain categories of measurement situations, into which business performance measurement is classified. The Soft Systemic approach was then analysed in terms of the causes of complexity in these categories. The quantitative / qualitative aspects of measurement complexity are caused by:

- The presence of conflicting worldviews - the Soft Systemic approach encourages measurement practitioners to investigate the worldview of actors within the measurement system, in relation to the purpose of the measurement system. It recognises that a measurement system will reflect some worldview. Consequently it makes the identification of such a worldview a transparent part of the design process. It also seeks to ensure that the reflected worldview, the purposes of the measurement systems, and the system of interest are all aligned.

- The nature of understanding - the traditional approach tends to build measurement systems that provide information that feed a mathematical model used to predict future behaviour. The Soft Systemic approach is able to cope with more complex situations where only a qualitative understanding is possible. This ability stems from the definition of measurement in which the measurement process includes information generation. In this way the Soft Systemic approach encourages practitioners to consider the demands for information, and to make a decision as to which kind of measurement will

provide the information most suitable to the purpose of the measurement system.

- Qualitative measures - the use of qualitative measures requires the practitioner to create an agreed and commonly understood set of measures with the actors of the measurement system. The Soft Systemic approach tackles the complex task of creating shared understanding, by involving actors within the measurement system's design and operations processes. In line with the principle that measurement should be participative, actors are involved in deciding what should be measured and how. Also the same principle encourages participation in the data collection process, this in turn helps to increase understanding of the measures. Hence the emphasis placed on participation by the Soft Systemic approach to measurement, helps to create the shared knowledge needed in the use of qualitative measures.

The other aspect of complexity in business performance measurement is the active / passive nature of measurement systems:

- The Soft Systemic approach recognises that many measurement systems will have an influence on the behaviour of a system, particularly in social systems. Having recognised the behavioural influence of measurement the Soft Systemic approach seeks to use this influence. Rather than try to eliminate the effect, it is encouraged where it supports the purpose of the measurement system. Hence it may be said that the Soft Systemic approach responds to the complexity of active measurement contexts, by expecting the behavioural influence and proactively shaping it to the purpose of the measurement system.

The complexity of business performance measurement has been reviewed in light of the principles of the Soft Systemic approach. Unlike the traditional approach, it was shown that these principles encouraged the measurement practitioner to recognise and deal with the demands of such complex measurement situations.

12.2.2.d. Formulate a practical performance measurement framework based on the principles of the Soft Systemic approach to performance measurement

The principles of the Soft Systemic approach to measurement have been incorporated into the Soft Systemic Performance Measurement Framework (SSPMF). The framework was developed to assist measurement practitioners to further appreciate the complexity of measurement situations:

- A set of cycles was identified, along which practitioners should travel in order to gain the fullest appreciation of the complexity of a measurement situation. These cycles are:
  1. Categorise measurement situation
  2. Appreciate complexity of measurement situation
  3. Measurement

- The classification of measurement situations was made use of, and a number of pragmatic questions were elaborated to assist practitioners with the classification of measurement situations. Further guidance was then given as to what kind of measurement approach is most appropriate to each measurement situation.

- The 'framework jigsaw' was introduced, to draw attention to five areas for practitioners to consider and a number of specific issues within each. The framework encourages practitioners to consider the unique nature of their specific measurement situation, and provide their own responses to that

complexity. The framework is a means by which practitioners can evaluate their own measurement system. The framework identifies five broad areas to which practitioners should give consideration:

1. People/Roles issues
2. Purpose issues
3. Worldview issues
4. Behavioural influence issues
5. Measures & Measurement process issues

Finally an initial validation of the SSPMF was provided, through the review of its use in two case study situations. The SSPMF was shown to add specific benefits in both a qualitative / passive and a qualitative / active business performance measurement situation, also in a team and non-team measurement situation.

12.2.3. Summary

The first overall objective of the research project was to articulate the problem. This objective has been achieved by:

- Identifying specific challenges to measurement in the areas of business performance measurement, Chaos and Quantum theory.

- Identifying a number of generic causes of complexity in measurement situations; and introducing a new measurement classification based on the complexity of measurement situations.

- Using the new classification of measurement situations to critique the traditional approach to measurement; and thereby identifying situations, such as business performance measurement, where a new approach to measurement is needed.

The second objective of the research project was to formulate a response to the research problem. This objective has been achieved by:

- Proposing a set of Soft Systemic principles to measurement; and showing that this Soft Systemic approach is significantly different to the traditional approach.

- Showing that the Soft Systemic approach is more suitable to the complex challenges of business performance measurement.

- Translating the Soft Systemic approach into a practical framework (SSPMF), to assist measurement practitioners in business performance measurement; and validating that framework in case study work.

References

ABEGGLEN, J.C. & STALK, G. (1985) *Kaisha: The Japanese Corporation*, New York, Basic Books.

ACKOFF, R.L. (1979) The Future of Operational Research is Past, *Journal of the Operations Research Society*, Vol. 30, pp. 93.

ACKOFF, R. L. (1981) *Creating the Corporate Future*, Chichester, J. Wiley & Sons.

ACKOFF, R.L (1986) *Management in Small Doses*, Chichester, John Wiley & Sons.

ACKOFF, R.L. (1994) *The Democratic Corporation*, New York, Oxford University Press.

ACKOFF, R.L. (1995) Keynote Address to, *4th United Kingdom Systems Science Society*, Humberside & Hull Universities, 1995.

ACKOFF, R.L. & EMERY, F.E. (1972) *Redesigning the Future*, London, Tavistock.

ADAMSON, C. (1993) Evolving Complaint Procedures, *Managing Service Quality*, Vol. 3, No.2, pp. 439-444.

ARGYRIS, C. & SCHON, D.A. (1978) *Organisational Learning: a theory of action perspective*, London, Addison-Wesley.

ASHBY, R.W. (1956) *An Introduction to Cybernetics*, London, Chapman & Hall Ltd.

BEER, S. (1981) *Brain of the firm: the managerial cybernetics of organisation: companion volume to heart of the enterprise*, Chichester, John Wiley & Sons.

BOHM, D. (1980) *Wholeness and the Implicate Order*, London, Routledge and Kegan Paul.

BOHM, D. (1983) *in* Zohar, D. & Marshall, I. (1993) *The Quantum Society*, London, Bloomsbury Publishing Ltd.

BUSINESS INTELLIGENCE (1992*) Business Performance Measurement*, London, Business Intelligence Research.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, (1940) Final report., *Advance. Sci.*, 1940, No.2, pp.331-349

CAMPBELL N.R., (1920) *Physics. The elements,* Cambridge, The University Press.

CAMPBELL N.R., (1928) *An account of the principles of measurement and calculation*, London, Longmans.

CAMPBELL N.R., (1938) Symposium: measurement and its importance for philosophy, *Aristotelian Society, Suppl. Vol. 17*, London, Harrison,

CHECKLAND, P.B. (1981) *Systems Thinking, Systems Practice*, Chichester, J. Wiley & Sons.

CHECKLAND, P.B. (1985) From Optimizing to Learning: A development of Systems Thinking for the 1990s, *Journal of the Operational Research Society*, **36**, pp. 9.

CHECKLAND, P.B. & SCHOLES, J. (1990) *Soft Systems Methodology in Action*, Chichester, J.Wiley & Sons.

CHURCHMAN, C.W. (1947) The meaning of measurement, *in* Churchman, C.W., Ackoff, R.L. & Murray, W. (ed.s) *Measurement of Consumer Interest*, University of Pennsylvania Press.

CHURCHMAN, C.W., ACKOFF, R.L. & ARNOFF, E.L. (1957) Introduction to Operations Research, New York, Wiley.

CHURCHMAN, C.W. (1959) Why Measure? *in* Churchman & Ratoosh (eds), *Measurement Definitions & Theories*, New York, J. Wiley & Sons, pp. 84-94.

CHURCHMAN, C.W. (1961) *Prediction and Optimal design*, Englewood Cliffs, NJ., Prentice-Hall.

CHURCHMAN, C.W. (1971) *The design of Inquring Systems*, New York, Basic Books.

CURTIS, D.A. (1985) The Modern Accounting System, *Financial Executive*, Jan-Feb pp 81-85

DRUCKER, P.F. (1968) *The practice of management*, (3rd edition), London, Pan Books Ltd.

DRUCKER, P.F. (1992) *Managing for the future*, London, Butterworth Heinemann.

ECCLES, R.G. (1991) The performance measurement manifesto, *Harvard Business Review*, January - February, 1991, pp. 131-137 (*also & quoted from* Holloway, J.,

Lewis, J., & Mallory, G. (1995) *Performance Measurement & Evaluation*, London, Sage Publications Ltd, pp. 5-14.

EISENHARDT, K.M. (1989) Building Theories from Case Study Research, *Academy of Management Review*, Vol. **14**, No. 4, pp. 532-550.

FEYNMAN, R. (1967) *The Character of Physical Law*, Cambridge, USA, MIT Press.

FINKELSTEIN, L. (1973) *Fundamental Concepts of Measurement*, Acta IMEKO VI, IMEKO, Budapest, IMEKO, pp.11-18

FINKELSTEIN, L. (1975) Fundamental Concepts of Measurement: Definitions & Scales, *Measurement & Control*, **8**, pp.105-111

FINKELSTEIN, L. (1982) Theory & Philosophy of Measurement, in Sydenham, P.H. (ed) *Handbook of Measurement Science*, Chichester, J.Wiley & Sons Ltd, pp. 1-30

FINKELSTEIN, L. (1994) Measurement: Fundamental Principles, in Finkelstein & Grattan (eds) *Concise Encyclopaedia of Measurement & Instrumentation*, Oxford, UK, Pergamon Press, pp.201-205

FLOOD, R.L. (1987) Complexity: A definition by construction of a conceptual framework, *Systems Research*, **4**, pp. 177-185

FLOOD, R.L. & CARSON, E.R. (1988) *Dealing with Complexity*, New York, Plenum Press.

FLOOD, R.L. & JACKSON, M.C. (1991) *Critical Systems Thinking, Directed Readings*, Chichester, John Wiley & Sons.

FORRESTER, J. (1961) *Industrial Dynamics*, Cambridge, MA, USA, MIT Press.

FOSTER, M. (1972) An introduction to the theory and practice of action research in work organisations. *Human Relations,* **25**, pp.6

GEANURACOS, J. & MEIKLEJOHN, I. (1993) *Performance Measurement: The New Agenda*. London, Business Intelligence Ltd.

GLEICK, J. (1987) *Chaos: Making a New Science*, New York, USA ,Viking Penguin.

GRIBBIN, J. (1992) *Everyone's Guide to Science*, London, Corgi Press.

HITCHINS, D.K. (1992) *Putting Systems to Work*, Chichester, J.Wiley & Sons.

HMSO, (1993) *British Railways Act* , London, UK , Her Majesty's Stationary Office.

HOOVER, K.R. (1988) *The elements of Social Scientific Thinking*, New York, St.Martin's Press.

HOLLOWAY, J., LEWIS, J., & MALLORY, G. (1995) Performance Measurement & Evaluation, London, Sage Publications Ltd.

JACKSON, M.C. (1982) The nature of soft systems thinking: the work of Churchman, Ackoff and Checkland, *Journal of Applied Systems Analysis,* **9**, pp.17-29.

JACKSON, M.C. (1983) The nature of soft systems thinking: comment on three replies, *Journal of Applied Systems Analysis*, **10**, pp.109-13.

JACKSON, M.C. (1985 a) The itinerary of a critical approach, review of Ulrich's 'Critical Heuristics of Social Planning', *Journal of Operations Research Society*, **36,** pp.878

JACKSON, M.C. (1985 b) Social Systems Theory & Practice: The need for a Critical Approach, *International Journal of General Systems*, Vol. **10**, pp.135.

JACKSON, M.C. (1987) new direction in management science, in New Directions inn Management Science, ed.s Jackson, M.C. & Keys, P., pp.133-64, Aldershot, Gower.

JACKSON, M.C. (1991) Modernism, Post-Modernism and Contemporary Systems Thinking, *in* Flood, R.L & Jackson, M.C. (1991) *Critical Systems Thinking, Directed Readings*, Chichester, John Wiley & Sons pp. 287 –301.

JACKSON, M.C., & KEYS, P. (1984) Towards a System of Systems Methodologies, *Journal of Operational Research*, Vol. **35**, pp. 473-486

JENKINS, G.M. (1972) The Systems Approach, in J. Beshion & G.Peters (ed.s) *Systems Behaviour*, Milton Keynes, Open University Press.

JENKINS, G.M. & YOULE, P.V. (1971) *Systems Engineering*, London, Watts.

JOHNSON, H.T. (1990) Performance Measurement for Competitive Excellence, in Kaplan, R.S. (1990) (ed) *Measures for Manufacturing Excellence*, Boston, MA, USA, Harvard Business School Press.

JOHNSON, H.T. & KAPLAN, R.S. (1987) *Relevance Lost: The rise & fall of management accounting*, Boston, MA, USA, Harvard Business School Press.

JUNG, C.J. (1926) *Psychological Types*, New York, Harcourt and Brace.

KANT, I. (1929) *Critique of Pure Reason*, London, Macmillan.

KAPLAN, R.S. & NORTON, D.P. (1992) The Balanced scorecard Measures that drive Performance, *Harvard Business Review*, Boston, **70 iss.1**, pp.71-80

KAPLAN, R.S. & NORTON, D.P. (1993) Putting the Balanced Scorecard to work, *Harvard Business Review*, Boston, **71 iss.5**, pp134 – 143.

KAPLAN, R.S. & NORTON, D.P. (1996) using the balanced scorecard as a strategic management system, *Harvard Business Review*, Boston, **74 iss. 1**, pp.75-86

KELLERT, S.H. (1993) *In the Wake of Chaos*, London, The University of Chicago Press, Ltd.

KIRCHER, P. (1959) Measurements & Managerial Decisions, in Churchman & Ratoosh (eds), *Measurement Definitions & Theories*, New York, USA , J. Wiley & Sons, pp.64-83

LANE, D.C. (1993) With a Little Help form Our Friends. In *System Dynamics 1993*, ed. E.Zepeda and J.A.D. Machuca, MA, System Dynamics Society, (published in expanded form as *City University Business School Working Paper Series*, ITM/93/DCL2)

LANE, D.C. & SMART, C. (1994) Mad, Bad & Dangerous To Know?, *City University Business School Working Paper Series*, IM/94/DCL1.

LILIENFELD, R. (1978) *The Rise of Systems Theory*, New York, Wiley.

LINSTONE, H.A. (1994) New Systems Thinking & Action for a New Century, Presidential Address *ISSS Annual Conference*, Asilomar, California, USA, ISSS.

MINTZBERG, H. (1979) Qualitative data as an attractive nuisance: The problem of analysis. *Administrative Science Quarterly*, 24, pp. 590-601.

MORECROFT, J.D.W. (1988) System Dynamics and Microworlds for Policy Makers, *European Journal of Operational Research,* **35**, 1988.

NOLAN NORTON (1991) *Performance Measurement in the Organisation of the Future*, Boston, Nolan Norton & Co.

NSC (1993), Internal Document 1. *South Central Commercial Organisation: Introducing the team.*

NSC, (1994) Internal Document 2. *Mystery Shopper Questionnaire.*

OWEN, D. (1993) Calculating Customer Happiness. *Managing Service Quality*, Vol. **3**, *No.2, pp.* 445-448.

PFS, Internal Document 1 (1994), *Strategic Plan*

PFS, Internal Document 2 (1994), *"Integrating Financial and Non-Financial Measures"*, Report on IIR conference (24-25th Jan 1994).

PETERS, T. (1987) *Thriving on Chaos*, London, Pan Books.

RSA (1995) *Tomorrow's Company: The role of business in a changing world*, London, UK , Royal Society for the encouragement of Arts, Manufacturers & Commerce.

SCHODERBEK, C.G. & SCHODERBEK, P.P. & KEFALAS, A.G. (1980) *Management Systems - Conceptual Considerations*, Dallas, USA , Business Publications Inc.

SENGE, P.M. (1990) *The Fifth Discipline*, London, Century Business.

SENGE, P.M. & ROSS, R. & SMITH, B. & ROBERTS, C. & KLEINER, A. (1994) *The Fifth Discipline Fieldbook*, London, UK , Nicholas Brealey Publishing Ltd..

SHANNON, C.E. & WEAVER, W. (1949) *The Mathematical Theory of Communication*, Chicago, University of Illinois Press.

STERMAN, J.D. (1984) Appropriate Summary Statistics for evaluating the Historic Fit of Systems Dynamic Models, *DYNAMICA*, vol. **10**, pt. 11 winter 1984.

STERMAN, J.D. (1994) Learning in and about complex systems, *System Dynamics Review*, vol. **10**, nos. 2-3 (summer-fall), pp.291-330.

STEVENS, S.S. (1946) On the theory of the Scales of Measurement, *Science*, **103**, pp.677-680.

STEVENS, S.S. (ed) (1951) *Handbook of Experimental Psychology*, New York, Wiley.

STEVENS, S.S. (1959) Measurement, Psychophysics, and Utility, in Churchman & Ratoosh (eds), *Measurement Definitions & Theories*, New York, USA, Wiley, pp.18-63

SYDENHAM, P.H. (1982) (ed) *Handbook of Measurement Science*, Chichester, J.Wiley & Sons Ltd.

ULRICH, W. (1981) A Critique of pure cybernetic reason: the Chilean experience with cybernetics, *Journal of Applied Systems Analysis*, **8**, pp.33-59

ULRICH, W. (1983) *Critical Heuristics of Social Planning*: *A New Approach to Practical Philosophy*, Bern/Stuttgart , Paul Haupt.

ULRICH, W. (1987) Critical Heuristics of Social Systems Design, *European Journal of Operational Research*, vol **31,** pp.276-283.

ULRICH, W. (1988) Systems Thinking, Systems Practice, and Practical Philosophy: A Program of Research, *Systems Practice*, vol **1**, pp.137-163.

WALDROP, M.M. (1992) *Complexity*, London, Penguin Books.

WARFIELD, J. (1989) *Societal Systems*, London, Intersystems Publications.

WIENER, N. (1948) *Cybernetics: or Control and Communication in the Animal and the Machine*, Cambridge, USA, MIT Press.

WOLSTENHOLME, F.E. (1982) System Dynamics in Perspective, *Journal of the Operational Research Society,* **33**, pp.547-556.

WOLSTENHOLME, F.E. (1990) *System Enquiry: A Systems Dynamics Approach*, Chichester, J.Wiley & Sons.

ZEITHAML, PARASURAMAN, & BERRY (1990) *Delivering Service Quality - Balancing customer perceptions & expectations*, London, The Free Press.

ZOHAR, D. & MARSHALL, I. (1993) *The Quantum Society*, London, Bloomsbury Publishing Ltd.