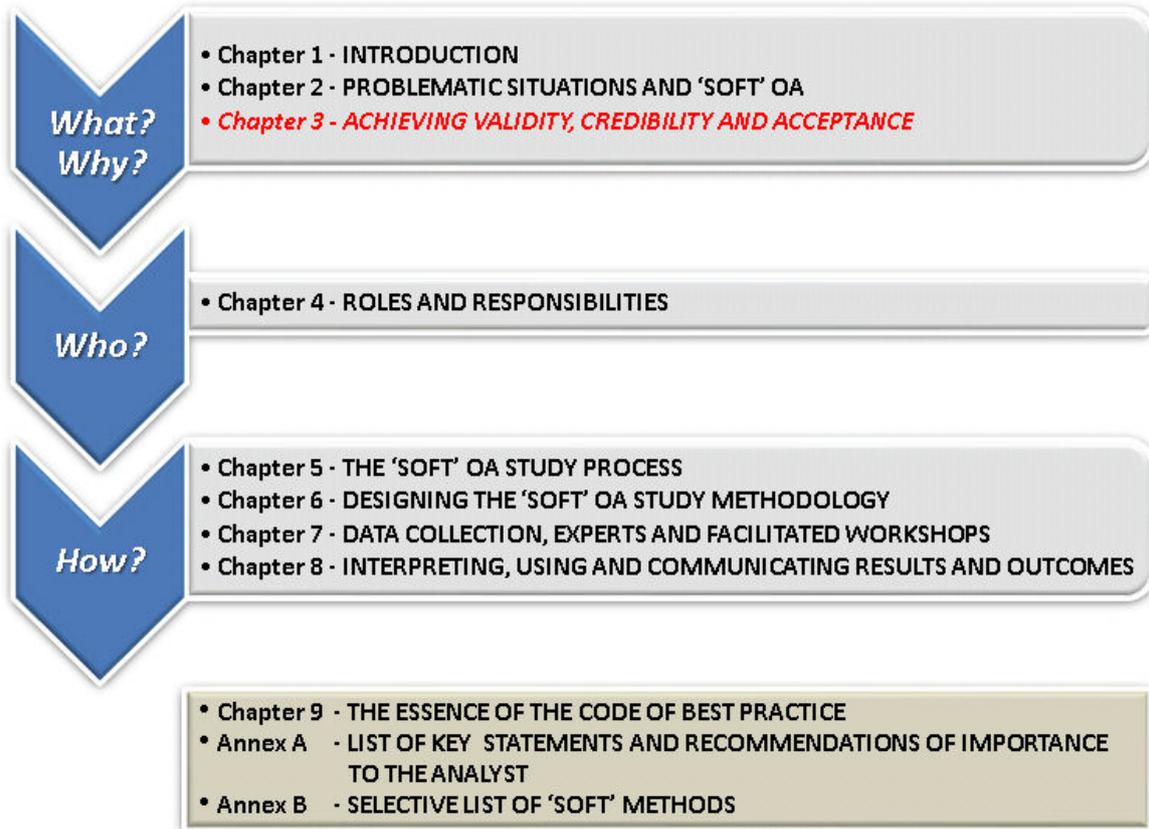


Chapter 3 – ACHIEVING VALIDITY, CREDIBILITY AND ACCEPTANCE



- The CoBP identifies how validity, credibility and acceptance can be achieved in a 'soft' OA study.
- The primary dimensions of validity are objectivity and rigour; credibility and acceptance are not distinct qualities but are rather derived from validity.
- The analyst's aim should be to make a clear distinction between the reality which is shared amongst the stakeholders, and the sectional perspectives which each may propagate for his own reasons.
- Gathering subjective judgements from experts exposes the analyst and his study to bias which can be motivational or cognitive in nature.
- The biggest threat to validity is ignorance at the design stage of what is likely to be important. This threat can itself be mitigated by creating an iterative design similar to that used in experimentation.
- An analyst needs to conduct activities in an ethical manner that deserves the confidence of all parties involved.
- Credibility and acceptance will be reinforced by independent scrutiny.

3.1 INTRODUCTION

The previous chapters of this Code have set out the aims and purposes of a Code of Best Practice and discussed the characteristics of 'soft' OA and judgement-based analysis. This chapter will describe the general context and process in which judgement-based methods are applied, and show where and why issues of validity have impact on the utility of the methods. The primary aspect of relevance to stakeholders in the use of these methods is validity. Credibility and acceptance of a method are not separable from validity but are rather derived from it. This chapter will discuss the nature of all three concepts and conclude with a discussion of ethical aspects of conducting a ('soft') OA study.

3.2 THE CONCEPTUAL ENVIRONMENT OF 'SOFT' METHODS

The typical conceptual environment in which 'soft' methods come into play is shown in Figure 3-1¹. Decision makers, faced with a need to formulate a plan of action, will express their predicament as a problematic situation to which some structure should be given. Analysts are asked to suggest a design for a study of the problematic situation; the design evokes methods, models and data in an iterative, and hopefully convergent, programme of analysis which may include objective knowledge from the worlds of science, mathematics and engineering.

¹ This figure in itself is an example of 'soft' OA: a concept map where key concepts and their relationships are depicted in order to create a structured visual image of the 'problematic situation'. Its purpose is creating clarity, focus and enabling communication and debate.

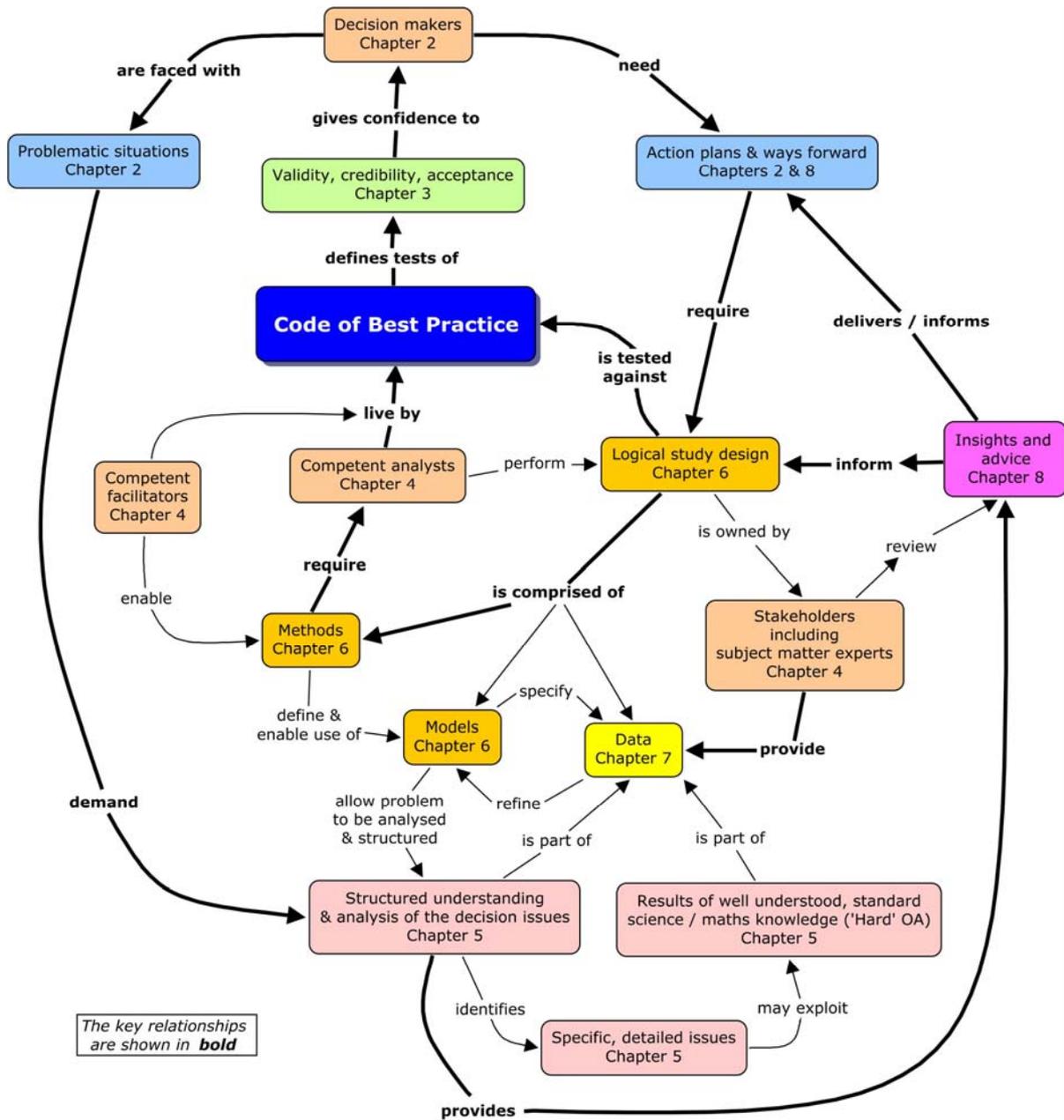


Figure 3-1: ‘Soft’ OA and the Role of the CoBP.

The CoBP is written with this environment in mind. Chapter 2 has explained the difficulties of defining complex problematic situations, discussed aspects that characterise them and related problematic situation types with ‘soft’ and ‘hard’ OA. It also explains why ‘soft’ OA can be helpful to a decision maker. Chapter 4 explains the roles and responsibilities of the clients, analysts, facilitators, and other stakeholders within a typical ‘soft’ OA study. Chapters 5, 6, and 7 discuss the action plans which will deal with complex problematic situations and detail the model building and analysis process which in the above diagram is represented as an iterative process combining stakeholder views, data collection, and analyst expertise in choosing the appropriate modelling approach. Chapter 8 of this volume explains how to engage the client (and other stakeholders) to best communicate results to them, ensuring the study outcomes are of most value. The concepts of validity, credibility and acceptance are incorporated into all aspects of this conceptual environment and each links naturally into the study design process.

Analysts should test their study design against this CoBP in order to establish the validity and credibility of their approach. The structured understanding which flows from the analysis forms the basis of insights and advice on the proposed courses of action to the decision makers.

This process is a re-expression in the decision-making context of the general approach to systematic enquiry and assessment. It therefore raises similar philosophical questions relevant to the issues of validity and credibility.

3.3 THE PHILOSOPHY OF METHODS

This is an extensive field which this CoBP cannot hope to address completely. However, it is important to understand the foundation ('grounding') of methods so that judgement-based approaches can be seen in relation to the conventional methods of science, engineering and mathematics.

Consideration of the philosophical foundations has more than general relevance; it may also be helpful in the conduct of individual studies in so far as the study domain is an instance of this general philosophical context.

The world view of the researcher can be expressed in terms of the three aspects to the philosophy of knowledge and the methods use to gain it: ontology, epistemology, and axiology (see also [1]):

What is the grounding of the techniques used in judgement-based analysis? A good analyst should always understand the philosophical foundation of his tools and methods.

- *Ontology* – What are the elements (constituents) of discourse and consideration, and do they endure? Are the elements objective ('real' or 'true'; see also Section 3.4.1) or are they constructed and so dependent for their meaning and interpretation on the cultural place in which they are posited?
- *Epistemology* – What meaning is to be drawn from a set of the elements and their relations? Are the meanings and relations objective ('real') and time independent, or are they (also) constructed and context-dependent? What enduring principles can be expressed in connection with the ontologically derived elements and can we, through reflection, reason about them? Such considerations bear upon the power of explanation which a method gives its users. It may also have effect through its aesthetic qualities, a more satisfying construct leading to enhanced explanatory power. Such considerations stray into the third aspect, axiology.
- *Axiology* – What is held to be worthy or of value? Axiology is concerned with the (ultimate) purpose of the research. Two perspectives are relevant: that of knowledge for its own sake, and that of knowledge which informs action. In practice, it may not be possible to decide in which category specific knowledge resides. Much, if not all, of the work conducted by the users of this CoBP will serve the second category of knowledge (i.e. which informs action). The worth or value of analysis practice and its products is also strongly dependent on the application of appropriate ethical principles. In particular, the general principles of good scientific practice, an analyst and client's honesty and openness, and the rigour of the study process are key considerations. Ethical considerations are discussed in more depth later in this chapter.

Each practitioner needs to establish his position in respect of these three philosophical aspects. Many find that a pragmatic, *critical realist* approach² is their natural position. A critical realist holds that knowledge is gained from the real world through the use of our senses assisted by our critical powers of reasoning. Knowledge can be both captured objectively by measurement, and constructed subjectively from the

² Implying also the capture of authentic knowledge, based on sense experience and empirical verification. A critical realist holds that science should be understood as an ongoing process in which scientists improve the concepts they use to understand the mechanisms that they study (Wikipedia). A further discussion of this subject can be found in Chapter 7.

expectations, world view, and values of the stakeholders in a decision situation. In essence, the aim of the critical realist should be to make a clear distinction between the reality which is shared amongst the stakeholders, and the sectional perspectives which each may propagate for his own reasons. Wide experience has shown this position to be feasible, not least because it is universally recognised by stakeholders.

3.4 THE NATURE OF VALIDITY

3.4.1 Dimensions of Validity

The primary dimensions of validity are *objectivity* and *rigour*, as defined by the Concise Oxford English Dictionary (as below). In essence, objectivity refers to the ontological aspect of a method and its data, whilst *rigour* refers to their essential epistemological quality. Supplementary aspects of validity which reflect axiological considerations and so may be present in differing intensity according to the context in which a method is applied, include:

- Repeatability;
- Auditability/transparency;
- Independence and lack of bias;
- Grounding/consistency (in/with standards, and other data and methods);
- Understand-ability;
- Explanatory power;
- Completeness;
- Robustness under uncertainty; and
- Clear separation of data from the method which uses it.

The *dimensions of validity* can be accounted as follows.

- *Objectivity*. Analysis should be *objective* – i.e. based on rules grounded in theory or established practice and characterised by recorded argumentation and rationale and following an agreed and sound process accepted by all involved. A good test of objectivity is whether an analysis is capable of debate amongst the stakeholders.
- *Rigour* is achieved through strict enforcement of logical rules and doctrine, such as this CoBP. Methods should be applied as proposed and documented, and any deviations should be justified and documented.
- *Repeatability* – sometimes called *reproducibility* or *replicability* – is the quality of a phenomenon to occur again, possibly in different places and times, and observed by different people. It is a key characteristic of the scientific study of phenomena, and may be difficult to achieve when (partly) relying on judgement as some conditions of the study domain (not least the expert stakeholders) may be beyond the control of the researcher. However, it should be regarded as a worthwhile objective. It is often the justification for the re-iteration of studies whose results have been challenged.
- *Auditability/Transparency*. Analysis should be *trustworthy*, with no undeclared assumptions or unstated simplifications (see *rigour*, above). Any given method needs to be both verified and validated. Verification tests whether the method works as it is specified to do, whilst validation results from a (satisfactory) comparison with a standard of behaviour external to the application to hand. Tests of verification and of validation, taken together, may be referred to as the execution of due diligence. Analysts have an obligation to monitor and report their own analytical processes, including those taken to establish the validation state of a method, e.g. through the use of method

logbooks. Transparency to enable repeatability may not be the only goal; transparency to demonstrate the legitimacy of the process undertaken is just as important. The assumptions and mental processes that underpin the design must be documented alongside the results so that they can be scrutinised together. Political and power factors may limit the transparency achievable in judgement-based OA; this is discussed further in Chapters 4, 6 and 7.

- *Independence and Lack of Bias.* For some, the analysis should be independent of vested interests [2]. For others, vested interests are part of the analysis and should be captured. The analyst must reflect on and deal carefully with bias, where possible mitigating or capturing it. Perceived objectivity of the analyst may be questioned. The relationship of the analyst with the customers, stakeholders and participants will be a factor. The role of the analyst within the method should form an explicit element of the study design. The analyst should regard himself as accountable for the quality of the analytical work; he needs to address arising issues with integrity, and in a neutral and impartial manner. Awareness of the political and social norms, values and power structure of the stakeholders is important in determining the perceived independence of the method and its analyst executors, and thus the entire validity of the design of a judgement-based study. Political issues in particular might be very difficult to accommodate into a study which seeks to meet criteria of validity. Issues of independence are discussed further in Chapter 4.
- *Grounding/Consistency (in/with standards, and other data and methods).* Methods should be based on solid theoretical and philosophical grounds. Also, where appropriate, they should be validated comparatively against real data gathered in designed experiments.
- *Understand-ability.* Questions to be addressed include: is the nature and methods of the enquiry or study fully understood by all stakeholders? Is the need for validation well understood and is the nature of the processes of validation inclusive? What is the impact of judgement biases and ‘heuristics’, as discussed below?
- *Explanatory Power.* What depth and breadth of explanation of the system properties and behaviours which the problematic situation embodies is afforded by the OA method and its results?
- *Completeness.* Do the methods adopted for the study address all aspects of a problematic situation, and, if not, in what sense does their omission impact the study?
- *Robustness under Uncertainty.* The analysis should acknowledge uncertainty in data and method right from the outset, and a plan should be formed to reduce the impact of uncertainty and manage the residue so that the outcome of the analysis can be said to be robust, i.e. of known sensitivity to variations in the inputs, both structural and parametric. Issues of uncertainty are discussed more in-depth in Chapters 2 and 6.
- *Separation of Data from the Method which Uses it.* The overall methodology should strive to make a clear distinction between the methods adopted by the analysis, and the data those methods will employ. The distinction need not be fixed for the entire period of analysis; in general, even a method could be said to be a form of input ‘data’. However, it is important for the stakeholders that as clear a distinction as possible should be made and managed as the analysis proceeds, lest the stakeholders lose confidence in the coherence and ultimate credibility of the analysis.

The determination of validity in any particular case will hinge upon *triangulation* of some or all of these dimensions. Validity will be judged greater as the correlation increases between the characteristics of the methods employed. Triangulation is discussed further in Sections 6.6.1 and 8.2.1.

There are human limits to validity in judgement-based OA, arising from the impact of biases and ‘heuristics’ in acts of judgement. When humans declare opinions, it can reasonably be assumed that their utterances will not be fully objective, but rather that they will be vulnerable to bias. Gathering subjective judgements from experts exposes the analyst and his study to possibilities of *two varieties of bias: motivational and cognitive*.

The first, motivational bias, arises when an expert's opinion is influenced by non-relevant circumstances, for example a drive to please the client of the study to which he is contributing. This bias can be conscious or unconscious; the expert may or may not realise that he has altered his view. The second is cognitive bias which can intrude when an expert does not follow rules or standards which are held to be objectively derived. An expert will often draw, consciously or unconsciously, upon 'heuristic' approaches to determination of, e.g. a variable's value. A good example is *anchoring*, i.e. the reluctance of an expert, perhaps for unconscious emotional reasons, to amend an initial view which might have been inadvertently suggested by a third party or even the analyst himself. Motivational bias may be very hard to detect and nearly impossible to eliminate. Much depends upon the attitudes and ethics of the analysts and the experts. Cognitive biases, by contrast, are better understood and have been studied experimentally, offering possibility that they can be eliminated or compensated for. The phenomenon of biases will be discussed further in Chapter 7.

It is helpful to make a clear distinction between *internal and external validity* in the application of subjective methods; internal validity refers to the logical grounding and coherence of the proposed methods, whilst external validity concerns the congruity of the methods to the area of application. Greater precision and control in the design and execution of the methods will increase its internal validity. Wider applicability of a method is an indicator of increased external validity. In this sense, *validity can be thought of as fitness for purpose*.

3.4.2 Achieving Validity

What are the threats to validity?

Internal validity is typically vulnerable to:

- Poorly defined measurement scales or categories;
- Statistical weakness resulting from very poor levels of participation by experts; and
- Inadequate recording methods.

External validity is threatened by:

- Poor understanding of the objectives and priorities of the analysis;
- Misunderstanding of the domain of expertise, robustness of the outputs to uncertainty, etc.; and
- The effects of human traits such as the biases introduced by heuristic reasoning (ref. Section 7.2).

Some of the internal factors will interact with the external factors and this must be considered in the study design. An example is the danger of mathematical artefacts in the outputs, particularly where statistical analysis has been carried out. Any analyst should be aware of these threats and make efforts to identify them, avoid them or cope with them.

Overall, a balanced, holistic view of validity is required, and some compromises will undoubtedly be needed in any practical design carried out within limited resources. Complete validation is probably not achievable in all

It is only meaningful to debate validity of a method at the point of application, i.e. in the context of the decision problem being addressed.
"All models are wrong, but some are useful" [3].

applications, but, as with objective methods, it is something to be desired and aimed for. It is only meaningful to debate validity of a method at the point of application, i.e. in the context of the decision problem being addressed. Is the method to be used *sufficiently useful* for its purpose? Perhaps the biggest threat to validity is ontological: knowing at the design stage what is likely to be important. Only experience can tell you. This threat can itself be mitigated by creating an iterative design similar to that used in

experimentation. Having created a design based on a level one understanding of the issues and executed it, use the results to re-formulate priorities and expectations, redesign and re-execute.

3.4.3 Credibility and Acceptance

Credibility is achieved when expertise is delivered with trustworthiness. The level of credibility a study method may have will depend on the amount of expertise available to apply it, and the perceptions of the client (and other stakeholders) of that expertise. Indeed, there are both subjective and objective components to credibility. In particular, the trustworthiness of an analyst will itself be subjective and personal to the client system³. In order to gain credibility for those methods which have been validated through consideration of the above factors, it is necessary to also consider the acceptance of such models from the decision-maker community.

Acceptance is a concept which is present throughout the study process. It starts at the point where the problematic situation is raised and is critical through to the end of the process, where the analysis will be exploited by the client system. Communication between the analyst (i.e. the study team) and the client system is critical throughout all aspects of the study process; often lack of communication with stakeholders can be missed until the very end of a study and so damage its acceptance. Acceptance can be gained through transparency and communication of the modelling process. This will help the analyst gain the trust and confidence of the decision makers in the method, and more importantly, the study outcomes so that these can be of most value. Transparency of judgement-based OA is discussed further in Chapter 8.

The confidence a client has in an analyst can also be increased through adequate preparation. For example, training an analyst improves their own confidence which will then be more easily portrayed to the client system. Also, ensuring resources and facilities are available can ease the model building and data elicitation process.

Credibility and acceptance will be further reinforced by independent scrutiny.

3.5 ETHICAL CONSIDERATIONS

An analyst needs to “conduct activities in an ethical manner that deserves the confidence of all parties involved” [4]. Ethical practice requires that the following action disciplines must be observed [5]:

- Act with skill and care, and keep skills up to date;
- Prevent corrupt practice and declare conflicts of interest;
- Respect and acknowledge the work of others;
- Ensure that research is justified and lawful; and
- Do not mislead – present evidence honestly.

Very similar ethical standards are promulgated by The Military Operational Research Society (of the USA) on its website [6]. Contributors to ‘soft’ OA-based studies should acknowledge these ethical guidelines and those of any professional organisation of which they are a member.

Note that these disciplines are as incumbent on the stakeholders in general as on the analysts, facilitators, etc., who are conducting the analysis. It is possible that some of the stakeholders may find the process of analysis and its results discomfiting. They should be content that they have been granted ‘*procedural*

³ The term ‘client system’ refers to the (quite common) situation where there is no single individual acting as the client, but rather a group of individuals or (part) of an organisation. Figure 4-1 (Chapter 4) depicts the client system in red ovals.

justice': they have been involved, and can judge the fairness of the analysis process, even though they may not agree with its outcome, provided that there was initial agreement on the fairness of the rules followed during the collaborative process.

Many 'soft' methods require information and data to be taken directly from experts 'in the field'. The use of subjective methods could well be viewed as an *experiment*, particularly by the experts from who information is being captured. They are, in a sense, the subjects to which the methods are being applied; their involvement could be construed as a threat to their (mental) integrity. It is arguable, therefore, that the disciplines of ethical experimentation should be applied, at least in spirit, to many of the subjective methods. Considerations relevant to this perspective include:

- Accessibility of the methods to all stakeholders;
- The integrity of the participants themselves in their respective roles (chairman, member of workshop, stakeholder, analyst, client);
- The perceived validity of the method and its processes;
- The consent of participants;
- The utilisation of resources including participant/stakeholder time;
- Publication and distribution of results from the methods;
- Feedback for participants;
- Relationship with other contributing elements and parties to a domain being served by application of a 'soft' method; and
- Attitudes towards and actions taken by the client and other senior staff in power roles to participants in aftermath of an application of a subjective method.

The key test of the ethical validity of a method is whether it yields fresh knowledge; it would not be ethical to execute a study method which did not generate new data. It should be acknowledged that some of this knowledge is frequently of a sociological kind, reflecting prior ignorance on the part of some stakeholders of the perspectives and legitimate and well-founded preferences of other stakeholders.

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3.7 RECOMMENDED ADDITIONAL READING

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