CHAPTER NN

Critical Systems Thinking, Systemic Intervention and Beyond

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ABSTRACT

Applied systems thinking has evolved since the 1950s through three paradigmatic waves. Authors in the first wave regarded systems as real-world entities, and systems models as representations of reality, so objectivity was important. In contrast, second wave authors emphasised *thinking* in terms of systems, and the exploration of multiple perspectives. The role of models was to aid mutual understanding and enhance the appreciation of diverse viewpoints on action to be taken. In the 1980s, first and second wave advocates came into conflict. Then some third wave authors, initially working under the banner of critical systems thinking, argued that the division of the systems research community into two camps was unhelpful, and they advocated methodological pluralism—mixing methods from both traditions. Other authors set out to address power relations during interventions—in particular, the practice of exploring value and boundary judgements in projects in order to address conflict and marginalization. This practice came to be called 'boundary critique', and it was eventually integrated with methodological pluralism in a new approach called systemic intervention. This chapter gives readers a thorough overview of the emergence and maturation of both critical systems thinking and systemic intervention, illustrated with practical examples. It then discusses two major problems that remain unaddressed in the third wave. First, the increasing proliferation of methodologies and methods has resulted in such a diversity of views on systems thinking, that explaining what it is to newcomers has become a real challenge. Second, despite this diversity, all the new methodologies and methods are still founded on principles of rational analysis, and approaches that go beyond this are marginalized. For instance, arts-based and theatre methods are rarely mentioned in the literature on systems thinking, yet they can help people discover how their value and boundary assumptions have roots in unconscious impulses and memories. Such discoveries help to unfreeze taken-for-granted understandings, including the internalisation of oppressive power relationships. Very recent writings have begun to tackle these problems, but it is too soon to judge whether they represent an extension of the third wave, or the first swellings of a new, fourth wave of systems thinking.

KEYWORDS

Applied Systems Thinking, Boundary Critique, Critical Systems Thinking, Systemic Intervention, DSRP, Immersive Systemic Knowing

1 Introduction

'Systems thinking' refers to the practical application of systems ideas to address or prevent complex environmental, social and organisational issues. It is as much about dialogue and collaboration as what happens in our minds (Ulrich 1983), and it takes place in contexts of action (Midgley 2008a). While there have been many predecessor ideas, stretching from the days of the ancient Greeks to the early 20th Century (M'Pherson 1972, Midgley 1992a, Crowe 1996, Biggart et al 1998), Systems thinking first arose in modern form in the 1950s as a reaction to the limitations of more traditional scientific and management methods when confronted with complex, real-world problems. It especially came into its own when the complexity involved systemic properties like feedback loops (e.g., Forrester 1961), multiple human perspectives (e.g., Checkland 1981), conflict (e.g., Mason and Mitroff 1981) and/or marginalization processes (e.g., Midgley 1992b).

Most classical attempts at generating scientific understanding or solving problems are informed by a single disciplinary perspective; i.e., restricted by relatively arbitrary disciplinary boundaries (von Bertalanffy 1956, Boulding 1956). They also apply reductionist methods, which break phenomena into component parts so they can be studied or addressed independently in bite-sized pieces (von Bertalanffy 1968). This ignores the importance of appreciating the *interactions between* the parts, and between phenomena that are usually studied separately by different disciplines. When it comes to problem solving, ignoring interactions can actually bring about systemic resistance to reductionist 'solutions' or may create unanticipated side-effects (Daellenbach 2001).

Reductionist scientific and management methods often embody two other potentially pernicious assumptions: mechanism and subject/object dualism. Mechanism means viewing the world as a predictable machine (Prigogine 1987), where human beings are regarded as mindless cogs within it instead of self-conscious actors whose choices (based on subjectively or inter-subjectively relevant purposes and values) may be different to those that a supposed 'expert' might make. Value conflicts may therefore confound supposedly 'optimal' or 'objectively rational' solutions (Vickers 1983; Checkland 1985). Subject/object dualism is related to this, as it involves the conceptual splitting of the 'subject' (who observes things and is the holder of knowledge about them) from the 'object' (which is observed and known). If, following this split, the subject comes to be hidden, the illusion of perfect objectivity is created, as if we can have knowledge without a knowing subject (Fazey et al 2018). Mechanism and subject/object dualism often walk hand in hand, as the former involves the denial of agency to human beings, which is consistent with removing the knowing subject (who has agency) from the picture. For a good example of a mechanistic theory of human beings which denies both human agency and the relevance of subjectivity, see Maze (1983).

In contrast to all the above, systems thinking is *transdisciplinary*: the focus is on defining and redefining systems without conforming to disciplinary boundaries (von Bertalanffy 1968; Bailey 2001; Midgley 2001a). It not only disregards 'arbitrary' disciplinary boundaries, but it also avoids reductionism: while no analytical approach can be absolutely comprehensive (Bunge 1977; Ulrich 1983; Friend 2004), at least a systems approach facilitates the consideration of interactions within and between systems, rather than treating them as aggregates of separately-studied parts (Bunge 1977). Subject/object dualism and mechanism are both challenged, as the agency and inter-subjectivity of human beings is acknowledged (Fuenmayor 1991a,b,c): people are seen as interactive parts of larger socio-ecological systems, so can both change those systems and be changed by them (Gregory 2000).

In essence, systems thinking focuses attention on interrelationships, how parts interact to form whole systems, how those systems are defined by boundary distinctions, and what these interrelationships, systems and boundary distinctions might look like from different perspectives (Cabrera et al 2008, 2015; Cabrera and Cabrera 2015).

So, if the above describes systems thinking, what is *critical* systems thinking? To answer this question, we need to look at what happened from the 1950s to the 1980s that made a substantial group of researchers want to add a new word ('critical') to the front of a relatively well-accepted term.

In this chapter, we will briefly outline the history of systems thinking in the second half of the 20th Century, describing it in terms of three 'waves' (or paradigms) of development (see Midgley 2006a and Cabrera 2020 for discussions of the strengths and weaknesses of the wave metaphor). Critical systems thinking (CST) formed the crest of the third wave, and when it crashed onto the beach of our methodological practice, it fundamentally changed how many people approached systems thinking. This historical analysis will show why CST was needed.

Having provided this introduction, we will explain how CST initially took the form of two very different approaches that were developed in parallel during the 1980s and 1990s. These were then integrated in the late 1990s and early 2000s under the banner of 'systemic intervention'. Since then, there have been further refinements of both systemic intervention and the third wave ideas preceding it, and it is arguably now the case that this kind of work represents the dominant paradigm in the systems thinking research community.

All paradigms have their time in the sun, but are eventually challenged when sufficient problems with them are identified (Kuhn 1962). We will end the chapter by discussing two such problems with third wave ideas, which have been addressed in several promising recent pieces of work. These might represent new third wave thinking, or might signal the first swellings of a fourth wave—it is too early to tell. The emergence of new paradigms is characterised by shifts in the thinking of substantial groups within research communities (Kuhn 1962; Tsoukas 1993) and the ideas in question are still under development, so we cannot yet know how influential they will be.

2 Critical Systems Thinking and Systemic Intervention

Let us start by briefly examining the history of systems thinking, which will help us explain the first emergence of Critical Systems Thinking and the third wave.

2.1 Historical Background: The First Two Waves of Systems Thinking

The earliest modern systems ideas to gain popularity at the start of the first wave of systems thinking included the open system theories of Angyal (1941) and von Bertalanffy (1950), which began to influence practice in disciplines like Sociology (e.g., Parsons 1964) and Management (e.g., Kast and Rosensweig 1972). Social groups and organisations began to be viewed as systems. This new way of thinking was particularly influential in the cross-over between systems science and operational research (henceforth referred to as 'systems/OR'), where the then-emerging applied-scientific methodological traditions of systems analysis (e.g., Quade and Boucher 1968; Optner 1973; Quade et al 1978; Miser and Quade 1985, 1988), systems engineering (e.g., Hall 1962; Jenkins 1969), system dynamics (e.g., Forrester 1961) and organisational cybernetics (e.g., Beer 1959, 1966, 1981) were developing.

The first wave of systems thinking gained great popularity in the 1950s and 1960s. However, in the late 1960s (and even more in the 1970s and early 1980s), significant questions began to be asked, both about the philosophical assumptions embodied in the first wave, and the consequences of its practical application. The above systems/OR approaches were criticised for regarding models as representations of reality rather than as aids for the development of inter-subjective understanding between people with different perspectives (Churchman 1970; Checkland 1981; Espejo and Harnden 1989; de Geus 1994). If models are regarded as embodying 'the truth', then people with other perspectives can easily be dismissed as wrong, which can obstruct mutual learning and stimulate unproductive conflict. The practitioners who used these approaches often set themselves up (and were regarded by others) as *experts*. Thus, they fell into the trap of making recommendations for change without properly involving those who would be affected by, or would have to implement, that change. The result could often be recommendations that were regarded as unacceptable by stakeholders, and were therefore not implemented, or were resisted if implementation was attempted (Lee 1973; Rosenhead 1989).

These approaches were also criticised for viewing human beings as objects that could be manipulated as parts of larger systems, instead of individuals with their own goals, which may or may not harmonise with wider organisational priorities (Checkland 1981; Lleras 1995). In consequence, several authors pointed out that the first wave systems approaches, which mostly emphasised quantification, had inherited some of the mechanistic assumptions of earlier, more reductionist sciences, and thereby their advocates failed to see the value of bringing the subjective and inter-subjective insights of stakeholders into planning and decision making (e.g., Churchman

1970; Ackoff 1981; Checkland 1981; Eden et al 1983). Finally, it has been argued that most of these systems approaches assume that the goal of the person or organisation commissioning a systems project is unproblematic, when it is actually common to find that goals are unclear or there are multiple viewpoints on which goal is most appropriate to pursue (Checkland 1981; Jackson and Keys 1984). In such circumstances, it is relatively easy for the commissioner to subvert application of systems/OR approaches: unless the practitioner has a strong sense of ethics, and some understanding of how to facilitate participation, use of these approaches will tend to support only the views of clients paying for projects, allowing the opinions of others to be ignored (Lilienfeld 1978; Jackson 1991).

All these criticisms and more (see Hoos 1972; Lee 1973; Lilienfeld 1978; and Midgley and Richardson 2007 for further issues not discussed above) led to a significant paradigm shift in the theory underpinning the application of systems thinking. A second wave was born. In this new wave, systems were no longer seen as real-world entities, but as *constructs to aid understanding*. The emphasis was on dialogue, conflict resolution, mutual appreciation and the inter-subjective construction of meaning. Arguably, the authors best known for generating this paradigm shift are Churchman (1979a), Ackoff (1981) and Checkland (1981). It is worth saying something about Churchman's contribution in particular, as his work was not only foundational for the second wave of systems thinking, but also influenced later third wave developments, including CST.

Churchman (1970) was a systems philosopher and operational research (OR) practitioner who made a fundamental contribution to rethinking the systems idea: he argued that we should not assume that system boundaries are always real-world entities (such as the skin that separates the internal organs of the human body from its environment). Rather, boundaries can usefully be seen as conceptual: in an applied systems/OR project, they demarcate what is relevant to an analysis from what is superfluous, and they define stakeholder inclusion and exclusion. Judgements on boundaries are always values-based, and hence decision making on the remit of a project is an inherently ethical matter. Because "the systems approach begins when first you see the world through the eyes of another" (Churchman 1979a, p.231), participatory practice becomes essential. Churchman's rethinking of the systems idea, together with a strong desire in the systems research community to take account of human subjectivity and inter-subjectivity in order to address the shortcomings of the first wave of systems thinking, led to the development of a substantial set of new systems methodologies. Examples include strategic assumption surfacing and testing (Mason and Mitroff 1981), soft systems methodology (Checkland 1981; Checkland and Scholes 1990; Checkland and Poulter 2006), interactive planning (Ackoff 1981; Ackoff et al 2006), interactive management (Warfield 1994; Warfield and Cárdenas 2002) and structured dialogical design (Christakis and Bausch 2006; Laouris and Michaelides 2018). It is also worth noting that several first wave methodologies were thoroughly transformed in the second wave, with its focus on stakeholder participation and qualitative dialogue for collaborative learning— most notably, system dynamics (e.g., Senge 1990; Sterman 1994; Vennix 1996) and organizational cybernetics (e.g., Espejo and Harnden 1989; Espejo et al 1996; Espinosa and Walker 2017).

The second wave of systems thinking attracted a lot of interest in the late 1970s and early 1980s, and the first criticisms of it (that would later lead to the emergence of a third wave) were launched at the same time. The major issue was that the participative methodologies characterising the second wave did not sufficiently account for power relationships within interventions: they assumed that open communication between stakeholders would be unproblematic, when in fact it is often constrained (Mingers 1980, 1984; Jackson 1982). Also, some critics (e.g., Thomas and Lockett 1979) took a Marxist position, arguing that there are conflicts built into the structure of society. From a Marxist perspective, it is a problem that managers and workers can reach collaborative agreements using systems approaches without necessarily changing the basic relationship between the owners of an enterprise and those with no choice but to work for less than the full value of their labour. It suggests that systems thinking is being used to facilitate a 'false consciousness' amongst the workers: that it is acceptable for an employer to profit from the labour of employees.

Other criticisms came from a Habermasian perspective. Mingers (1980, 1984) and Jackson (1982) suggested that the focus of second wave systems thinking on participation is appropriate, but a theory of emancipation (of a non-Marxist variety) is needed to enable second wave methodologies to be harnessed in the service of real social change. Mingers and Jackson argued that uses of second wave systems approaches are often 'regulative': that is, intervention usually has such a local focus that wider unjust political and economic relationships are taken as the environment of the system of concern, and therefore participants are encouraged to adapt their organisations to these relationships instead of challenging them.

Very soon after these criticisms began to surface in the literature, second wave systems thinkers came under attack from a new direction. People became increasingly concerned that the academic systems/OR community was being torn apart by a paradigmatic war between first and second wave thinkers (Dando and Bennett 1981), yet both kinds of approach are necessary to deal with different types of problem. In 1984, Jackson and Keys published what was to become a seminal paper, arguing that the first and second waves should be regarded as complementary rather than competing.

2.2 The Third Wave of Systems Thinking

By the end of the 1980s, the third wave of systems thinking had begun to take shape, and many of the most influential ideas in it were developed under the banner of *critical systems thinking* (CST). CST was built upon two foundation stones: Ulrich's (1983, 1987, 1988, 1994, 1996) social theory and systems approach called critical systems heuristics, and Jackson and Keys's (1984) argument for methodological pluralism.

2.2.1 Critical Systems Heuristics

In critical systems heuristics, the central idea is the need to be critical of the value and boundary judgements made by planners. Those involved in and affected by planning are encouraged to reach agreement on the key assumptions upon which planning ought to be based. When dialogue is avoided by planners, those affected by their plans have the right to make a 'polemical' case against the planners, to embarrass the latter into accepting discussion.

It should be noted that critical systems heuristics was not explicitly launched as a criticism of the second wave, even though it clearly addresses some of the issues of power that were found to be problematic in earlier systems practice: while Ulrich drew upon the prior ideas of Churchman (e.g., 1970, 1979a,b) about system boundaries, critical systems heuristics was primarily formed out of reflections on mainstream philosophy of science (e.g., Popper 1959) and the limitations of critical philosophy (particularly Habermas 1976). It is really a synthesis of Habermas's theory of communicative action (including the idea that rationality is dialogical, so a rational plan is one that is based on free and fair discussion between planners and those affected by their plans) and Churchman's theory of system boundaries. Churchman's (1970) insight that boundary judgements (defining what is seen as relevant in an analysis) are dependent in large measure on value judgements (what is important to people in the context of action) is used by Ulrich to 'pragmatize' the idea of dialogue, making it clear that the boundaries of both participation and subject matter need to be critically examined by both the convener of a dialogue and its participants. In the absence of critical thinking about boundaries, dialogue may appear utopian and impossible to implement (if people believe that it needs to be all-encompassing) or problematic issues of inclusion and exclusion may simply be taken for granted.

To operationalize the principle of critical thinking about boundaries, Ulrich (1983, 1986, 1987) offers a set of twelve questions that he says should be fundamental to critical-systemic thinking about planning in any context. Each question can be asked about the situation as it is now ("what *is* the case?") and what ought to obtain ("what *ought* to be the case?"). Different participants may have different viewpoints on what is the case or what ought to be the case (or both), and these differences become the basis for discussion between stakeholders. The questions in both the 'is' and 'ought' modes can be found in Table 1.

An early example of the practical application of these questions is in Cohen and Midgley's (1994) evaluation of a service, in a city in the North of England, helping to divert people with mental health problems from custody. The idea was to find people with mental health problems in police cells or prisons so they could be offered appropriate treatment instead of just confinement (also see Midgley 1997a, 2000). An earlier stage of the evaluation had demonstrated that the service was very successful in securing the release of the majority of prisoners who had committed relatively minor offences, and who were responsive to mainstream psychiatric drug therapies. However, a substantial minority of prisoners were not diverted from custody. These people fell into three categories: those

who had committed serious crimes (there were no high-security psychiatric services in the region to take people who were considered to be a danger to the public); those who were unresponsive to medication (psychiatrists saw little point in transferring them to hospitals if they couldn't be treated with conventional approaches, and there were few alternative options, such as talking therapies); and a very small number of institutionalised offenders who would deliberately commit crimes when they were released from custody so they would be incarcerated again.

All three of these categories of people who couldn't be diverted from custody point to systemic problems with the mental health and criminal justice systems: appropriate alternative services were just not available. For this reason, the evaluation was concluded with a participative and proactive redesign of the mental health and criminal justice systems in the region, involving two groups of participants: professionals working in these systems, and users of the diversion from custody service (i.e., people with mental health problems with recent experience of being in prison or police cells). The critical systems heuristics questions were used to explore how the mental health and criminal justice systems would have to be redesigned to prevent people ending up in inappropriate custody in the first place: i.e., the ideal situation was one where the diversion from custody service wouldn't be needed, as people would be offered appropriate treatment options from the start. Cohen and Midgley (1994) and Midgley (1997a, 2000) explain how a significant consensus between the professionals and service users emerged, as they agreed on what sorts of services needed to be developed, and only a few, relatively-minor differences between the groups remained. A strong view was expressed by all the stakeholders that the consensus gave them confidence that those last issues could easily be resolved through dialogue. In reviewing the final evaluation report, the Home Office (the government ministry responsible for the criminal justice system) made special mention of the value of this redesign, saying that this is a methodology that should be more widely used for service evaluation.

In critical systems heuristics, when Ulrich talks about being critical about boundaries, he essentially means making "transparent to oneself and others the value assumptions underlying practical judgements, rather than concealing them behind a veil of objectivity" (Ulrich 1983, p.20). A major criticism of both first and second wave systems thinking is that value and boundary judgements are generally set 'pragmatically' by those stakeholders who are regarded as experts (especially in the first wave) or who hold unilateral decision making authority (in both the first and second waves), and there is little explicit reflection on whether they are the right judgements from the perspectives of those affected by but not involved in decision making, including ordinary citizens, marginalized stakeholders and those with an interest in broader issues of social justice (e.g., Ulrich 1981; Jackson 1991; Midgley 2000). The critical idea requires the avoidance of a premature 'hardening of the boundaries' in systemic inquiry (Ulrich 1983; Flood and Ulrich 1990)—hence the term 'critical systems thinking' came to prominence (see Flood and Jackson 1991a for further discussions of the origins of this term).

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The idea of being critical about value and boundary judgements came to be called 'boundary critique' in the mid-1990s (Midgley et al 1998), and this term is now widely used in the literature, moving the debate well beyond critical systems heuristics alone (e.g., Pinzón and Midgley 2000; Yolles 2001; Foote et al 2002, 2004, 2007; Luckett and Grossenbacher 2003; Boyd et al 2004, 2007; Cabrera 2006a; Córdoba and Midgley 2006; Achterkamp and Vos 2007; Midgley and Shen 2007; Henning and Thomas 2008; Reynolds 2010; Jokonya and Hardman 2011; Midgley and Pinzón 2011; Stephens 2013; Hodgson 2016; Tirivanhu et al 2016; Velez-Castiblanco et al 2016; Helfgott 2018; Midgley et al 2018; Paxton and Frost 2018; Pinzon-Salcedo and Torres-Cuello 2018; Torres-Cuello et al 2018; and Ufua et al 2018).

2.2.2 Methodological Pluralism

The other key argument contributing to the birth of critical systems thinking—the idea that systems practitioners should embrace methodological pluralism (Jackson and Keys 1984, Jackson, 1987a)—took several more years to fully evolve.

Jackson and Keys (1984), Jackson (1987b, 1990, 1991) and Flood and Jackson (1991b) proposed a practical framework, called the system of systems methodologies, for aligning different systems methodologies with their 'most appropriate' ideal-type contexts of application. The most frequently-cited version of the system of systems methodologies (SoSM) is presented in Table 2 (an expanded version has recently been proposed by Jackson 2019,

and will be touched upon later). The SoSM is a grid with two axes defining six contexts: one axis is labelled *system* (referring to perceptions of complexity), and the other is labelled *relationships between participants* (referring to perceptions of the relationships between people in the problematic situation being addressed).

The 'system' axis has two states: *simple* (easy to understand) and *complex* (difficult to understand).The 'relationships between participants' axis has three states: *unitary* (a perception of full agreement between participants on definitions of the problem situation), *pluralist* (a perception of disagreement between participants) and *coercive* (a perception of disagreement that is masked, or potential disagreement that is not being allowed to surface, due to power relationships between participants).

The six contexts in the SoSM are arrived at by cross-referencing the two axes. Various systems methodologies have been aligned with these different contexts: see Jackson and Keys (1984), Jackson (1987b, 2019), Banathy (1987), Oliga (1988), Flood and Jackson (1991b) and Midgley (1992a, 1995, 1996a) for details. In broad terms, when Jackson and Keys (1984) and subsequent authors conducted this alignment of methodologies with their ideal contexts of application, first wave (quantitative, modelling) systems approaches were said to be most appropriate for the unitary contexts; second wave (qualitative, participative) methodologies were regarded as best for pluralist situations; and third wave (confrontative, boundary-challenging) methodologies (Ulrich's 1983 critical systems heuristics was the only such approach identified) were aimed at coercive contexts.

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These were not arbitrary alignments. First wave methodologies were said to be best suited to unitary contexts because formulating models in response to a set of questions will only be of relevance to those people who agree that this set of questions is the *right* set. If there is disagreement over what the basic issues are (i.e., the context is pluralist), then this will not be addressed by provision of a simple set of facts, or projections of future scenarios, that are orientated to answer questions that only some people regard as important. Similarly, if we are dealing with coercion, the 'improvements' introduced by using first wave methodologies will simply strengthen the hand of those who have control over what issues are addressed by allowing them to pursue their aims more effectively. When there is genuine agreement on the nature of the problem, however, then first wave methodologies can provide useful answers.

In contrast, second wave methodologies were aligned with pluralist contexts because, when there is open and non-coercive disagreement, dialogue-based techniques can help enable better mutual understanding and decision making. However, when there is agreement on what the problems are (i.e., the context is unitary), then there are few differences between viewpoints to explore, so dialogue becomes redundant. Dialogue-based methodologies are equally unhelpful in coercive contexts because open disagreement is not easy to surface, and the intervention inevitably ends up supporting the dominant vision.

In contrast once again, critical systems heuristics was aligned with the coercive contexts because, when mutual understanding is difficult to achieve and a necessity for 'taking sides' arises, it can help in subjecting dominant visions to dialectical challenge (Jackson 1987b; Flood and Jackson 1991b). When there is agreement on the right course to pursue (i.e., the context is unitary), such dialectical challenge will usually be redundant. Also, if we try to use critical systems heuristics when disagreement is open (i.e., the context is pluralist), then its challenging nature may well threaten the potential for mutual understanding that could make conflict easier to handle in other ways.

We therefore see that each type of methodology aligned with contexts in the SoSM has its strengths, but each also has significant weaknesses. This gives rise to the possibility for methodology *choice* following diagnosis of the problem context. It also provides a means to consider how to *mix* aspects of different methodologies. Jackson and Keys (1984) talk about this in the following terms:

"Some problem contexts will, of course, not fit exactly into any one of the.... categories. Faced with such an intransigent problem context, the problem solver may still gain benefits from the analysis. It will be possible, using the analysis, to see how a particular methodology might be extended by making use of aspects of other approaches. For example, a problem solver who is armed with a soft-systems methodology appropriate for a [complex]-pluralist context may find it possible to 'harden up' his methodology for a problem context which has some [simple]-pluralist aspects. The resolution of conflict over objectives may be helped by the use of a quantitative approach to aid the decision makers in investigating the effects of their own preferred solutions relative to the solutions of others" (Jackson and Keys 1984, p.484).

The authors also refer to the possibility of dynamism in the problem context, necessitating movement between methodologies:

"The emphasis is on the key variables in problem contexts which can, in changing their character, lead to qualitative changes in such contexts, affecting the problems therein and thereby demanding a significant re-orientation in problem-solving approach" (Jackson and Keys 1984, p.474).

An example of using the SoSM is presented by Midgley (1988, 1989a, 1990a) and Midgley and Floyd (1990, 1993). These authors were commissioned to evaluate a computer training service for people with disabilities, back when personal computers (PCs) were a relatively new phenomenon in the workplace (Midgley and Floyd, 1988). Jobs involving PCs were proliferating, and vacancies were hard to fill because not enough people in the general population were being trained, so three London boroughs saw an opportunity to offer training to people with disabilities who might otherwise have difficulty finding employment. The funding for the training service was secured from the European Union, and some of it was set aside for the evaluation.

Confidential interviews with service users, training staff and other stakeholders were undertaken to explore the situation before the evaluation methods were designed. Some aspects of the evaluation (e.g., monitoring whether targets for training and employment were being met, and quantifying the flows of service users from referral agencies into disability assessment and training, and then out into employment) were regarded as simple-unitary because there was a consensus that they were important, how these things should be measured was seen as uncontroversial, and information could be provided through the use of descriptive statistics and flow diagrams.

However, other parts of the evaluation, while unitary (agreed upon as necessary), were more complex. These included undertaking an equal opportunities analysis, as there are multiple, interacting variables relevant to systemic disadvantage, and priorities needed to be established. Furthermore, it was important, not just to look at equal opportunities for people to access the training services, but also to see if the training (and other related support) had helped to mitigate the disadvantages that many of the clients faced. This part of the evaluation required dialogue with stakeholders about the equal opportunities categories to be used, and it involved the use of comparative statistics to assess access to services and the mitigation of disadvantage.

There were also several underlying, but not openly expressed, conflicts—especially between the staff team (trainers, employment placement officers) and governance board members when it came to understanding both the history of the program and strategic priorities. In addition, there was dissatisfaction amongst the trainees about some of the training, and the staff team tended to be defensive about this. Several trainees explained that they would not be willing to engage in public discussions of the quality of the training because they feared discrimination. Likewise, the trainers were not willing to discuss their disagreements over strategic priorities with the governance board. There were perceptions of coercion here. Midgley (1990a) and Midgley and Floyd (1993) describe how they used their role as independent evaluators to write reports raising the controversial issues themselves, without betraying confidences, and they also set up a service user workshop (without revealing who attended) with the sole purpose of raising quality concerns. These concerns were presented to the staff, who proposed actions to be taken, and both the concerns and actions were summarised in a report to the governance board.

This is a good example of a complex project where multiple contexts were defined, and methods from different paradigmatic sources had to be chosen or designed in response. One thing particularly worthy of note is that the unitary contexts (those characterised by agreement) were addressed through the use of 'expert' analyses, as recommended by Jackson and Keys (1984) and others, *but so were the contexts defined as coercive*. This underlines the importance of the observation by Clayton and Gregory (2000) and Clayton (2004) that, when it comes to the methodological response to be designed, coercive situations can be closer to unitary ones (characterised by agreement) than pluralistic contexts (where there are openly-discussable disagreements, so second-wave systems approaches come into their own). Indeed, in the face of coercion, the practitioner might need to shoulder a significant responsibility: to use his or her role to open analysis and discussion of controversial issues in a manner that is safe for those fearing reprisals. In the case of an independent evaluation, where there is a governance board with a remit to tackle problematic issues, this is quite possible because the coercion is relatively mild (the evaluation and governance offer pathways to mitigate its effects). In other situations where there are no arbitrators who coercive forces are required to respect, it may be much more difficult to secure change (Midgley 1993, 1997b), and the options for systems practice in such situations will be discussed shortly.

Before moving on, one final point needs to be made. Jackson (1990) stresses that the SoSM is not a 'rule book' to be followed systematically. Indeed, he is highly critical of authors (e.g., Banathy 1984, 1987, 1988; Keys 1988) who treat it in this way. Rather, it should be regarded as an ideal of intervention practice that is useful for critical reflection on methodology design. To explain, ideals are theoretical constructs, and to be critically reflective is to question assumptions. By saying that we should be critically reflective about methodology design, Jackson is suggesting that there is a need to look carefully at the situations we are going into, trying not to take too much for granted. We also need to consider the possible consequences of the methodologies we might use, and design our approach accordingly. So, by saying that the SoSM is an ideal that can be used to guide critical reflection, he is saying that the theoretical insights it provides can offer *direction* to our thinking, but should not *determine* it. Jackson (1990) recognises that practical situations may require compromises with what we might like to do with methodologies in an ideal world, and interveners must think critically about how they should manage non-ideal situations.

As the 1980s gave way to the 1990s, other authors rapidly began to join the growing movement, contributing to the evolving understanding of methodological pluralism (e.g., Oliga 1988; Midgley 1988, 1989a,b, 1990a,b, 1992c; Flood 1989, 1990; Gregory 1990, 1992), until it finally became possible to define a coherent perspective called 'critical systems thinking'. This was consolidated in a book of readings edited by Flood and Jackson (1991a). It became clear that a third wave of systems thinking was very much underway. While the first wave mostly took a quantitative, objectivist, applied-scientific line on systems, and the second wave stressed participation and multiple perspective-taking, the third wave emphasised the value of both—and shifted attention to how choices between the great variety of systems approaches can be exercised in a critical and systemic manner.

In the above review, although we have outlined the main events in the formation of CST, we have provided only minimal information about the vast amount of work on methodological pluralism that was conducted in the late 1980s and early 1990s (Midgley 1996b reported the involvement of over one hundred authors, with some writing multiple contributions). For more detailed reviews of this early CST literature, see, for example, Midgley (1992a), Munlo (1997) and Ho (1997). Most notably, we have skated over some of the complexities of the debates surrounding methodological pluralism: for example, how it is possible to justify drawing upon methods from a variety of paradigms when these paradigms make fundamentally different and supposedly irreconcilable assumptions about the nature of the world (ontology) and our knowledge of it (epistemology). These philosophical issues are discussed in detail by, amongst others, Flood (1989, 1990), Midgley (1989b, 1992a, 1996b, 1997c), Mingers and Brocklesby (1996, 1997), Jackson (1991, 2000), Zhu (2011), Bowers (2012) and Midgley et al (2017).

2.2.3 Rethinking Critical Systems Thinking

Even before Flood and Jackson (1991a) produced their book of edited readings on CST, there were considerable tensions in the CST movement. These centred primarily on three problems, and resolving them led to a significant rethinking of CST in the mid-1990s (other problems beyond these three were also identified by Midgley 1989b, 1990a, 1992a, 1996b; Gregory 1990, 1992, 1996a,b; Tsoukas 1992, 1993; and Wooliston 1992). Below, we explain the three problems and their resolution.

First, by saying that Ulrich's (1983) critical systems heuristics is only useful for dealing with situations characterised by coercion, Flood and Jackson (1991b) effectively confined boundary critique (being critical about the value and boundary judgements involved in constructing a project) to a minority of situations. This begs the question of how coercion gets to be identified in the first place if there is no attempt to look for possible alternatives to the purposes, values and boundary judgements being pursued by the first stakeholders (usually the paying client and others aligned with him or her) that the practitioner talks with (Ulrich 1990, 1993; Midgley 1996b). If there is no scope for boundary critique, coercion may be hidden by whoever is presenting a description of the problem situation. It is undoubtedly the case that more is needed by way of boundary critique than the twelve questions in critical systems heuristics (Midgley 1996b), but if people are serious about taking account of power relations, then boundary critique cannot be subordinated to a form of methodological pluralism that limits its application based on superficial diagnoses of problem situations. Inevitably, the answer to this problem is to accept that boundary critique, as a means to facilitate deeper diagnoses of problem situations, needs to be practiced up-front in all interventions (Midgley 1996b, 1997b,c), and this is a solution that has been widely (but not universally) accepted in the CST research community (e.g., Mingers 1997; Munlo 1997; Flood 1999; Han 2000; Córdoba and Midgley 2003, 2006, 2008; Boyd et al 2004, 2007; Shen 2006; Foote et al 2007, 2020; Córdoba-Pachón 2010; Stephens 2013; Barros-Castro et al 2015; Shen and Midgley 2015; Ufua 2015; Lewis 2016; Torres-Cuello et al 2018; Ufua et al 2018). This does not contradict the wish to embrace methodological pluralism, despite Jackson's (2000) argument to the contrary, because boundary critique is rarely enough on its own: it is always necessary for agents to find practical means to deal with problematic issues following boundary critique, and the use of a plurality of methods may be helpful in this regard (Midgley 1996b, 1997c), interspersed, if possible, with periodic checking on boundary questions (Córdoba and Midgley 2003, 2006, 2008). Here we have the first attempt at bringing together the hitherto-separate strands of CST (critical systems heuristics and methodological pluralism) into a single, coherent perspective on systems practice, without subsuming one within the other, and this would come to be developed by Midgley (2000) into a fully-fledged methodological approach called systemic intervention (see later for details).

The second problem concerns the SoSM, which Gregory (1992 1996a,b) persuasively argues against, saying it encourages people to accept only one interpretation of each methodology. Flood and Romm (1995) have demonstrated that it is actually possible to use methodologies for a variety of different purposes, some of which go beyond those they were originally designed for. Indeed, two researchers may have different but still legitimate understandings of the same methodology, even within a single project they are collaborating on, and this diversity gives rise to greater potential for variety in intervention (Velez-Castiblanco 2012). Placing the methodologies in boxes discourages alternative interpretations and uses of them, even if those uses are quite justifiable.

Not only does the SoSM 'freeze' interpretations of methodologies in an unnecessarily restrictive manner, but it cannot easily take account of the methodological developments that occur when researchers learn from other perspectives (Gregory 1992; Midgley 2000). Classic examples are system dynamics and organizational cybernetics, which have always appeared in the SoSM in the 'simple-unitary' and 'complex-unitary' boxes respectively. However, second wave research on these methodologies (as reported earlier in this chapter) has suggested that, rather than claiming the model represents reality (the traditional view), it is more useful to focus on the modelling *process* as a vehicle for the development of learning and social co-ordination (see, for example, de Geus 1994; Espejo and Harnden 1989; Sterman 1994; Vennix 1996; Lane 2000). System dynamics and organizational cybernetics practitioners have therefore changed their understanding of 'system' to one that is much closer to that embraced by Churchman (1979a), Checkland (1981) and Ackoff (1981), and presumably this new way of using it makes it *equally* applicable to unitary and pluralist contexts.

The third and final problem with the early work on CST is the continuing paucity of systems methodologies in the face of coercion (Midgley 1997b). The failings of first and second wave systems approaches in this regard were well documented in some of the first CST papers (e.g., Mingers 1980, 1984; Jackson 1982), but it seems to us that

the 'solution' to the problem of coercion proposed by Flood and Jackson (1991b), use of Ulrich's (1983) critical systems heuristics, is equally problematic. Contrary to the writings of Jackson (1987a), Oliga (1988), Flood and Jackson (1991b) and Gregory (1997), we contend that critical systems heuristics is not capable of dealing with any significant coercion (other than the mildest types) because *coercive situations are generally characterised by the closure of debate* (Midgley 1997b). Either those with authority simply refuse to talk to other people, they use their position to subdue or get rid of people who challenge them, or else they have 'reasons' why everything that is being said during debate misses the point. As Willmott (1989), Ivanov (1991), Romm (1995) and Midgley (1997b) have all observed, in any of these circumstances the use of critical systems heuristics to guide debate becomes redundant.

Of course, Ulrich (1983) does not ignore the ability of coercive agents to close off debate. He says that, when debate is obstructed, critical systems heuristics can still be used to support the "polemical employment of boundary judgments" (Ulrich 1989, p.84). This means that those affected by coercion can expose the coercive agent's ideology (expressed in the boundary judgements that he or she takes for granted) by offering a counter argument (a polemic) that does not even attempt to refute the 'facts' advanced by the coercive forces. The affected may simply assert what ought to happen from their own point of view. The critical systems heuristics questions can be used to guide the construction of this point of view, which will of necessity involve making different boundary judgements to those favoured by the agents of coercion. The result, if dialogue is not forthcoming, is the embarrassment of those practising coercion, as their arguments are revealed as just another stakeholder viewpoint, with its own ideology and no superior claim to objectivity (also see Gregory 2000 for further thoughts on the importance of ideology critique).

Let us leave aside, for now, Ivanov's (1991) counter-claim that the polemical employment of boundary judgements will not necessarily result in the embarrassment of those practising coercion. If we assume that engendering embarrassment *is* possible, then this suggests that *there is another participant to whom coercive forces must yield*. Coercive agents need only be careful about their image if there is a 'higher authority' who they must respect. Debate is therefore not genuinely closed: as we saw in the earlier example of tackling coercion in the evaluation of a computer training service for people with disabilities, there is an arbitrator (or in that case, an evaluator) to whom both the coercive forces and those affected by their activities need to defer.

In short, critical systems heuristics can only ever be of use when communication is possible, either face to face or via an arbitrator. Therefore, rather than viewing the approach as dealing with coercion (which in our view is characterised by closure of debate), we argue that it is more appropriate to see it as an approach to *value clarification*.

Indeed, we suggest that there are two 'modes' in which critical systems heuristics can be used. Mode one involves value clarification within a stakeholder group. Communication with other stakeholders then happens via an arbitrator (usually with the hope that more flexible, face to face communication may be possible in the future). For some practical examples of mode one critical systems heuristics, see Cohen and Midgley (1994), Midgley *et al* (1997, 1998), Midgley (2000) and Boyd et al (2004). Mode two, in contrast, comes into operation when stakeholders can work together to generate answers to the critical systems heuristics questions that transcend the narrowly defined interests of any one group. In this mode, critical systems heuristics is used to generate an accommodation between stakeholders through the mutual exploration and clarification of values that, to borrow a term from Ackoff (1981), 'dissolves' conflict. It is also possible to combine the two modes so that stakeholder groups first clarify their own values using critical systems heuristics, and then seek to transcend them in debate with others (for various discussions of a practical example of this, see Gregory et al 1994, Walsh 1995, and Gregory and Romm 2001).

Once we have reconsidered the role of critical systems heuristics in this manner, we are again left in a position of having very few methods to deal with the kind of coercion that involves closure of debate—which was the situation that, in part, brought the third wave of systems thinking into being. The solution, according to Midgley (1997b), is

to recognise that systems practice can take a variety of forms: as well as activities of information production and dialogue (which are the usual purposes pursued through first and second wave systems approaches), there is a need for the explicit inclusion of *political action and campaigning*. The idea is that, when it appears that dialogue is blocked and coercive forces have control, changes can be fought for within the wider system to free up the situation. Systems methods (of various kinds) may, of course, be useful in support of this wider political action. Dealing with coercion is therefore not so much a matter of which method to employ, but *what boundaries for analysis and engagement should be used*: when coercion is experienced, this suggests the need to widen the boundaries and change the context that is allowing the coercion to persist. Indeed, Flood and Jackson's (1991b) earlier version of CST, which kept critical systems heuristics in reserve for handling coercion, was criticised for tending to take organisational boundaries for granted (Midgley 1996b): intervention was usually for organisational change alone. We wish to underline here that to be truly *critical,* systems thinking must prioritise boundary critique (Midgley 2000), which often means going beyond the focus on a single organization (Córdoba and Midgley 2008). The reframing of coercive situations can rarely take place without it.

As with the birth of the first version of CST, the rethinking process we have described was again consolidated with the production of a book of key readings, this time edited by Flood and Romm (1996a). We particularly recommend this book to readers wishing to find out more about what CST can offer. Also, other systems thinkers outside the CST community have explored related issues (see, for example, Francescato 1992; Müller-Merbach 1994; Gu and Zhu 1995, 2000; de Raadt 1997; Linstone 1999; Zhu 2000).

Having pointed to this revision, we should nevertheless acknowledge that the two authors most closely associated with the early foundation stones of CST, Ulrich (2001, 2003, 2012a, 2012b) and Jackson (2000, 2003, 2019), didn't fully engage with it, and continued to develop their own approaches. While Ulrich (2012a) proposed an integration of the tradition of methodological pluralism into critical systems heuristics, his other 21st Century contributions largely remain in the tradition he founded. Likewise, Jackson stayed faithful to his earlier ideas (e.g., retaining the SoSM, despite the criticisms made of it by others), but in other respects we suggest that his work has evolved in a similar direction to the revised CST (e.g., providing a more sophisticated approach to exploring the problem context before choosing or designing a methodological response). Jackson also continued to respond to emerging issues and the latest developments in both systems thinking and social theory. It is not possible to cover all of these developments here, but three key aspects of Jackson's latest (2019) thinking are worth mentioning for the interested reader to follow up:

The first is the idea that exploration of the problem context needs to go beyond boundary critique to encompass thinking and/or methods from all four of the major paradigms that Jackson (2019) believes contemporary systems thinkers are using (and also see Midgley et al, 2013, who made a similar proposal in the context of evaluating systemic and participative methods). The second major development is an expansion of the SoSM: instead of just 'simple' and 'complex' as categories belonging to the 'system' axis, 'complicated' is added. Jackson takes the distinction between 'complicated' and 'complex' from Snowden's cynefin framework (Kurtz and Snowden 2003; Snowden and Boone 2007), which helps people categorise aspects of their problem context. 'Complicated' is used to refer to contexts characterised by 'known unknowns', in contrast with complex situations that confront us with 'unknown unknowns'. Where there are known unknowns, Snowden and Boone (2007) and Jackson (2019) say that it is possible to wait for some patterns of system behaviour to emerge, or to use analytical tools to resolve the unknowns, and then act to stabilize what is preferable and reduce what is not. However, in the case of unknown unknowns, people must act first, then sense and respond to feedback in a rapid learning cycle. Jackson (2019) then critically examines ten different systems methodologies, and evaluates what they have to offer in terms of dealing with the nine different contexts that are defined in the new version of the SoSM. The third major development we see in Jackson's (2019) latest contribution, although work on this was begun by Jackson (2000), is the full integration of complexity theory into CST. Jackson offers an elegant overview of complexity theory, and identifies six types or dimensions of complexity that systems approaches must tackle: technical, process, structural, organisational, people, and power. Jackson's (2000, 2003, 2019) work offers an alternative to the earlier-discussed revision of CST, consolidated in Flood and Romm (1996a) and then subsequently developed in new directions by other authors, and there is no reason why we cannot learn from both.

2.3 Beyond Critical Systems Thinking

After the publication of the edited book mentioned above (Flood and Romm 1996a), there was some discussion among a subset of the authors about how this work was 'branded'. These discussions took place in light of the fact that CST had shown itself to be successful in tackling a range of complex social and organizational issues, and was receiving a lot of critical acclaim within the systems research community (and to a lesser extent in sub-sets of the operational research, cybernetics, complexity science and action research communities), but the ideas were not particularly influential in the social sciences. More importantly, they were little known outside academia, except among organizations directly involved in CST projects. A concern was expressed that the potential of CST to address highly complex issues would not be fully realised if knowledge of it was confined to transdisciplinary academic research communities alone.

At the same time as this discussion was happening, there was a renewed interest in systems thinking in government. In 1997, in the UK, the Labour Party was elected with a large majority, and one of the issues they wanted to address was the need for "joined up government" (e.g., Bogdanor 2005, p.1) to deal with some of the most complex social issues that refused to be confined within the neat jurisdictional boundaries of a single ministry. In the late 1990s, Tony Blair (the then UK Prime Minister) was being advised by Mulgan (1997), a systems thinker working in social policy. Peter Senge's (1990) book, *The Fifth Discipline*, was being read widely in business organizations. Also, the internet was starting to reach mass audiences for the first time, and a search using the term 'systems thinking' threw up more hits than any individual could possibly read in a single lifetime. It was clear that there was a real opportunity to reach beyond academia.

In this context, the first author of this chapter made a personal decision to stop using the term 'critical systems thinking' as the main label for his work, and many others (but not all) followed suit. We will explain four different elements of this decision, as they have not previously been discussed in the literature.

First, the word 'critical' is widely used in academia with four different meanings: to undertake penetrating analyses of truth claims (e.g., Popper 1959); to develop an appreciation of how a piece of art or literature has been written and then affects people (e.g., Belsey 1980); to develop theories and practices that challenge the societal status quo (e.g., Horkheimer 1972); and simply to indicate that something is important (e.g., Kumar et al 2020). However, in everyday usage, being 'critical' often has negative connotations: it generally means being punitively judgemental (Merriam-Webster 2019). Thus, adding the word 'critical' to 'systems thinking' is potentially problematic in three ways: it is ambiguous within academia (meaning either 'questioning', 'appreciative', 'radical' or 'important'); it can be taken to signal 'inward-looking' academic interests, as these four meanings are mainly used in universities and other research contexts, rather than in the wider world; and, outside academia, it has the potential to be badly misinterpreted as condemnatory.

Second, as explained above, the term 'systems thinking', without the 'critical' adjective in front of it, was becoming widely accepted. Strategically, if it was important to reach beyond academia, it made little sense to continue with a different version of the term. Indeed, the first author recognised that CST was a label defined *within the academic systems community* to differentiate more critical versions of systems thinking from less critical ones (in the sense of questioning the value and boundary judgements made in projects), but that distinction wouldn't be meaningful to someone coming to our field for the first time.

Third, a barrier to communicating systems thinking beyond our research community was the diversity of methodologies, concepts and uses of language, which CST advocates welcomed as an aspect of their commitment to theoretical and methodological pluralism. While this diversity might be useful, it also came with a lot of pre-fixes distinguishing one kind of systems thinking from another: in addition to 'critical' there were (among others) 'hard', 'soft', 'cybernetic', 'servo-mechanistic' and 'integrative' (Cavaleri 1994). While we might want to preserve the diversity of methodological resources, the diversity of *labels* was problematic. In the late 1990s, it became evident

that there was a need for the systems research community to unite behind a single label to enable a critical mass of activists to communicate more widely. Given that 'systems thinking' was already out there, this seemed like the obvious label to go for.

Fourth, and finally, the third wave of systems thinking had brought CST to the forefront of debates in our research community. There was widespread recognition of the value of both boundary critique and methodological pluralism. In this sense, CST had moved from the margins (a couple of small groups of academics arguing for critical systems heuristics and methodological pluralism in the mid-1980s) to the mainstream, with acceptance of the ideas by the majority of systems researchers working in social policy and management, and even those who chose to stick with narrower methodological foci acknowledged it as a legitimate approach. In this sense, the battle within the systems research community had been won: CST had, to a significant extent, become central to systems thinking. Therefore, maintaining a distinct label was no longer necessary.

With these reasons in mind, the first author of this chapter started writing about systems thinking in general, with the historical narrative of the three waves explaining how it has evolved over time (see especially Midgley 2000, 2003a, 2006a). He also decided to use the label 'systemic intervention' for the specific form of theory, methodology and practice that integrates the two strands of CST (boundary critique and methodological pluralism). We suggest that systemic intervention, together with the work of Jackson (2000, 2003, 2019), which built on and developed the earlier version of CST, completes the most foundational innovations in the third wave of systems thinking. This is not to say that there cannot be further innovations, but the basics are now in place.

Systemic intervention involves "purposeful action by an agent to create change" (Midgley 2000, p.8), which is a potentially attractive phrase in the arenas of social policy, management and community development. There have been many complaints over the years, especially outside academia, that the term 'systems thinking' connotes analysis without action (e.g., Brethower and Dams 1999; Couros 2015), yet it is so widely used that it cannot easily be replaced. Rather than try to replace it, the idea was to use 'systems thinking' as a general label for the field, and 'systemic intervention' as a name for action that is informed by a penetrating diagnosis of problematic issues and the creative design of methods. The latter is explained in more detail below.

2.4 Systemic Intervention

Midgley's (2000) systemic intervention is founded upon a new approach to systems philosophy, challenging subject/object dualism. As discussed earlier, subject/object dualism involves the conceptual splitting of the 'subject' (who observes things and is the holder of knowledge about them) from the 'object' (that is observed and known). If, following this split, the subject is hidden from view, we end up with a false impression of perfect objectivity and denial of the relevance of subjectivity, as if we can have knowledge without an observing subject. Alternatively, if the object is hidden, we succumb to the illusion of solipsism (denial of the existence of objects outside an individual consciousness).

The ideal of objectivity has long been central to the pursuit of science, and Popper (1959) famously talks about how any piece of scientific knowledge involves a truth claim, based on an 'independent observation' that is tested and agreed upon by a community of scientists. Philosophers of science, such as Popper (1959, 1972), make it clear that independent observation doesn't actually mean observation without an observer: it means that any observer undertaking the same observation under the same conditions would arrive at the same conclusions about the truth claim. In other words, any possible biases brought in by the subject have been eliminated.

There are two problems with this from a systems perspective. First, many scientists (let alone non-specialist readers outside scientific communities) don't actually study the philosophy of science and are unaware of the careful caveats built into the above understanding of what a truth claim involves. Therefore, there is insufficient scrutiny of the role of subjective perception and inter-subjective interpretation, as objectivity is largely taken for granted (unless an obvious methodological mistake has been made). The second problem with this understanding of science is more important: it assumes that subjectivity and non-universal inter-subjectivity (especially that of the researcher) should be *eliminated*, instead of being understood as *a critically important source of information* (e.g., Hodgson and Leicester 2017; Lissack 2017; Fazey et al 2018). Science, as traditionally practiced, focuses on truth claims about the world, but marginalizes or excludes other vital foci, including inter-subjective claims of rightness

(socially shared value judgements about appropriateness) and understandings of individual subjective perspectives (including the researcher's personal values) (Churchman 1970; Habermas 1976, 1984a,b; Ulrich 1983; Midgley 1992c, 2003b, 2008a, 2016a; Alrøe 2000).

Also, as mentioned above, authors hiding the object make the same assumption of subject/object dualism: they become so concerned with exploring subjectivity that they deny the possibility of speaking about anything beyond the contents of consciousness, so all claims to objectivity lose their legitimacy (e.g., von Glasersfeld 1985). From a systems perspective seeking to transcend subject/object dualism, this is equally problematic (Fuenmayor 1991a,b).

Midgley's (2000) argument for a new philosophical approach to this issue can be summarised as follows. A conventional approach to epistemology (the study of the nature of knowledge) asks, 'if there is such a thing as knowledge, what gives rise to it?' There are many possibilities: an individual consciousness, an embodied mind, an individual linked into a linguistic community, an inter-subjective construction of a social group, etc. Actually, there are as many possibilities as there are theories of epistemology.

Now, anything that can be seen as giving rise to knowledge can be called a 'knowledge generating system'. The trouble is, if the task of epistemology is to identify a general theory that can specify the nature of knowledge generating systems, it is very easy to slip into subject/object dualism. Somehow, knowledge generating systems come to be seen as fundamentally distinct from the knowledge of the world they give rise to. This is illustrated in Figure 1.

<< INSERT FIGURE 1 HERE >>

However, there is an alternative approach to epistemology. A key insight in many second and third wave systems approaches is that all knowledge is bounded (Churchman 1970; Ulrich 1983; Cilliers 1998). In other words, while in reality everything may be interconnected, what we actually know about any situation has limits, and it is these limits that we call boundaries. So, for Churchman (1970), all knowledge is dependent on boundary judgements, whether these boundary judgements are implicit or explicit. If we recognise this, then suddenly both knowledge generating systems and the world itself come to be defined in exactly the same manner—through the process of making boundary judgements (Midgley 2000). This is represented in Figure 3. Knowledge about knowledge generating systems and the rest of the world has the same character: there is no dualism between the subject (knowledge generating system) and object (world).

<< INSERT FIGURE 2 HERE >>

Of course, there is still a *kind* of dualism in here, but it's not the pernicious subject/object dualism that underpins mainstream scientific and other research practices that focus on only one side of the subject/object pair while making the other side invisible. Rather, it's a duality between the *process* of making boundary judgements and the *content* of any analysis, whether it's an analysis of what's in the world or an analysis of knowledge generating systems giving rise to knowledge about the world. This actually means that it is possible to accept any number of theories about either knowledge generating systems or the wider world, depending on our purposes. Each theory will be based upon a different boundary judgement (Midgley 2000, 2011).

Of necessity, there is a great deal of detail missing from this summary of the new systems philosophy. For instance, it is important to acknowledge that boundary judgements about the world cannot exist independently from

knowledge generating systems—it's just that defining the nature of the latter requires a boundary judgement and should not be taken for granted. We, therefore, recommend consulting Midgley (2000) for more information.

2.4.1 The Meaning of Systemic Intervention

Having discussed Midgley's approach to systems philosophy, we can now consider the concept of *intervention*. As mentioned earlier, Midgley (2000, p.8) defines intervention as "purposeful action by an agent to create change".

Given the systems philosophy already described, there are many different ways of describing an agent, depending on the boundary judgements that are assumed. An agent may be seen as a lone decision-maker, an organisation, a group of people, a person using a particular form of language, a community within a particular kind of ecosystem, etc. This takes us back to the idea that it is quite legitimate to choose between different conceptions—to choose between different boundaries of analysis. Nevertheless, although there are many ways to conceive of agents for particular purposes, we can still talk about intervention in a *general* sense as purposeful action by an agent to create change.

So, what is *systemic* intervention? Midgley (2000) defines it as purposeful action by an agent to create change *in relation to reflection upon boundaries.* The link with the systems philosophy we discussed earlier should be clear: if knowledge is dependent on boundary judgements, then reflection on these gives rise to new possibilities for knowledge to inform action.

2.4.2 Observation as Intervention

Now, many authors have championed the cause of intervention, but where Midgley (2000) departs from some of these (e.g., Seidman 1988) is in the opposition they create between intervention and the kind of observation that is undertaken in science. Midgley's view is that human agents are incapable of avoiding intervention (even when they choose not to engage in a given action, they inevitably do something else that will have effects, whether they realise it or not), so when scientists set up observations, they are actually conducting interventions! This might appear to be a controversial assertion, so let us explain using five short points which indicate the dependence of observations on the positioning of the observer (more detailed arguments can be found in Midgley 2000, 2001b, 2003b, 2004, 2008a):

1. The systems principle of interconnectedness suggests that all observers are either directly or indirectly linked with what they observe (von Bertalanffy 1968). In other words, there can be no such thing as *truly* independent observation, even though scientists use methods to minimise their influence on what they observe.

2. Observers *make decisions* about what to observe. So, scientists can choose what to study, depending on their values (Ulrich 1983; Midgley 2000; Alrøe 2000).

3. Observers select concepts to guide observation. So, the same scientific observer may observe in a very different manner depending on whether she chooses, for example, reductionist scientific concepts or systems concepts (Midgley 2001b, 2004).

4. The interpretation of sense data is integral to observation (Maturana 1988; Maturana and Varela 1992). It is not credible to claim that scientifically controlled observation is identical for all people simply because it is a biological process: the empirical evidence tells us something quite different. For instance, under conditions of ambiguity, cultural expectations influence what different people see when presented with the same visual material (e.g., Bagby 1957), and there is evidence of interpretation going on even during simple acts of visual perception (e.g., Ullman 1980; Rock 1983). Of course, we should be clear that this is not a solipsist position, which says there is no relationship at all between the cognitive construction of observations and an external world that may not even exist (Mingers 2014): sense data seems to reflect some of the external world, and is essential for perception (Gibson 1979; Neisser 2014; Rogers 2017), but elements of interpretation are still integral to that perception.

5. Observations are related to meanings that are generated by communities of practice (Popper 1959). Scientists don't conduct their observations in a vacuum: they conduct them in order to make a

meaningful contribution to scientific debate. Therefore, their observations will be constructed in ways that will support them in making a difference in the debates in which they are engaged (also see Midgley and Ochoa-Arias 2001).

So, based on these points, Midgley (2000) argues that scientific observation is undertaken *purposefully*, by an *agent*, to *create change*—even if it's just a change in a scientific debate. Notice that Midgley's words precisely reflect his definition of intervention (purposeful action by an agent to create change), making it clear that scientific observation is indeed interventionary.

2.4.3 Boundary Critique

At this point we have discussed Midgley's contribution to systems philosophy, and have had a look at what systemic intervention means (purposeful action by an agent to create change in relation to reflection upon boundaries). We have also explained Midgley's argument that scientific observation should be regarded as part of intervention practice. What we want to do now is deepen our understanding of what the incorporation of *boundary critique* (discussed earlier as an important aspect of CST) means for systemic intervention. Midgley's thoughts on boundary critique are entirely consistent with his systems philosophy, focused on making boundary judgements about both the world and who or what it is that gives rise to knowledge about the world.

As we saw in the discussion of the second wave of systems thinking, the work of Churchman (1970, 1979a,b) was foundational. Churchman's (1970) basic insight, developed substantially by Ulrich (1983) at the start of the third wave, was that boundary judgements and value judgements are intimately linked. Values direct the drawing of the boundaries that determine who and what is going to be included in an intervention. But taken-for-granted boundaries also constrain the values that can possibly emerge. So, there's a tight relationship between boundaries and values, and reflection on different possibilities for making boundary and value judgements becomes imperative if an intervention is to be regarded as systemic (Midgley 1997d). This, to Midgley (2000), is the core concern of the methodology of systemic intervention.

After Churchman had made his second wave contribution, in the third wave Ulrich (1983) stressed that boundary critique should be a *rational* process. For Ulrich (following Habermas 1976), all rational arguments are expressed in language, and language is essentially a tool for dialogue, so a boundary judgement is only rational if it has been agreed in dialogue with all those involved in and affected by an intervention. This is a high standard of rationality to expect all decision makers in society to conform to, but Ulrich (1983) nevertheless says that people can work towards it, and at the very least they should feel obliged to provide reasons to stakeholders when they believe they have no alternative but to close down dialogue before an agreement is reached (perhaps because of resource constraints or the actions of an 'unreasonable' minority).

Midgley (1992b, 1994, 2000) then took some of the insights from Churchman and Ulrich and asked a slightly different question: what happens when there are conflicts between stakeholders making different value and boundary judgements? One of his answers (another can be found in Midgley 2000, 2016b; and Midgley and Pinzón 2011) is expressed in Figure 3.

<< INSERT FIGURE 3 HERE >>

In the Figure, we see two boundaries, and each of them has a set of ethics (values in action) associated with them. We can call the narrower boundary the primary boundary, and the wider one the secondary boundary. Between the two boundaries is a marginal area. Within the marginal area are people or issues that are of concern to those operating with the wider boundary, but which are excluded from the concerns of those using the narrower boundary. The two ethics come into conflict, and whatever is in the margins becomes the focus of that conflict.

Now, conflict can sometimes be productive (Churchman 1979b; Mason and Mitroff 1981; Yolles 1999; Stacey et al. 2000; Sword 2007; Andrade et al. 2008), or when it is judged to be unproductive it can be resolved, but in many social situations this kind of resolution doesn't happen. What happens instead is that the conflict is simply stabilised. The stabilisation happens by the imposition of either a *sacred* or *profane* status on the marginal people or issues.

The terms 'sacred' and 'profane' are not meant in a religious sense, but indicate the valued or devalued status of marginalised elements. There is rarely a consensus about whether marginalised issues or people are sacred or profane, but by institutionalising value judgements in social rituals, the conflict can be stabilised with one set of values dominating. So, if the profane status of marginal elements is institutionalised, then the primary boundary is reinforced because people can quite justifiably ignore or derogate whatever is in the margins. But if the sacredness of marginalised people or issues is institutionalised, then this challenges the narrow boundary judgement and reinforces the wider secondary one.

As Midgley (2000) sees it, these kinds of processes operate at every level in society, from small groups to international relations. Many different stakeholders and issues can be marginalised for all sorts of different reasons, and when they are made profane, the effects can be quite devastating. Some forms of marginalisation are relatively easy to overcome because they have their roots in quite localised histories of conflict, but some stem from conflicts that are really endemic across society, and those are the ones that are most difficult to change.

Some examples of marginalisation (relating to unemployment, customer relations, labour disputes and ecological sustainability) can be found in Midgley (1992b, 1994, 2000) and Yolles (2001). These may help to further clarify the theory. However, Midgley's purpose in presenting these ideas is not merely to propose an interesting sociological theory: he argues that it can usefully inform *intervention*.

An example is a project where Boyd et al (1999, 2004) facilitated the design of new services for young people (aged under sixteen) living on the streets. The practitioners recognized, and all the relevant stakeholders concurred, that it was crucial for young people to be core participants in the research. This was a boundary judgment about participation that would have important consequences for the issues to be considered in the design process. The young people had quite specific concerns that they wanted to be addressed, and some of these would almost certainly have been omitted if participation had been limited to professionals alone. However, when involving young people, the practitioners had to be aware that there was a double danger of marginalization: in general, young people under sixteen are viewed as less 'rational' than adults. Also, these particular young people could easily have been stereotyped as troubled and untrustworthy teenagers because, in order to survive on the streets, many of them had to resort to begging, petty crime or prostitution. Therefore, in setting up design workshops, the practitioners gave the young people space, out of the hearing of professionals, to develop their ideas (an empowerment technique), and exactly the same planning methods were used with children as were used with adult participants to generate proposals for change. This allowed a direct comparison to be made between the ideas from the young people and adults, and prevented the kind of marginalization that might have occurred if the practitioners had used a more 'playful' approach with the young people and a more traditional 'rational planning' method with the professionals. It would have been easy, if the latter had been done, for the professionals to have viewed only their own output as the 'proper' plan. This was just one of many issues that Boyd et al (2004) explored and addressed through boundary critique.

Also, see some of the other empirical examples in the literature about how boundary critique (reflecting on value and boundary judgements during intervention) can incorporate analyses of conflict (e.g., Foote et al 2007, 2020; Midgley and Pinzón 2013; Midgley 2016b; Ufua et al 2018) and marginalization (e.g., Midgley et al 1998, 2007; Midgley 2000, 2006b, 2015; Córdoba and Midgley 2003, 2006, 2008; Walsh et al 2018) and address them during planning and problem solving.

2.4.4 Theoretical and Methodological Pluralism

Boundary critique, as described above, enables a deeper, more penetrating analysis of the context of an intervention than might otherwise be undertaken if the remit of a project is simply accepted uncritically from a client. The exploration of different possible boundaries and values that could be relevant to an intervention, and the identification of conflict and marginalization, are important because they can inform the selection of useful theories

and the choice or design of appropriate methods to address the subtleties of the situation (Midgley 2000). This, of course, implies both theoretical and methodological pluralism (Midgley 2011).

While previous authors in the CST tradition (e.g., Jackson 1987a, 1991; Oliga 1988; Flood 1989, 1990, 1995; Midgley 1989a,b, 1990a,b, 1992a,c, 1997a,c; Flood and Jackson 1991a,b; Flood and Romm 1996a,b; Gregory 1992, 1996a,b; Mingers and Gill 1997) had discussed methodological pluralism at length, Midgley (2000, 2011) was the first to extend to *theoretical* pluralism as well. Different theories assume different boundaries for analysis, so if it's legitimate to decide on boundaries out of a wide range of possibilities, it must also be legitimate to draw upon a wide variety of theories.

Then, if we look at different methodologies, we find that they make different theoretical assumptions. So, if it is acceptable to welcome in a variety of *theoretical* ideas, a similar variety of *methodological* ideas can have validity too.

Midgley (2000) and Midgley et al (2017) explain that there are *two forms* of methodological pluralism, both of which are essential to systemic intervention. The first is learning from other methodologies to inform one's own. That way, each agent has a continually *evolving* understanding of systems methodology. We no longer have to accept a situation where people build a methodology like a castle and then defend it against others who want to breach the castle walls (the attitude that prevailed during the paradigm war described by Dando and Bennett 1981). Rather, if people begin to see methodology as *dynamic and evolving*, they can learn from others on an on-going basis.

The second form of methodological pluralism is about drawing upon, and mixing, methods from other methodologies (as well as designing one's own). Arguably one of the great strengths of the systems thinking literature has been the wealth of methods that have been developed to serve different purposes over the years (see Midgley 2003c, for the largest collection of readings published to date). If we can learn from other methodologies on an on-going basis *and* adopt a wide range of methods, while still keeping the idea of reflecting on value and boundary judgements at the core of our approach, then we can have a truly flexible and responsive systems practice.

As a brief illustration of how methodological pluralism works in systemic intervention, the project to facilitate the design of new services for young people living on the streets (discussed earlier, and in Boyd et al 2004) used a number of different interlinked methods and techniques:
- Individual interviews with young people, foster carers, and retailers;
- The use of photographs and cards with evocative pictures to stimulate ideas;
- Focus groups with staff working in a children's home and police who had regular contact with homeless youth;
- Rich pictures (visual depictions of the problem situation using drawings and arrows showing the links between key issues, as discussed by Checkland and Poulter 2006);
- A synergistic combination of the critical systems heuristics questions (Ulrich 1983) with idealized design (Ackoff et al 2006), implemented in separate stakeholder and multiagency workshops (idealized design is a participative approach to planning where far-reaching systemic designs prevent, rather than mitigate, social problems);
- Values mapping (a bespoke method that the practitioners developed for the project to visualize people's values and the logical connections between them);
- Small group, multi-agency action planning;
- The production of reports, magazines and posters for multi-audience dissemination; and
- Formative evaluation (feedback questionnaires filled in by participants).

As we see it, no single, previously-existing methodology was able to provide all the methods needed for this project. Methodological pluralism, underpinned by boundary critique, was absolutely necessary (Boyd et al 2004).

2.4.5 The Contribution of Systemic Intervention

Arguably, the main contribution in Midgley's (2000) systemic intervention is the synergy that comes from bringing boundary critique and methodological pluralism together into a single approach. Boundary critique without the methods that come with the full range of first, second and third wave systems methodologies may provide interesting sociological insights, but won't necessarily achieve change. In contrast, welcoming methodological pluralism without underpinning it with boundary critique can lead to superficial diagnoses of problem situations, which in turn can render intervention using multiple methods inappropriate, ineffective or even harmful. It is the full integration of these two strands of CST in systemic intervention that makes all the difference: a deep, penetrating diagnosis of the problem situation can be followed by the creative design of an appropriate, bespoke set of methods.

2.5 Criticisms and New Developments

While the third wave of systems thinking is still bubbling on the shore of systems practice, it seems to us that the main ideas are now fully formed and have been applied quite extensively. People are still making new contributions, but they are now mostly developments of existing theory, methodology and methods rather than offering something fundamentally new.

However, there have been a few recent exceptions to this generalization, and we want to focus here on two in particular that we believe have the potential to be significant. As we said in our introduction to this chapter, it will be difficult to know, until more time has passed, whether these two contributions actually represent an extension to the third wave or the first swellings of a fourth wave. We suspend judgement on this, and simply note that the authors associated with both of the new contributions have been influenced by third wave thinking to an extent, but have raised serious objections to some of its most fundamental paradigmatic assumptions.

2.5.1 DSRP: Beyond Methodological Pluralism

In 2006, Cabrera finished a PhD thesis that looked at a range of systems approaches from the three waves to identify systems concepts and skills that are universal across them all (Cabrera 2006b). From a review of the literature, he identified a minimum set of four key concepts that are shared across the systems paradigms, noting that being 'shared' didn't always mean that they were understood in exactly the same way by different authors. Nevertheless, by bringing these concepts together, and by choosing particular meanings that fit with his desire to create a coherent understanding of systems thinking that could form the basis of a new methodology and practice, Cabrera offered the following understanding of what systems thinking involves:

People make *distinctions* (boundary judgements differentiating phenomena of interest from other things) of *systems* (wholes made up of parts), where the parts are in *relationship* with one another (and systems are also related to other systems), and every distinction, system and relationship is viewed from a *perspective*. The four concepts in italics in the previous sentence (distinctions, systems, relationships and perspectives) were then summarised with the initials DSRP. These ideas are also expanded upon in Cabrera and Cabrera (2015) and Cabrera et al (2015).

Most importantly, Cabrera (2006b) and subsequent colleagues argue that deploying each of these concepts is a *skill*, so there are four systems thinking skills in total: making and contrasting boundary distinctions, seeing how parts combine into systems, understanding relationships, and appreciating the implications of multiple perspectives. He noted that these are skills that people use every day, but we can get better at systems thinking if we can become more conscious of how we think—i.e., be more 'meta-cognitively aware'. We can deploy the skills deliberately until their use becomes second nature.

Of course, Cabrera was aware that there are many more than four important systems concepts (e.g., 'emergence', 'feedback' and 'homeostasis'), but these can be treated as secondary to the lean set of four that he defined. For example, emergence is a property of *systems* (in that systems have features that can only be explained by the totality of parts and their relationships); feedback is a particular type of *relationship*; and homeostasis refers to the capacity of a *system* to internally regulate its own stability. Cabrera recognises the multitude of useful systems concepts discussed by Francois (2004), and the idea is not to sweep them all away, but to isolate the leanest possible set underpinning the thinking skills so that systems thinking can be taught in a simple and straightforward manner that

anyone able to engage with some elemental abstractions (i.e., the large majority of people, including most children) can grasp. If more concepts are needed, they are available in the literature.

Having established the basic idea of the four systems thinking skills, Cabrera teamed up with others to criticise some of the best-known writings on critical systems thinking (CST), and especially the idea of methodological pluralism that is fundamental to both CST and systemic intervention (Cabrera et al 2008). Cabrera et al argue that, by welcoming the wide variety of systems methodologies described earlier in this chapter, and saying that they are all useful for different purposes, methodological pluralists have made systems thinking into a hugely over-complicated and often contradictory network of ideas: each methodology has its own unique jargon. If we keep all this variety, it is almost impossible to say what systems thinking is without giving multiple accounts from different paradigmatic perspectives. This, of course, is a huge barrier to people coming to the ideas for the first time. Cabrera et al's (2008) solution is to set aside all this methodological jargon and tell a much simpler story of what systems thinking is about: the story of DSRP.

If we think back to the origins of methodological pluralism in the 1980s, the idea made sense in the context of the paradigm war that was raging at the time between first and second wave systems thinkers (Dando and Bennett 1981; Jackson and Keys 1984). Methodologists were making what we believe were unreasonable statements that only their own approaches had value, and others were simply invalid. It made absolute sense to show that different methodologies or methods were useful for different purposes. Nevertheless, thirty-five years later, perhaps we are seeing an unforeseen side-effect of the acceptance of methodological pluralism by the majority in our research community: a proliferation of methodological variety that is now too difficult for people to grasp without multiple years of study.

There have been a number of replies to Cabrera et al (2008) published in the literature, and perhaps the most relevant to this discussion is the one by Midgley (2008b), who argued that discarding the variety of methodologies and questioning methodological pluralism is throwing the baby out with the bathwater. Perhaps DSRP could be a simple narrative *underpinning* the use of a plurality of methods drawn from the different systems methodologies. This is an idea that Cabrera, Midgley and other colleagues have been pursuing through a new collaboration, and we shall see in future years where it leads.

In the process of teaching DSRP to various people across all age groups, Cabrera and his colleagues have developed three additional sets of simple rules to embed DSRP in organisations and communities. They have concluded that, while DSRP produces individual systems thinkers, another set of simple rules is useful to a group of individuals who wish to approach their team or organization systemically. Similarly, two further rule sets provide change models to explain how individuals and organizations, respectively, transition from one phase of organizing to another. Two case studies of practice in Cabrera et al (2018) describe these interwoven approaches, which fundamentally rest on DSRP. We discuss the DSRP element of these practical examples below (for more details of the other sets of simple rules, see Cabrera et al, 2018):

The first case study is of a US community featuring a mid-sized school district that set out to change the face of public education by moving beyond 'teaching to the test'. They applied a systems thinking approach to the task by incorporating multiple theoretical models that would help the Head of the school district transform everything from the design of classrooms, the organization (district) itself, teaching and learning practices, how the content curriculum was viewed and handled, assessment and evaluation, and school culture. The project required participation across several scales within the school district, and involved students, teachers, professional development and curriculum design staff, and all those who directly worked with the Head and the School District Board. The graduation rate climbed from 78% to 90%, and students performed above both state and national averages on standardized tests. The district increased grade-level math and reading skills, and narrowed the achievement gap for minority and special education students. More interestingly though, in terms of transcending an overly-narrow focus on test scores, the qualitative effects on students and teachers in areas that implemented the

embedding of DSRP in the curriculum to aid meta-cognitive reflection were even more pronounced, with reported increases in prosocial behavior, decreases in bullying, and increased transfer of learning across subjects.

The other major example in Cabrera et al (2018) involves DSRP applied to natural resource management. The Wisconsin Water Thinkers Network (WWTN) is an

> "initiative led by ThinkWater, a national movement of educators, students, managers, stewards, scientists and citizens who think and care deeply about water and believe that systems thinking is key to a more secure water future. The WWTN was formed to create space for dialogue about effective water education, research, and outreach" (Cabrera et al 2018, p.941).

In small teams, participants used DSRP to think through questions related to their Vision, Mission, Capacity and Learning (abbreviated to VMCL, which is the systems thinking rule set for groups and organisations). They also applied NFST (which stands for Nay-sayers, Fence-sitters, Supporters and Thought leaders, which is Cabrera et al's rule set for effecting community- and/or organisation-wide change). Unlike traditional change models that focus on getting everyone on board or diluting the opposition, NFST prioritizes the focusing of effort where it will have most effect. According to Cabrera et al (2018, p.939),

> "...thought leaders typically require just camaraderie and appreciation to continue their work in support of the mission and vision. More incentives and efforts should be focused on supporters (those who buy into the mission but are not thought leaders) to effect organizational change. A tactical error is often made in trying to buy the loyalty of fence-sitters: such rewards only incentivize fence-sitting. Instead, motivate fence-sitters to join supporters by showing them what we call "party photos," or communications that show them the benefits of being a supporter (e.g., camaraderie, getting rewards, having fun, loving what one does). Trying to get everyone on board will actually thwart your change effort. Instead, leaders should work with those who are willing from the onset and "differentially incentivize" various subgroups in the change effort to move from their subgroups to a more ideal subgroup...".

While full programmatic outcomes were yet to be assessed at the time of publication, the outcomes of the DSRP-VMCL-NFST process were reported as having positive impacts on the mind sets of participants (Cabrera et al, 2018). The WWTN expects their new strategies to be the foundation for innovative and effective efforts to change the paradigm of water education and outreach in Wisconsin and beyond, and if Cabrera et al's other educational interventions are anything to go by, the new paradigm will include the integration of DSRP to enhance meta-cognitive reflection on thinking about water as an integral property of socio-ecological systems.

2.5.2 Immersive Systemic Knowing: Beyond Rational Analysis

The second development of significance in the context of ideas that challenge fundamental paradigmatic assumptions in the third wave of systems thinking is the work by Rajagopalan and Midgley (2015) and Rajagopalan (2016), which is critical of the continued focus of systems thinking solely on methodologies and methods for rational-analytic thinking, excluding or marginalizing other ways of knowing.

Rajagopalan (2016) argues that the originators of each new wave of systems thinking have claimed that their work makes a paradigm break from mainstream Western science. Each wave is indeed a step forward: for instance, the first wave challenged the necessity of conventional disciplinary boundaries (e.g., von Bertalanffy 1968), the second wave augmented and transformed the science of objectively rational planning with the idea that we have to work with a plurality of subjective and inter-subjective rationalit*ies* (e.g., Checkland 1981), and the third wave showed how intervention is unavoidable (e.g., Midgley 2000), undermined the idea that analysis could be value-free (e.g., Ulrich 1983), and embraced methodological pluralism (e.g., Jackson 2000).

Nevertheless, one assumption remains constant. It flows from the mainstream science that came before systems thinking, and is still as strong as ever in the third wave: this is the assumption that the main focus needs to be rational analysis. Even though our understanding of the meaning of 'rational analysis' has changed over the years, so we now accept that exploring values and subjectivity counts as much as truth-orientated inquiry (Rosenhead 1979; Rosenhead and Mingers 2001), it is still quite clear that rational analysis continues to be privileged. The output of rational analysis is 'propositional' knowledge (whether expressed in natural language, qualitative models

or mathematics), and this is given priority over other 'experiential', 'presentational' and 'practical' ways of knowing. These are terms that come from Heron and Reason (1997): propositional knowing is essentially conceptual; experiential knowing directly arises in each encounter with the world, where the knowledge is not necessarily articulated verbally; presentational knowing involves creative expression (art, poetry, theatre, etc.); and practical knowing is about mastering skills or competencies. The last three types of knowing are barely mentioned in most third wave writings.

Indeed, Rajagopalan (2016) argues that almost all the literature on systems thinking *omits to include entire ways of knowing that have been practised across human cultures globally over many centuries*. Thus, in its mainstream manifestations at least, it remains rooted in Western culture (which has long valued propositional knowing over other forms) and is still tethered (more than its advocates would like to admit) to scientific rationality—albeit a form of scientific rationality that is no longer narrowly focused on truth-orientated inquiries alone.

Rajagopalan (2016) argues that systems philosophy needs further development, and he offers a new ontological and epistemological perspective. He is specifically critical of an assumption found in much Western philosophy: that intentionality is the foundation of human consciousness (e.g., Husserl 1964). This assumption also flows through a lot of the systems thinking literature (Fuenmayor 1991a,b,c; Georgiou 2000). Indeed, the focus of almost all applied systems projects is the agency of the practitioner, decision makers and/or stakeholders striving to bring about change. This is common in the first, second and third waves. It is an especially pertinent criticism of systemic intervention (Midgley 2000) because of its emphasis on purposeful action by an agent to create change.

In contrast, Rajagopalan (2016) draws on Indian philosophical traditions to unfold the idea that there are two key modes of human consciousness, which he calls the *striving mode* (concerned with intentionality and purposeful change) and the *abiding mode* (concerned with non-intentional, mindful awareness, which is well documented in non-Western cultures). The abiding mode is not to be confused with passivity or a fatalistic attitude; rather, it is manifested as being totally alert and aware, full of a sense of being and plenitude, at profound ease with one's surroundings, involving contentment and an experience of oneness with the world (e.g., Herrigel 1953; Abram 1996, 2011).

A common metaphor that systems thinkers use is that the reductionist approach in traditional science stops us seeing the wood for the trees, while a systems perspective brings the wood back into focus. Actually though, because systems thinkers have had to admit that fully comprehensive analysis of complex phenomena is impossible (Bunge 1977; Ulrich 1983; Midgley 2000; Friend 2004), it's not exactly the whole wood that is seen, but some bounded version of it, or viewpoint on it, that is limited by our analytical capabilities. While extant systems thinking (largely composed of striving consciousness with rationalist moorings) maps some evident and explicit relationships between trees, it is the abiding mode that can intuit and feel (rather than analyse) the complete wood.

While Rajagopalan (2016) unfolds an alternative philosophical path for systemic intervention, breaking with the assumption of intentionality as the foundation of human consciousness, Rajagopalan and Midgley (2015) set out to explore the relationships between the four ways of knowing mentioned earlier. They discuss how apprentices in India learning traditional crafts are tutored by a master who facilitates all the modes of knowing, so when learning in one mode is frustrated, a shift to another mode can help. The Master also sets up paradoxical experiences, where the models of reality offered or framed by the different modes come into conflict, which prompts efforts at revising boundary and value assumptions, and thus deepens the inquiry. This, they say, can teach us something about how we might develop new methodological ideas for systems practice that bring the modes of learning together. However, it is too early in their research programme to say where this will lead in terms of the development of new or enhanced systems approaches.

Most tellingly though, Rajagopalan (2016) is critical of how Midgley (2000) and other third wave thinkers have addressed marginalization. Rajagopalan's concern is forms of marginalization that structure whole societies and have been entrenched over centuries, such as that expressed in the vicious resurgence of ethnicity, hyper-

nationalism and racism in many parts of the world today (e.g., the xenophobia in the USA and the Brexit chaos); or, in his experience, the power and persistence of the caste system in India. In situations like this, where almost everyone in the context has been part of the system for generations, he says it is insufficient to merely identify the problem and seek people's involvement in developing rational-analytic proposals for action. The experience of being part of that kind of marginalization is so deeply ingrained into people's identities, beyond propositional knowing, that all four forms of learning need to be harnessed together to mobilize personal change that can eventually stimulate wider systemic change. This is why Rajagopalan (2016) explicitly steps away from CST and calls his approach 'immersive systemic knowing'.

Two examples of applying immersive systemic knowing to organizational development (OD) and cultural renewal are briefly described. OD practice often involves the consultant's interaction over a sustained term with a client system/organisation – say, six months to a year. An initial diagnostic inquiry identifies the overall pattern of dysfunctionality to be addressed. Multiple tools (psychographic studies, interviews, etc.) are used to characterize the totality of the organisational context. The *cultural context of an organisation* includes the qualities and emotions that inform the organisation space, and also those that are delegitimized in the organisation and are therefore concealed or rendered subterranean. The main *patterns of role-taking* within this context are identified. Juxtaposition of the organisational context and the role-taking patterns in the context of producing a process inquiry map generates an 'aha moment'—a new recognition of the overall systemic picture, the issues needing to be worked on and the possibilities for change—that no one member was previously able to adduce. It also underlines both the need and potential for inducing simultaneous changes at two levels: i.e., consciousness of the system (the organisational moorings) and its members (the individual role-taking). The inquiry is refined, and a pathway for changes is drawn up and navigated. The initial response to the map is often cathartic, as hidden blocks to energy flow are released, and greater possibilities for freedom in the system are seen; there is an upwelling of energies towards healing the system and ushering in a new paradigm. Empowerment for the change may require appropriate plans for systems, processes, technology and training.

Two organisational process inquiry maps (from organisations that have been anonymised) are presented in Figures 4 and 5, and these are illustrative.

<< INSERT FIGURES 4 AND 5 IN HERE >>

Process inquiry map 1 (in Figure 4) depicts an organisation that was facing a deep sense of stagnation, first encountered some years previously. At the point of intervention, it was at a crossroads. It was beset by uncertainty and doubt concerning its viability because two key people had become unavailable. There was an awareness that the structures and ways of doing things that had evolved in a past context were no longer relevant because the organisation had completed its mission in that sphere. Key questions were, 'how should the organisation move towards new responses in the present that are orientated to emerging challenges?' and 'what is the course to chart, and how can it marshal existing resources to its purpose?'

In contrast, *process inquiry map 2* (in Figure 5) depicts an organisation that was performing quite well. It was a large, 35-year-old, Indian NGO with a great sense of its continuity in the face of many changes. However, underlying this was a deep-rooted rift in its psyche between two orientations to community work that were perceived by participants as being in opposition to one another. These were described as the 'developmental' and the 'professional' approaches. The former was characterised by an emphasis on community development with overtones of feudal patriarchy (common in the region where the organisation was based), while the latter sought to apply the kinds of contemporary management approaches that are typically used in funding agencies and charities. This rift was compounded by a legacy of leadership struggles, and flip-flopping between these two approaches, with each new CEO abandoning one and switching to the other, resulting in people in the organisation splitting into four camps as shown in the four quadrants; each, as it were, having a distinctly different experience of the organisation depending on where they were positioned in relation to both the developmental/professional narratives and their orientation to either the legacy of previous CEOs or its current leadership.

In terms of general process, an inquiry map is created as follows: the consultant uses her resources—tools as well as her sensing (using whole mind-body awareness of the people and the spaces, and multiple ways of knowing)—to arrive at a preliminary formulation of two key polarizations along which the organization is riven. The two polarities are represented as two axes on the map, which is shared with the organisational team (see Figures 4 and 5 for examples), discussed, and an agreed final version is taken forward into a workshop. The members of the organisation are invited to explore the new articulation of their space in this manner:

> 1. The map is physically represented in a large empty room. The consultant walks to each of the pole positions in turn and describes their characteristics. Then she briefly describes the nature of the quadrant spaces and the central position, *each time speaking from that location, in the voice of an organisation member transacting his or her role there*.

> 2. The group members are then invited to take up positions on the map and speak *from their chosen vantage points* about their experiences of the organisation and their role-taking. Names are evaluated and assigned to the various locations/spaces: the poles, quadrants, centre, etc. As people speak, all the values, qualities, emotions, tensions, perceptions, and energies that characterise the spaces and people's role-taking are noted on the map, preferably distilled into single words.

> 3. The map is collectively fleshed out and transferred to a chart/whiteboard.

> 4. The nature of the pulls, pushes, conflicts between these positions, the drama scripts they generate within the organization (including the concealed or subterranean scripts), and the resulting overall dynamic is reviewed, preferably enacted in the space, with facilitation by the consultant. Frequently, these drama scripts and dynamic processes (not visible in the diagnostic map) are recorded or captured in the form of mind maps, system dynamics models, art or poetry, as people assimilate the process aspects.

> 5. A broad consensus on how the organization should now reconfigure, and move towards the future, is then worked out. The consultant facilitates, ensuring that the participants engage all their four ways of knowing; if necessary, introducing on-the-spot exercises to enable this.

The reconfiguration of the organisation addresses the processes of attrition in its space (both sorts - legitimate and subterranean, now represented in the process inquiry map), that have cumulatively developed into a gridlock. People seek change to the processes of attrition and release from the gridlock—in synchrony at the system and individual role-taking levels—for the organisational renewal. This is achieved as follows: the participants learn through authentic encounters with others, and not through rational analysis alone. The element of drama that comes from people speaking from their locations creates a theatrical ambience where a heightened alertness to authenticity or its absence is created. This *experience of authenticity* makes several things possible: people begin to see that their own location is not the only legitimate way to be in the space, and that members of the organisation in other locations also have their own legitimate reasons for being that way. Individuals are also able to see and accept their 'shadow qualities' (alternative and frequently unpalatable interpretations of their identities, roles and actions) as they are mirrored back by other participants in the drama of each person's role-taking. Therefore, people are able to see how the 'mess' or 'gridlock' that characterizes the overall process dynamic of the organisation comes to be; and, more importantly, each person begins to see how they personally contribute to this. The facilitation by the consultant has nudged members at large to arrive at the pivotal question of '*how am I part of the problem, and thus how can I be part of the solution?*' This catalyses action towards envisioning and implementing change, at both levels, individual and system. Organisational transformation becomes a shared purpose, which no longer remains a burden on the shoulders of a leader or consultant alone.

3. Conclusion and Future Perspective

In this chapter, we have explained the first emergence of CST as part of the third wave of systems thinking. It came to prominence following critiques of the first two waves for being relatively naïve about power relations and engaging in a paradigm war that threatened to tear apart the systems research community.

We introduced the two early foundation stones of CST, Ulrich's (1983) critical systems heuristics and Jackson's (1987a,b) work on methodological pluralism, before describing how the whole CST enterprise came to be revised in the mid-1990s in response to problems identified with the earlier work (Flood and Romm, 1996a) – a revision that most, but not all, CST writers engaged with (see Ulrich 2012a and Jackson 2019 for new contributions that continue to develop the ideas that formed the early foundation stones). This revision was the start of a move to fully integrate the two initial strands of CST, focused on boundary critique and methodological pluralism, and it came to maturity in the form of Midgley's (2000) systemic intervention.

Systemic intervention is about undertaking penetrating diagnoses of problematic issues using boundary critique (including the identification of conflicts and marginalization processes) before designing a bespoke intervention approach, potentially drawing upon the full panoply of systems and other methods that are appropriate for addressing the issue at hand.

The third wave of systems thinking has been with us now for over thirty years, and significant criticisms of it are beginning to surface in the literature. While there have always been critiques of *particular* ideas within the third wave (and in the previous two waves of course), the last few years have seen criticisms of the *whole paradigm*. One such criticism is of methodological pluralism. Cabrera et al (2008) point out that welcoming an ever-increasing variety of methodologies with their own specialist forms of jargon makes it very difficult to communicate systems thinking simply and coherently to newcomers, and this situation needs to be addressed if systems thinking is to fulfil its potential and be more than a minority academic interest. In contrast, Rajagopalan (2016) criticises the legacy of Western science and philosophy, which he claims still dominates third wave systems thinking in the form of an over-emphasis on the striving of change agents, propositional knowledge and associated rational-analytic methods (including those for modelling subjective and inter-subjective perspectives as well as those purporting to capture objective understandings). These are privileged at the expense of working with other ways of knowing. Rajagopalan also recognises the value of abiding alongside striving.

It is too early to know if these critiques will contribute to the further evolution of the third wave of systems thinking, or whether they are the first swelling of a fourth wave. This depends on how the new ideas develop, whether other complementary or competing ideas emerge, and how the whole systems research community reacts. Regardless of what happens next, this is an exciting moment in the development of systems thinking as a field. Once again there is considerable non-academic interest in what we can contribute to addressing the grand challenges facing the world, especially among global agencies concerned with promoting and implementing the UN Sustainable Development Goals: e.g., the World Health Organization (de Savigny and Adam 2009), the United Nations (United Nations Chief Executives Board for Co-ordination 2017) and the OECD (Governance Directorship of the OECD 2018). We look forward to contributing to meet these challenges.

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The 12 critically heuristic boundary questions in the *is* mode	The 12 critically heuristic boundary questions in the *ought* mode
(1) Who is the actual *client* of the system design, i.e. who belongs to the group of those whose purposes (interests and values) are served, in distinction to those who do not benefit but may have to bear the costs or other disadvantages?	(1) Who ought to be the *client* (beneficiary) of the system to be designed or improved?
(2) What is the actual *purpose* of the system design, as being measured not in terms of declared intentions of the involved but in terms of the actual consequences?	(2) What ought to be the *purpose* of the system, i.e. what goal states ought the system be able to achieve so as to serve the client?
(3) What, judged by the design's consequences, is its built-in *measure of success*?	(3) What ought to be the system's *measure of success* (or improvement)?
(4) Who is actually the *decision taker*, i.e. who can actually change the measure of success?	(4) Who ought to be the *decision taker*, i.e. have the power to change the system's measure of improvement?
(5) What *conditions* of successful planning and implementation of the system are really controlled by the decision taker?	(5) What *components* (resources and constraints) of the system ought to be controlled by the decision taker?
(6) What conditions are *not* controlled by the decision taker, i.e. what represents *"environment"* to him?	(6) What resources and conditions ought to be part of the system's *environment*, i.e. not controlled by the system's decision taker?
(7) Who is actually involved as *planner*?	(7) Who ought to be involved as *designer* of the system?
(8) Who is involved as *"expert"*, of what kind is his expertise, what role does he actually play?	(8) What kind of *expertise* ought to flow into the design of the system, i.e. who ought to be considered an expert and what should be his role?
(9) Where do the involved see the *guarantee* that their planning will be successful? (E.g. in the theoretical competence of experts? In consensus among experts? In the validity of empirical data? In the relevance of mathematical models or computer simulations? In political support on the part of interest groups? In the experience and intuition of the involved?, etc.). Can these assumed guarantors secure the design's success, or are they false guarantors?	(9) Who ought to be the *guarantor* of the system, i.e. where ought the designer seek the guarantee that his design will be implemented and will prove successful, judged by the system's measure of success (or improvement)?
(10) Who among the involved *witnesses* represents the concerns of the affected? Who is or may be affected without being involved?	(10) Who ought to belong to the *witnesses* representing the concerns of the citizens that will or might be affected by the design of the system? That is to say, who among the affected ought to get involved?
(11) Are the affected given an opportunity to *emancipate* themselves from the experts and to take their fate into their own hands, or do the experts determine what is right for them, what quality of life means to them, etc? That is to say, are the affected used merely as means for the purposes of others, or are they also treated as "ends in themselves" (Kant), as belonging to the client?	(11) To what degree and in what way ought the affected be given the chance of *emancipation* from the premises and promises of the involved?
(12) What *world view* is actually underlying the design of the system? Is it the world view of (some of) the involved or (some of) the affected?	(12) Upon what *world views* of either the involved or the affected ought the system's design be based?

Table 1: The Critical Systems Heuristics questions (from Ulrich, 1986)

		Relationships between Participants		
		Unitary	Pluralist	Coercive
System	Simple	Simple-Unitary: key issues are easily appreciated, and general agreement is perceived between those defined as involved and/or affected	Simple-Pluralist: key issues are easily appreciated, but disagreement is perceived between those defined as involved and/or affected	Simple-Coercive: key issues are easily appreciated, but suppressed disagreements are perceived between those defined as involved and/or affected
	Complex	Complex-Unitary: key issues are difficult to appreciate, but general agreement is perceived between those defined as involved and/or affected	Complex-Pluralist: key issues are difficult to appreciate, and disagreement is perceived between those defined as involved and/or affected	Complex-Coercive: key issues are difficult to appreciate, and suppressed disagreements are perceived between those defined as involved and/or affected

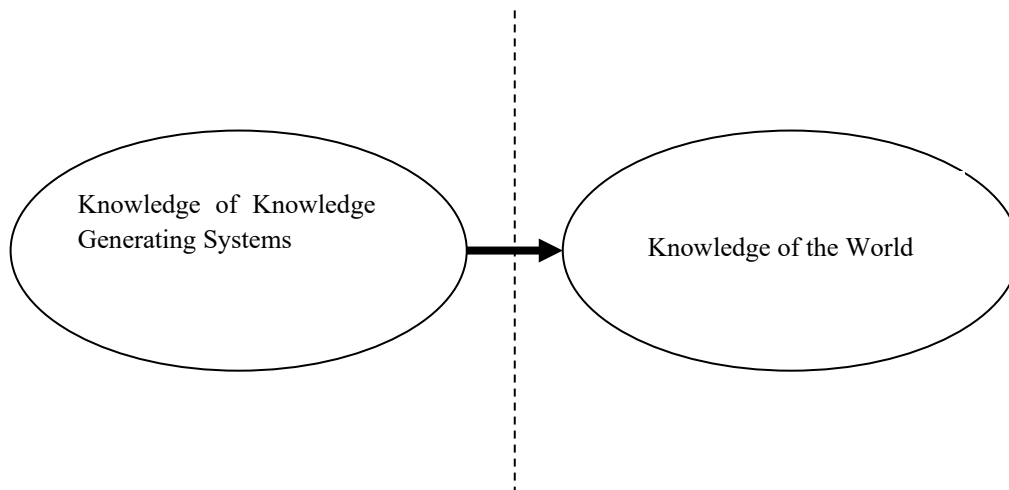Table 2: The System of Systems Methodologies (adapted from Flood and Jackson, 1991).

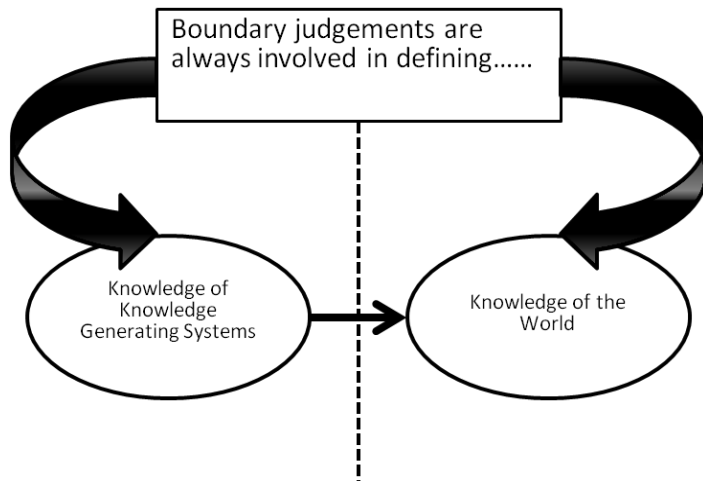Figure 1: Conventional approach to epistemology (from Midgley, 2011, p.5)

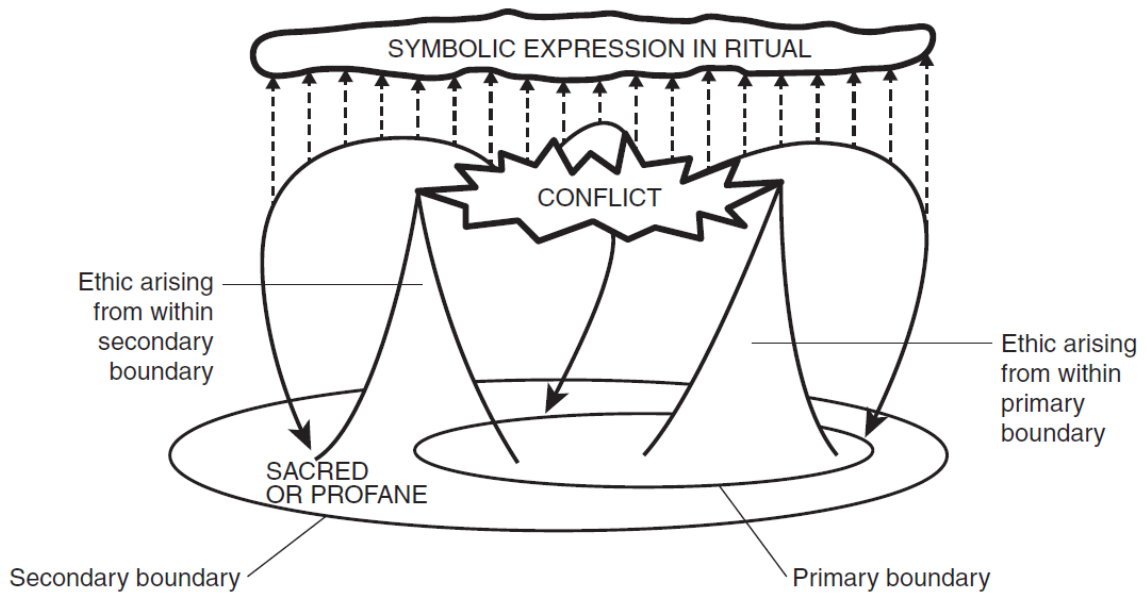Figure 2: Systemic Approach to Epistemology (from Midgley, 2011, page 6)

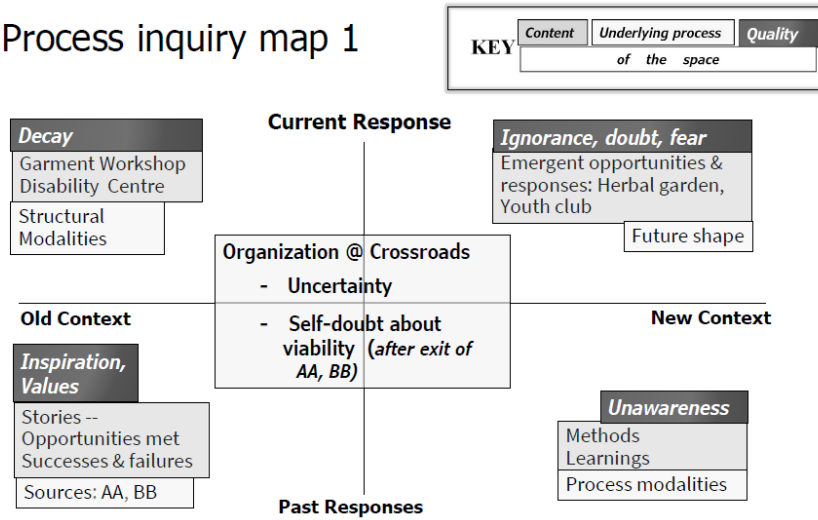Figure 3: Marginalization Process (from Midgley, 2015, p.159).

Figure 4: An example of immersive systemic knowing applied to organisational development and change
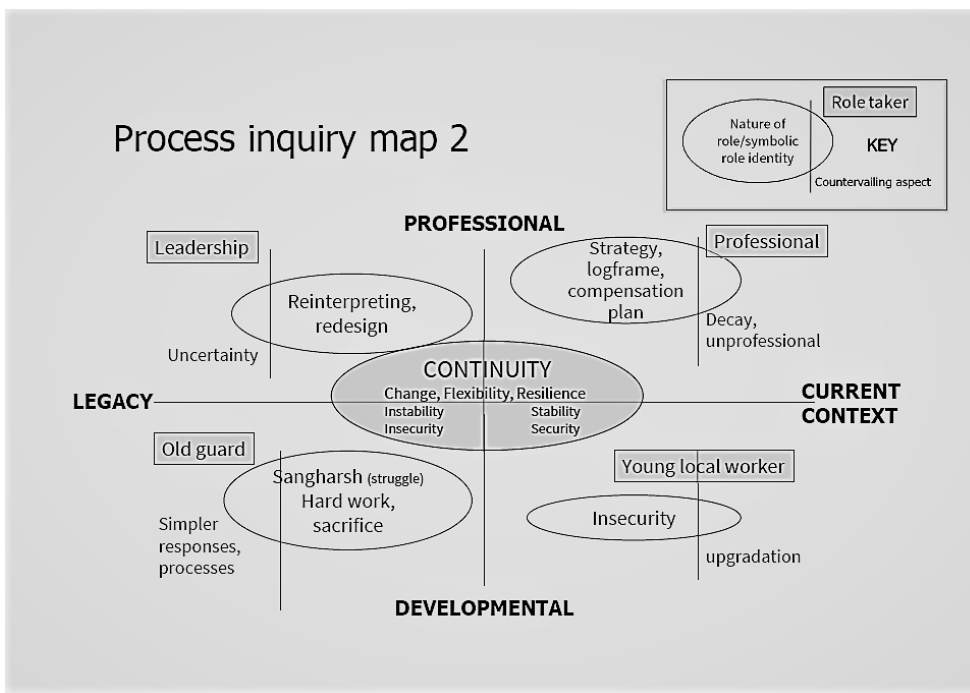

Figure 5: A second example of immersive systemic knowing applied to organisational development and change