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14 **Elaborating a critical realist approach to soft systems methodology**

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18 This paper explores the implications of adopting a critical realist approach to soft systems methodology
19 (SSM) both to address local problematic situations and to develop deeper explanations. However, its
20 potential as a means for developing generalizable knowledge for management science has been limited due at
21 least in part to its adherence to strong interpretivism. After exploring the history of soft systems methodology
22 and basic tenants of critical realism, the paper builds on previous discussions of ways in which SSM is
23 compatible with a critical realist approach. Next, the consequences for such an approach are considered by
24 examining a case in which SSM was integrated into a critical realist approach for discovery as means to guide
25 large-scale reform in a non-profit organization. The case revealed that critical realism served as an effective
26 guide both for incorporating existing knowledge as well as setting the stage for its possible modification.
27 Opportunities and challenges in the approach are presented. Apart from the adoption of a realist ontology, a
28 critical realist approach to SSM requires assuming a dual-role as an insider--outsider, which presents a
29 number of challenges. However, it appears soft systems methodology are highly compatible and could
30 serve to help bridge the practice--research gap.
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34 **Keywords:**

35 critical realism, soft systems methodology, interdisciplinary studies, theory-practice gap,
36 performance management systems
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1. Introduction

Soft systems methodology (SSM) is an action-oriented methodology for framing and addressing problems in complex organizational contexts. Based primarily on the works of Peter Checkland (Checkland, 1980, 1983; Checkland and Scholes, 1990), it has been used in a widening range of research contexts (Hanafizadeh and Mehrabioun, 2018). SSM was originally offered as an alternative to a functionalist, rationalist view for solving problems in organizations, the outcomes of which were seen as limited (Checkland, 1983).

At the heart of Checkland's methodology is an interpretivist view that sees the system as a means to organize our thinking in order to gain understanding and address a situation perceived as problematic. This perspective has been criticized as a foundation for SSM (Jackson, 1991; Mingers, 2000a) because it ultimately limits the potential of the methodology in achieving its goal.

As an alternative, several works (Mingers, 2000a, 2004, 2014) discuss adopting a critical realist perspective on SSM. Critical realism is a philosophical approach that maintains a realist ontology, epistemological relativity, and judgmental rationality—*i.e.* that attempts to understand the world are separate from the world itself, but that we as humans may undertake processes of discovery and so learn about it, though not all of these attempts will be equally valid (Bhaskar, 1975). The approach has garnered increasing attention in management and organizational science as an alternative to positivism and interpretivism in that it appreciates the power of meaningfulness in social interaction while maintaining a realist position.

As a relatively new philosophy, many ideas within critical realism have yet to be developed in practical, applied settings (O'Mahoney and Vincent, 2014). Additionally, the concepts and terminology may be unfamiliar to many scholars. Specifically, detailed examples of critical realist approaches for specific methodologies exist but are not numerous, and no explicitly "critical realist" SSM has been elaborated, despite their supposed compatibility (Mingers, 2000a). Given the potential of SSM as an effective means of addressing field problems, this paper seeks to expand on critical realist ideas as they apply to SSM, exploring the implications and challenges of such an approach when applied to the study of organizations.

The study has two additional objectives. First, it is meant to generate discussion on a popular technique as a means not just for structuring organizational problems and planning for action but also for developing knowledge. Second, it seeks to make the methodology more accessible by providing an illustrative example. The study addresses the following research question:

RQ: What are the implications of adopting a critical realist approach to soft systems methodology?

This paper considers what Bhaskar (2010) refers to as "first-wave" critical realism, centering on a relatively small portion of what has developed into a substantial philosophical approach. In so doing, the interest is in the potential for SSM to assume a dual purpose of structuring and addressing problematic situations and also as a means to apply and refine knowledge of the structures and mechanisms that bring such situations about and which can be used in their resolution. This is no simple task, as Checkland (1983) specifically sought to avoid the application of technical solutions in response to human problems.

After exploring the SSM approach, the paper compares a critical realist approach of inquiry, RRREIC, to the broad stages of SSM as presented by Checkland and Scholes (1990). Next, a case study in a non-profit organization serves to illustrate the approach and forms the basis of discussion of its implications.

2. Background

This section introduces SSM by exploring its origins, the general process, and its application to field work in various disciplines. Next, criticisms of the method related to the current discussion are explored, followed by a consideration of how adopting a critical realist approach could address these.

2.1. Origins and Applications

SSM originated from a series of works by Peter Checkland based on his and other researchers' work at the University of Lancaster, beginning in the 1960s (Checkland and Scholes, 1990). It originated in response to "hard" systems thinking, itself based on General Systems Theory of Von Bertalanffy (1968), which had been cited as lacking when applied to social situations (Checkland, 1983). The hard approach views the world as made up of systems that can be studied objectively, and in which the "problem", however complex, is clearly defined (Jackson, 1991).

In seeking to bring about positive change in organizations, SSM has become an action research approach in its own right (Baskerville and Wood-Harper, 1998), which departs from a hard systems approach by viewing the problem itself as problematic. As opposed to the engineering problems to which systems thinking had previously been applied, in organizations and social settings a “problem” could be viewed in any number of ways, including as unproblematic, depending on the views of the stakeholder in question (Checkland, 1983). Thus, Checkland viewed the hard systems approach as maladjusted as a potential source for improvement in difficult problem situations. Checkland adapted hard systems thinking in three primary ways: its primary objective became to improve areas of social concern through continuous learning, it adopted the idea of a “human activity system”, or holon, as opposed to seeing the world as made up of systems in a traditional sense, and it moved increasingly toward an interpretivist approach grounded in the phenomenology (Jackson, 1991; Zexian and Xuhui, 2010).

Along with the above changes, SSM evolved from a method which was presented as 7 steps into a more flexible approach to discovery and for addressing problem situations (Checkland and Scholes, 1990). So, while early versions of SSM had distinct stages (Checkland and Scholes, 1990; Mingers, 2000a), more recent versions expressly avoid any such standardization, and each application of it “can be seen... as research into its use” (Checkland and Scholes, 1990, pp. 275). The method is, ideally, constantly evolving. Generally, however, it employs stages of finding out, expressing the problem situation, creating a model of the ideal system, comparing the real situation to the model, analyzing feasible and desirable change, and taking action (the steps listed in Table 2).

Concerning these stages, SSM begins with a process of finding out which continues throughout the project. The classic tool for representing the result of this process, but which can also be a tool for finding out, is the rich diagram, graphical depictions of a problem situation meant to capture elements of the intervention, the social situation, and the political situation. Next, SSM moves to model building. The goal here is to develop an ideal type of the systems relevant to the problem situation. These are elaborated by conceiving a root definition which expresses the selected activity system as a transformation process, subject to environmental constraints. The traditional mnemonic for creating models is CATWOE, which refers to the Customers who are affected by the transaction, the Actors, who carry out the transformation, the Transformation itself, the Worldview or Weltanschauung that make the transaction meaningful, the Owner, who could potentially stop the transformation, and Environmental constraints. The learning process results in great part to the subsequent comparison between the real situation and the model. Ideally, comparison allows participants to identify feasible and desirable change, and to take action.

It is important to stress that, while presented as a linear process, SSM is meant to be iterative, and later versions present increasingly flexible applications that see SSM as a means of interacting (Checkland and Scholes, 1990) with a problem, denominated Mode 2. An extreme, idealized form of Mode 2 sees SSM as “an entirely mental act of structured thinking” (Checkland and Scholes, 1990, pp. 286), and contrasts with an extremely rigid, interventionist approach to SSM (Mode 1).

Since its creation SSM has been applied in many management and organizational disciplines (Van De Water et al, 2007; Mingers and White, 2010; Hanafizadeh and Mehrabioun, 2018).

2.2. Philosophical underpinnings of SSM

As mentioned in the previous section, SSM as presented by Checkland adopts an interpretivist position. This position is grounded primarily in the phenomenology of Alfred Schutz (Mingers, 1984). This sees the primary task of the social research as describing and understanding the meaning behind action.

Table 1 Functionalist and interpretivist approaches compared

Element	Functionalist Approach	Interpretivist Approach
Worldview	The real world is systemic	There are no presuppositions that the world is systemic
Systems view	Using the word ‘system’ to analyze the problematic situation	The problematic situation can be creatively designed, may not be defined by the term ‘system’

Use of models	Models can bring knowledge of the real world	Models are ideal types: possible human activity systems
Role of quantitative analysis	Quantitative analysis is useful	Quantitative analysis is limited to demographics
Role of knowledge	The intervening process is carried out on the base of professional knowledge	The intervention should be carried out by considering all stakeholders involved
Evaluation criteria	The resolution is evaluated by its effectiveness and efficiency	Evaluate the improvement according to effectiveness and related principles

Source: Adapted from Zexian and Xuhui (2010)

Table 1 compares the interpretivist and functionalist approaches to systems thinking. Most importantly, SSM does not traditionally view a system as an “adaptive whole entity” (Atkinson and Checkland, 1988), but rather a type of organizing framework for viewing the world in order to gain understanding of it. From this perspective, human activities are not separated from their surroundings, and that parts of these may have their own purposes, objectives, and meanings. Therefore, under the interpretivist view these are seen as “models relevant to debate” and not “models of” (Atkinson and Checkland, 1988, p. 723).

Also relevant to the current discussion is the role of the researcher and of expert knowledge. The SSM of Checkland rejects the primacy of technical rationality (Jackson, 1991), the view that concrete management problems can be solved by applying the appropriate techniques and theories. Additionally, as opposed to the hard systems view, SSM is fundamentally and necessarily applied in nature, and can act as a means of developing experienced based knowledge (Zexian and Xuhui, 2010).

SSM has inspired a number of debates (Mingers, 1984; Jackson, 1991; Mingers, 2000a). Specifically, it has been argued that the interpretivist position prioritizes localized learning and results over generalizable discovery and exploration. Mingers (1984) notes: “subjectivist methodologies are valuable, particularly as an antidote to positivist views, but are not in themselves suitable for guiding social intervention”. Specifically, an interpretivist stance can lead to theory–practice inconsistencies, especially if an attempt is made to generalize which stem from a relativist position of the truth (Smith, 2006). That much published research employing SSM is about SSM (Hanafizadeh and Mehrabioun, 2018) might evidence this difficulty.

2.3. A critical realist approach to Soft Systems Methodology

Systems thinking and critical realism share much in common (Mingers, 2014), and Mingers (2000b) argues that adopting a critical realist position for SSM would allow the researcher to avoid logical inconsistencies, but does not describe how one might go about it. Additionally, several authors have noted that critical realism could provide a suitable basis for dealing with philosophical issues in information systems (Smith and Johnston, 2014) and in management science in general (Mingers, 2000b). However, critical realism has developed a diverse following and its own vocabulary, which can be restrictive (O’Mahoney and Vincent, 2014). Therefore, this section will present some ideas of critical realism and relate these to SSM before elaborating a critical realist approach to SSM.

Since its original elaboration as *transcendental realism* (Bhaskar, 1975), what is now referred to as critical realism has garnered significant interest and developed several branches. As Mingers (2000b) provides a detailed discussion of many of the issues of concern here in relation to SSM, the following paragraphs will be limited to an overview of what Bhaskar (2010) referred to as “first-wave” critical realism: a realist ontology, epistemological relativism, and judgmental rationalism. Next, a critical realist process for discovery will be considered.

The original argument of critical realism was for a separation of ontology from epistemology, *i.e.* that a reality consisting of causally efficacious entities, whether physical, social, or imagined, exists independently of human knowledge of it. However, unlike an empiricist view, which limits causality to series of observable events, critical realism sees entities as having causal powers, which may be exercised or not via the acting of generative mechanisms. Mechanisms, in turn, are conditioned by physical and social structures, which may vary by context and produce differing outcomes (Bhaskar, 2016). Thus, there is a stratification of reality consisting of observable events, events that are experienced (empirical), and an underlying real or “deep” (Fleetwood, 2014) in which mechanisms and structures exist. Thus, a major aim of critical realist discovery is to identify these mechanisms as a means of developing more complete explanations.

In addition, in open systems, mechanisms operate simultaneously and at different levels of reality. Thus, reality is further stratified into levels, which Bhaskar (2010) refers to these as a “laminated totalities”. Therefore, attempting a complete explanation (in the extent that this is possible) would require considering these levels, and further their type. For example, Bhaskar and Danermark (2006) list 7 types in disability research: physical, biological, psychological, psycho-social, socio-economic, cultural, and normative.

There are two consequences of level for the current discussion: First, depending on the level of interest, mechanisms can be understood as situational (macro-to-micro), action-formation (micro-to-micro), or transformational (micro-to-macro) (Hedström and Swedberg, 1998; Brante, 2001). Second, because disciplines tend to concentrate on a particular level and possible a particular type of mechanism, typically a multi-disciplinary consideration will be necessary to approach a complete understanding of a given phenomenon (Bhaskar, 2010).

In developing explanations, critical realism remains epistemologically relative, *i.e.*, potentially several means for discovery could serve depending on the nature of the subject, and therefore is open to a wide range of methodologies (Mingers, 2015). However, as reality must be interpreted via our experiences, the approximation of it that is arrived at via study will always be corrigible. However, unlike strong interpretivism, each interpretation is not necessarily equally valid (Bhaskar, 1975).

Critical realism often follows a particular process for methodology for discovery. In applied research, this is the RRREIC process (Bhaskar, 2010, 2016), and begins with the resolution of the observable entities in a complex situation. The observable elements of the situation have a deeper, real subsurface which also contains emergent properties. Therefore, the next stage, redescription, involves choosing a level of description based on what is perceived to be appropriate to the study.

The next stages are retrodiction of component causes to existing events or retrodiction of possible mechanisms, elimination of competing alternatives, identification of the likely underlying generative mechanism(s), and finally correction of earlier findings in light of the study’s results.

Table 2 Comparison of critical realism and soft systems inquiry

Critical Realism	Soft systems Methodology	SSM Tools
Resolution	Finding out	Rich diagrams Analyses 1, 2 & 3
Redescription	Expressing the problem and the ideal	CATWOE Analysis Developing root definitions The 3-5 E's Conceptual models
Retrodiction or Retrodiction		
Elimination	Comparison of models to real world	
Identification	Analyzing feasible and desirable change	

Table 2 compares the stages of SSM and its tools for analysis. There are similarities between these, and the basic processes of SSM map roughly to RRREIC. The fundamental difference in adopting a realist ontological position means that SSM asks no retroductive nor retrodictive question (*e.g.* “how must the world be for the problematic situation to be so?”), and thus the focus of explanation building in SSM centers on understanding the meaning of participants, rather than the underlying mechanisms.

Also, what could be seen as redescription in SSM (expressing the problem) explicitly rejects the imposition of theory outside of a theory of SSM (Mingers, 2000b). Therefore, while critical realism supports a conscious (if critical) integration of existing theory, SSM works solely in the context of the study, where SSM users express the perception of the real problem and the ideal through rich diagrams, CATWOE analysis, and conceptual models. Here, worldview is the most important to understanding and addressing the problem situation.

3. Illustrative Case Study

An SSM project employing a critical realist grounding will be used to illustrate the approach and as a means to discuss challenges and opportunities thereof. The project centered on a non-profit association based primarily in Barcelona, Spain, here referred to as SciDF, and began in the fall of 2017. The case will be particularly useful for illustration because, on the one hand, it addressed a complex situation in which both goals and proposed means were seen as problematic. Thus, the setting is appropriately “messy” for applying SSM. On the other hand, it also had an explicit aim to develop organizational theory, and performance measurement and management theory in particular.

3.1. Case Background

Formed by a community of scientists and those interested in scientific issues, the goal of the organization is to encourage debate and community engagement, and to provide learning opportunities for early career researchers. To achieve these goals, the association organizes numerous activities throughout the year, which include organized discussions and debates with prominent members of the scientific community, social events, networking, and media campaigns. The activities are carried out by a team of approximately 80 volunteers led by the association president and a directing committee. Funding comes from small grants, ticket sales, and fees for organizing events.

At the time of the study, SciDF reported a number of challenges which led the researcher to propose the SSM project. The association had been successful in organizing several events with high attendance, and had garnered media attention for highlighting a lack of debate on scientific topics in an important regional election. At the same time, initial interviews revealed a number of challenges, including significant volunteer turnover, a failure to meet commitments, and unclear objectives. Also, the association itself was evolving rapidly, considering expansion to other locations and hiring full-time employees.

3.2. Research approach

Figure 1 outlines the methodology followed in the case study. The stages involved will be presented as a means for discussion.

Figure 1 Illustrated research approach

[INSERT FIGURE 1]

The process of inquiry initially centered on the creation of rich diagrams of the problem situation and of ideal models. Elements were re-described through an iterative process in which observation and rich diagram creation was incorporated with literature from the field of performance measurement and management, a multidisciplinary subject within organization and management studies. The use of these databases was meant to facilitate the development of scientific knowledge, an ambition that will be revisited in a later section of this paper.

3.3. Data Collection

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4 SSM is inherently applied, and in this study the researcher assumed an active role in the organization as an
5 insider (Groen et al, 2012; Suomala et al, 2014). After discussing the project with the directing committee, the
6 research actively participated in organizing events as a volunteer. Participating gave rise to several observations
7 that would not otherwise have been possible, but also resulted in tensions.
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10 To help create a more complete understanding of the problem situation, observations from the field
11 were recorded in an observation log (Figure 1) if these were used in any of the RRREIC processes, along with
12 notes from four semi-structured interviews with members of the organizing committee. The diagrams and
13 models resulting from the interviews were shared with interviewees to develop them further. The researcher
14 also participated in team meetings, multiple discussions, and was involved in the activities of the organization
15 as a volunteer.

16 From these observations, the problem situation was re-envisioned as a problematic performance
17 measurement and management system. Performance measurement and management is a broad topic within
18 organization and management studies, which draws primarily from research in information systems,
19 accounting, operations, and human resources (Choong, 2014; Franco-Santos et al, 2007). Essentially,
20 performance measurement and management involves attributing value to goals and objectives, establishing
21 targets and rewards, controlling and/or empowering performance, and establishing appropriate information
22 flows (Ferreira and Otley, 2009). Behind the study of these systems is a search for improved organizational
23 performance, where performance can be understood as the achievement of organizational objectives.

24 Delimiting the problem in this way served two purposes. First, the topic addressed may of the stated
25 challenges, especially around structuring problems in the form of strategic goals, defining measures of
26 performance, and communicating feedback information. Next, centering on performance measurement and
27 management limited the scope of the literature review to this topic, a critical element for understanding the
28 problem situation and its antecedent causes in the study. Theories of mechanisms were drawn from a
29 concurrent systematic review which was adapted for the purposes of this study. Specifically, the research
30 employed a review of challenges and sources of failure for performance measurement and management
31 systems, Van Camp and Braet (2016), as a base, and incorporated other studies as needed that had been
32 gathered following a process of realist synthesis (Pawson, 2006).
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34 The sources of failure were re-interpreted from a critical realist view in the form of supposed
35 underlying mechanism, its type (Hedström and Swedberg, 1998), and level. For example, Van Camp and
36 Braet (2016) list “Unbalanced amount” of non-financial and financial performance measures as a potential
37 cause of failure. This cause of failure would be incomplete for the purposes of the study, which seeks to
38 understand why such an imbalance would be problematic. Further exploration provided nuance: non-financial
39 measures tend to provide more information (Lau, 2011), so an over-reliance on these can result in feelings of
40 ambiguity, which in turn can spur a number of undesirable behavioral outcomes (Widener, 2007). These
41 potential explanations were stored in a table to aid in further processes of elimination and identification.

42 **Figure 2 Textual content of rich diagram used for model creation**

43 [INSERT FIGURE 2]
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45 **3.4. Data Analysis**

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47 Analysis was an ongoing from the start of the project and began with a stage of “finding out”, which centered
48 around the development of rich diagrams such as that in Figure 2. As the investigation went on, additional
49 issues were included in a diagnosis table and in diagrams used for discussion, such as difficulties with funding,
50 internal communication issues, issues with scope and boundary, challenges communicating performance for
51 feedback. Following Checkland and Scholes (1990, p. 45), no formal technique was used to create the
52 diagrams.
53

54 Also during analysis, and as a precursor to an in-depth examination of potential mechanisms, a number
55 of relevant systems were modeled using CATWOE analysis.

56 **Figure 3 A model of a system for measuring and managing performance**

57 [INSERT FIGURE 3]
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59 The ideal model and its related systems are in Figure 3. Several models were developed, but in the end
60 the performance measurement and management system was chosen as the focus of discussion. This choice
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served several purposes. First, performance measurement and management is an established field of study with an extensive literature base. Second, choosing one broad system to model had a practical purpose as well as a theoretical one: discussing one model across many groups reduced the number of concepts being discussed. It also encompassed many of the observed problem situations and could be easily related to other problematic systems, such as task assignment and identification opportunities, a system for financing operations, and a system of internal communication (See Figure 3). The system in Figure 3 contains elements of “theory-based” conceptions of performance measurement and management systems drawn from the literature (mainly Ferreira and Otley (2009)), adapted, recombined, or re-envisioned for the purposes of the project based on observations and discussion in the field.

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Table 3 Idealized Performance measurement and management system

Model Activity	Real world	Analysis	Possible underlying mechanism	Possible corrective action
Appreciation of SciDF goals & strategic direction	Exists	Core' team of SciDF have a deep understanding of the goals of SciDF, including the more ambitious ones that imply coming change. The process is largely informal, through frequent communication from a few active members, but there are also minutes, formal documents, and the webpage that reinforce direction	The evolution of the association means that many formal documents that exist online are out of date. For new volunteers, a lack of induction process means higher ambiguity. Perception of being "thrown into the pot"	Appreciation of the goals seems to work fairly well for more senior volunteers. For new members, a mentoring program, team leads, or instructional document could help on-boarding process
Developing strategies & plans	Exists	Numerous documents exist and the primary avenue to reach SciDF's strategic goals have been defined, though not in relation to its relatively new ambitions of expansion. Identification of strategic opportunities takes place from time to time during team meetings, but follow-up activities appear limited. During strategic meetings, multiple perspectives on SciDF's goals hinder progress	Large group of opinionated stakeholders complicate sense-making Flat organization structure adds to ambiguity Conflict <i>having a good time vs. getting things done</i> may contribute to ambiguity at the organizational level, e.g. answering why are we here?	Regular sessions, limited to vetted "core team" specifically for the purpose of strategic control.
Defining performance measures & objectives	Exists	Specific performance metrics depend by group and are sometimes clear (e.g., 5 talks per year). Other functions appear to lack specific measures (e.g., fund-raising), while others are developed given a urgent need (e.g., voting project).	Lack of measures likely source of goal, role, and process ambiguity	In relation to the above, take time to set and monitor quantifiable objectives

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Setting targets & rewards (to groups or individuals)	Informal / Ad hoc	Targets have been set in the context of Talks and the voting initiative, but rewards have not. A few members cite the association on their CVs, and core members have their information up on the website. Informal rewards in the form of recognition takes place in Whatsapp groups, on Basecamp, and to some extent at the events themselves.	In combination of the above, lack of targets mean team may not know when they are doing well, contributes not only to ambiguity but also feelings of injustice (especially for new arrivals)	Regular core team sessions specifically for that purpose. Targets should be realistic, and rewards can likely remain informal, befitting the worldview of the volunteers
Performance information collected & communicated	Informal / Ad hoc	Largely absent outside of organizers of formal discussions. Without clear measures in the first place, performance feedback is mostly subjective. This has contributed to misunderstanding and missed objectives, especially for communications team	Mixing of communication channels mean subjective performance feedback is clouded with informal communication, creates informational overload	Create dedicated channels of communication Split groups so that communication is limited to those who need to see it Avoid mixing fun channel with not fun items
Analysis and evaluation of performance information	Informal / Ad hoc	President, team leaders, and active volunteers . There are extensive notes on the goals but not on follow-up activities.	Contributes to the ambiguity Makes corrective action, feedback, and rewarding more difficult because it must be subjective	Emphasize revision of objectives along with identification and pursuit of new opportunities
Corrective Action	Informal / Ad hoc	How performance is monitored and responded to depends on each activity and organizational group, but is often either highly reactive or non-existent. President often has to intercede which contributes to a number of problems: angst on the side of the volunteers, limited time for him to manage organization.	Lack of reflection on explaining why or why not of performance Ultimately hinders organizational learning	Depends on team, but most volunteers used to high degree of autonomy, so 'leaving it to them' may be most appropriate in combination with other elements. A focus on empowerment from leadership as opposed to performance control and stepping in has been suggested.

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Feedback Rewarding	and	Informal / Ad hoc	See above. As an association made up of volunteers, rewards of some type are critical for maintaining motivation and commitment, two areas that SciDF has struggled with. Positive and negative feedback is communicated publicly via Whatsapp and Basecamp, meaning it can be lost through information overload.	Information overload lessens effects of both positive and negative feedback Both feedback and rewards are often tied to subjective or unclear measures; may amplify reactions to ambiguity A great amount of feedback is shared with group, which may intensify sense of injustice	More formal recognition of efforts (awards, team ceremonies) Reduction of information exposure through 'silo-ization' Clear measures and established frequency of review, along with empowering environment described for corrective action
Monitoring		Does not exist	The activities around performance measurement and management are largely informal. Therefore, monitoring of the system itself is mostly non-existent, or relegated to ad hoc, infrequent review.	Lack of formal monitoring recognized by team as due to newness and fast evolution of the organization itself	Expected to 'self-correct' with other corrective action
Control		Does not exist	See above: Monitoring	See above: Monitoring	See above: Monitoring

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6 Further analysis of the process is presented in Table 3 and represents the outcome of an initial process
7 of comparison of the ideal (goals) and what was observed and described. This table references the elements
8 of the model (Figure 3), whether the element was observed in practice, and a description of it according to the
9 theoretical framework. Possible underlying mechanisms are also included along with potential corrective
10 action.

11 **Figure 4 Identified Mechanisms leading to corrective action**

12 [INSERT FIGURE 4]

13
14 Figure 4 presents the final explanation of the problem situation as it relates to SciDF. These employ
15 the mechanism types of Hedström and Swedberg (1998), arranged around an inter-individual level of analysis
16 (Brante, 2001). Central to the problem situation were a large, diverse group of stakeholders and an attempt at
17 a democratic decision-making process, which were contributing to deficiencies in the performance
18 measurement and management system elements in Table 2 and Figure 3. These deficiencies perpetuated and
19 reinforced a lack of process, role, and goal clarity and impeded individual learning. Certain elements of the
20 system, e.g. a lack of clear targets and recognition, appeared to contribute to a sense of under-performance
21 and a lack of individual commitment, especially with certain groups of volunteers. Lack of commitment and
22 missed (implicit or subjective) targets influenced the leadership, who would monitor whether tasks had been
23 completed on team communication channels. What resulted was a sort of vicious cycle in which the
24 information overload further clouded the feedback information that was being communicated.
25

26 Suggested corrective action is included in Table 3 and is based on the mechanisms represented in
27 Figure 4. For example, the suggestion to hold regular review sessions for the directing committee with
28 specific, quantified targets is based on the idea that these can make inform action, decreasing ambiguity, and
29 also appeals to a sense of fairness. An improvement in this area could then in turn increase volunteer
30 commitment to the organization and, ultimately, improve its performance.
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32 **4. Discussion**

33 This article puts forth that SSM essentially offers an effective means of resolving and redescribing complex
34 organizational realities, and for arriving at action plans for implementing change. The point of approaching
35 SSM from a critical realist perspective is to maintain its positive aspects—a commitment to bringing about
36 positive change, appreciating complexity and the perspective of multiple stakeholders—but also to augment
37 these in a way that allows for introducing and developing existing knowledge.
38

39 The following paragraphs discuss how critical realism might bring this about with reference to the case
40 study, and possible tensions that may arise as a result. Second, adopting the RRREIC process offered a manner
41 for addressing the underlying how? and why? of problem solving through a focus on generative mechanisms
42 and conditioning structures. Indeed, researchers have noted that while SSM can provide an ideal vehicle for
43 redescribing an issue, i.e. at arriving at the question to be asked, it provides little guidance for how the issue
44 can be addressed (Hanafizadeh and Mehrabioun, 2018). In remaining epistemologically relative, the critical
45 realist approach does not dictate the use of a particular method a priori and so there are many possibilities for
46 incorporating other methods.
47

48 In the described case study, interviews and observation served to develop an initial assessment of the
49 problem situation, which was validated at several stages by participants of the project. Other, more intensive
50 methods are certainly possible and may have been beneficial to the project, which was ultimately limited to
51 the interpretations of the researcher. Indeed, attempts at using SSM to develop theory typically employ
52 multiple research methods (Hanafizadeh and Mehrabioun, 2018). However, doing so without adopting an
53 explicit philosophical position from which to operate can result in logical inconsistencies (Smith, 2006).

54 Finally, critical realism offers a means of reconciling multiple mechanisms operating at multiple
55 levels. While SSM focuses on organizational problems, the case has presented only one, fairly uncomplicated
56 view of mechanisms which has been described as the “interindividual” level (Brante, 2001). While this is
57 useful for illustration and appropriate given the nature, it should be noted that expanding this idea to other
58 types of mechanisms operating at other levels would yield more complete explanations. Therefore, possibly
59 in combination with other methods, the continued exploration of stratification could provide a means of
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4 making SSM more accessible to a wider range of practitioner–researchers, and to make it more suitable to
5 even more complex problems that require multi-level, multi-disciplinary studies to address.
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7 The case also demonstrates one possible method for systematically introducing outside knowledge into
8 the system, and thereby addresses concerns about the assumptions of SSM being regulative (Jackson, 1991;
9 Houghton, 2002). In the case study, a literature review was fit for this purpose and aided not just in
10 redescribing the problem situation in theoretical terms, but also as a process of co-discovery. In this way, in
11 addition to discussing desirability and feasibility, theories of possible action were also considered in terms of
12 their plausibility.

13 Therefore, it could be argued that there are three major benefits to be gained through a critical realist
14 approach. First, that a critical realist approach to SSM benefits development of management as a science by
15 deliberately incorporating existing knowledge into the treatment of problematic situations in a critical manner.
16 Next, that a critical realist approach benefits SSM in practice in maintaining a focus on its transformation and
17 by recognizing the social, physical, and imagined mechanisms and structures. Finally, that a critical realist
18 approach benefits SSM in that it provides a foundation for its ongoing evolution, initially by remaining
19 epistemologically relative.
20

21 However, in pursuing a dual purpose that seeks to transform practice and develop knowledge, potential
22 tensions arise that would not otherwise be present with a strictly phenomenological perspective. These
23 purposes may well serve each other, as understanding the former will help develop the intervention to bring
24 about the desirable change. In these cases, the primary objective of SSM as a means of addressing a situation
25 that is viewed as problematic (Checkland and Scholes, 1990) can be maintained.
26

27 On the other hand, pursuing a dual purpose is also perhaps the most dramatic deviation from the
28 original vision of SSM, in that it could be seen as promoting the instrumentalist application of knowledge that
29 Checkland (1980) set out to avoid (Flood, 2000), and at risk for employing theory in a way that leads to “not
30 seeing” (Poggi, 1965). Checkland is clear that any intervention should consider the views of all stakeholders,
31 as both meaning and the solution must come from the people involved in the problem situation (Checkland
32 and Scholes, 1990).

33 Therefore, the researcher must again find a way to combine the search for and identification of
34 mechanisms, maintaining a healthy skepticism of the results, and arriving at practical solutions. This coincides
35 with a need to balance the demands of being an outsider and an insider, where the former may emphasize
36 results for theory and the latter results for the organization (Suomala et al, 2014). In the case study, balance
37 was sought mainly by actively involving participants in defining the problem and developing an action plan.
38 There is also an issue concerning criteria for judging the “validity” of the identify mechanisms.
39

40 For the localized results of the case study for theory, it does appear that results are significant for
41 performance measurement and management and could contribute to explanation building in that field, albeit
42 with further exploration and development. The elimination, identification, and correction stages were
43 achieved through comparison of the models, open debate, and reflection, and these processes were
44 accompanied by the development and maintenance of a “diagnosis database”. Results fit with some extensive
45 works in the field of performance measurement and management, e.g. that a lack of clear measures can be a
46 source of ambiguity (Hall, 2008) and contribute lead to feelings of injustice (Wouters and Wilderom, 2008).
47 Apart from discussing the theories with the study participants, Kempster and Parry (2014) have argued that
48 one way of evaluating proposed mechanisms is through publication, which carries the added benefit of
49 potentially making the results of SSM studies more accessible to be applied in other contexts.
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51 Also, the need to constantly apply the results of the literature review generated some interesting results
52 in itself. For one, many of the studies needed to be re-interpreted in order to fit the critical realist approach.
53 The review of Van Camp and Braet (2016) that served as the starting point is exemplary: not all the listed
54 sources of failure came in the form of generative mechanisms, and so converting these into a usable form for
55 applied research required some effort and interpretation along the lines of realist synthesis (Pawson, 2006).
56 This process also fit well within the SSM methodology in that it served in redescribing the problematic
57 situation as well as in comparing the actual and the ideal.

58 An additional benefit of this process is that it demonstrates a practical means for achieving what
59 Bhaskar (2016) refers to as the principle of hermeticism, i.e. that theories should be tested in everyday life.
60 This has potential to further benefit research directions, in that the immediate demand to offer an immediate
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4 practical solution as a part of SSM requires a grounding in relevancy. Thus, researchers adopting SSM as a
5 methodology for applied work will likely follow lines of inquiry relevant to practitioners.
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7 Concerning the correction of previous findings in the localized setting, the extent to which the study
8 revealed an accurate conception of the mechanisms at work is open to debate. At a practical level, and adopting
9 the “insider view”, results were used in the development of an action plan, so the objectives of SSM have
10 been met to some degree in that consensus on the nature of the problem and potential resolution was achieved.
11 However, it is unclear the extent to which that action plan would generate the desired results, and which of
12 these, if any, could be attributed to the mechanisms that were identified, or to the method itself as a tool for
13 self-discovery. In this way it appears that SSM as described by (Checkland and Scholes, 1990) is limited on
14 its own in its ability for theory testing outside of practical adequacy (e.g., performance improves) and
15 confirmation by the stakeholders. There is therefore an opportunity to incorporate other methods to facilitate
16 this process.

17 5. Conclusions

18 This paper explores the implications for adopting a critical realist approach for research that employs soft
19 systems methodology. The discussion is somewhat limited in that it has presented a relatively narrow and
20 uncritical view of critical realism. There are many perspectives and debates within realism and critical realism,
21 and adopting one of these or another might demand modifying the design of method. However, as with soft
22 systems methodology, the illustrative case study presented is meant to demonstrate one possible manner to
23 undertake a critical realism-inspired project.
24

25 There is an opportunity to further develop a union of critical realism and SSM. First, this study has
26 paid little attention to concepts of boundary, level, and mechanism type (Brante, 2001). Elaborating such a
27 union could be especially useful in expanding SSM to a wider range of contexts because considering these
28 generally requires a multidisciplinary approach. It could also facilitate the incorporation of other methods into
29 SSM and thereby address limitations to achieving open and meaningful debate (Jackson, 1991), and to further
30 develop criteria for evaluating mechanisms (Robert Isaksen, 2016).
31

32 This paper demonstrates how a soft systems approach is compatible with a critical realist foundation
33 through an applied research project. By adopting a realist ontology, researchers employing soft systems
34 methodology can pursue practical relevance, appreciating the central role of meaning in social interactions,
35 but also seek to develop explanations that can potentially extend beyond a given research context. Though a
36 balance must be struck between the goal of theory-building and relevance within the study, the original goal
37 of soft systems methodology, bringing about improvement in problem situations, can be maintained, but also
38 potentially enhanced through the active development of explanations. Such a position therefore represents
39 one possible path to bridge the research–practice gap.
40

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Figure 1

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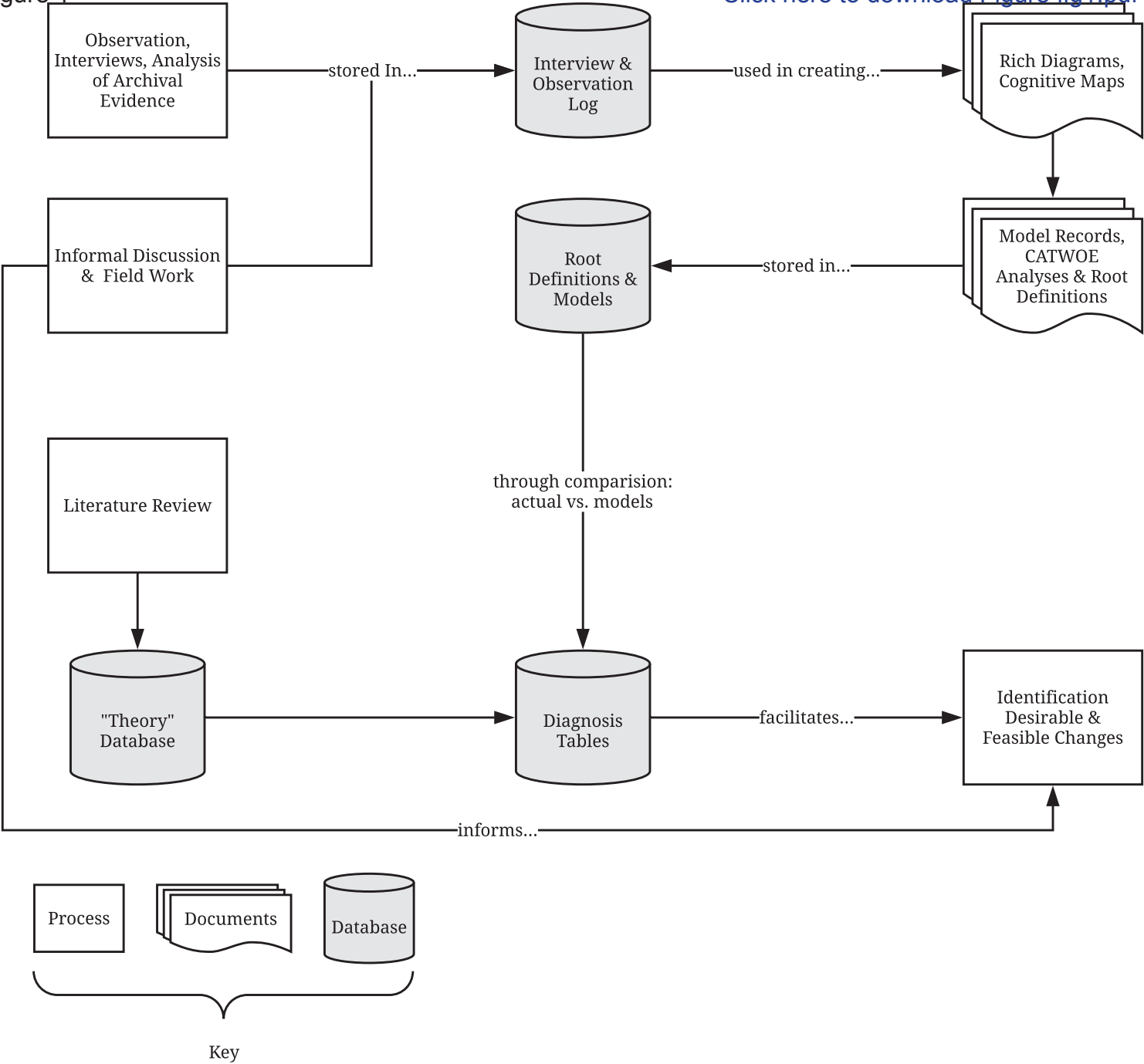


Figure 2

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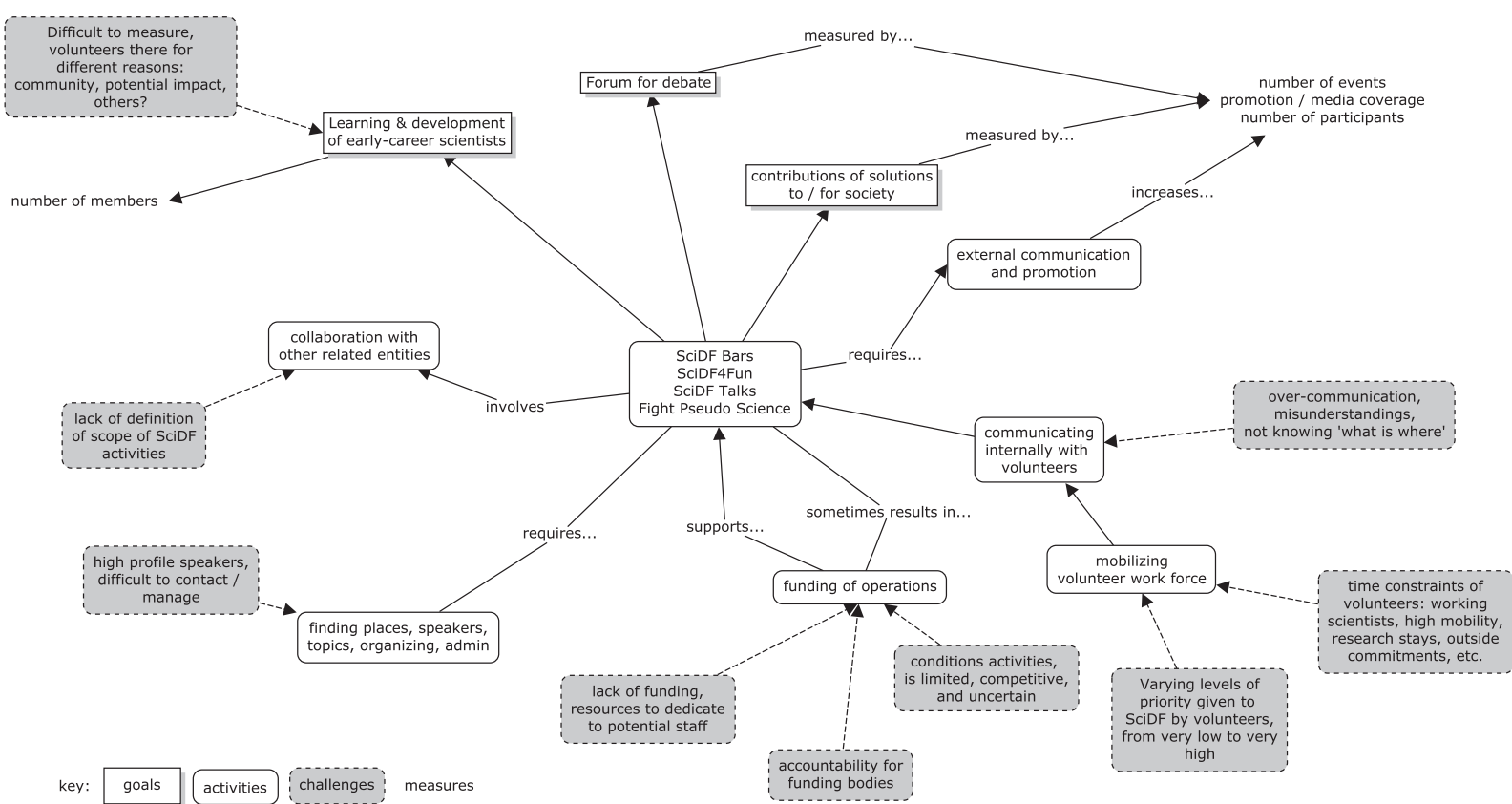


Figure 4

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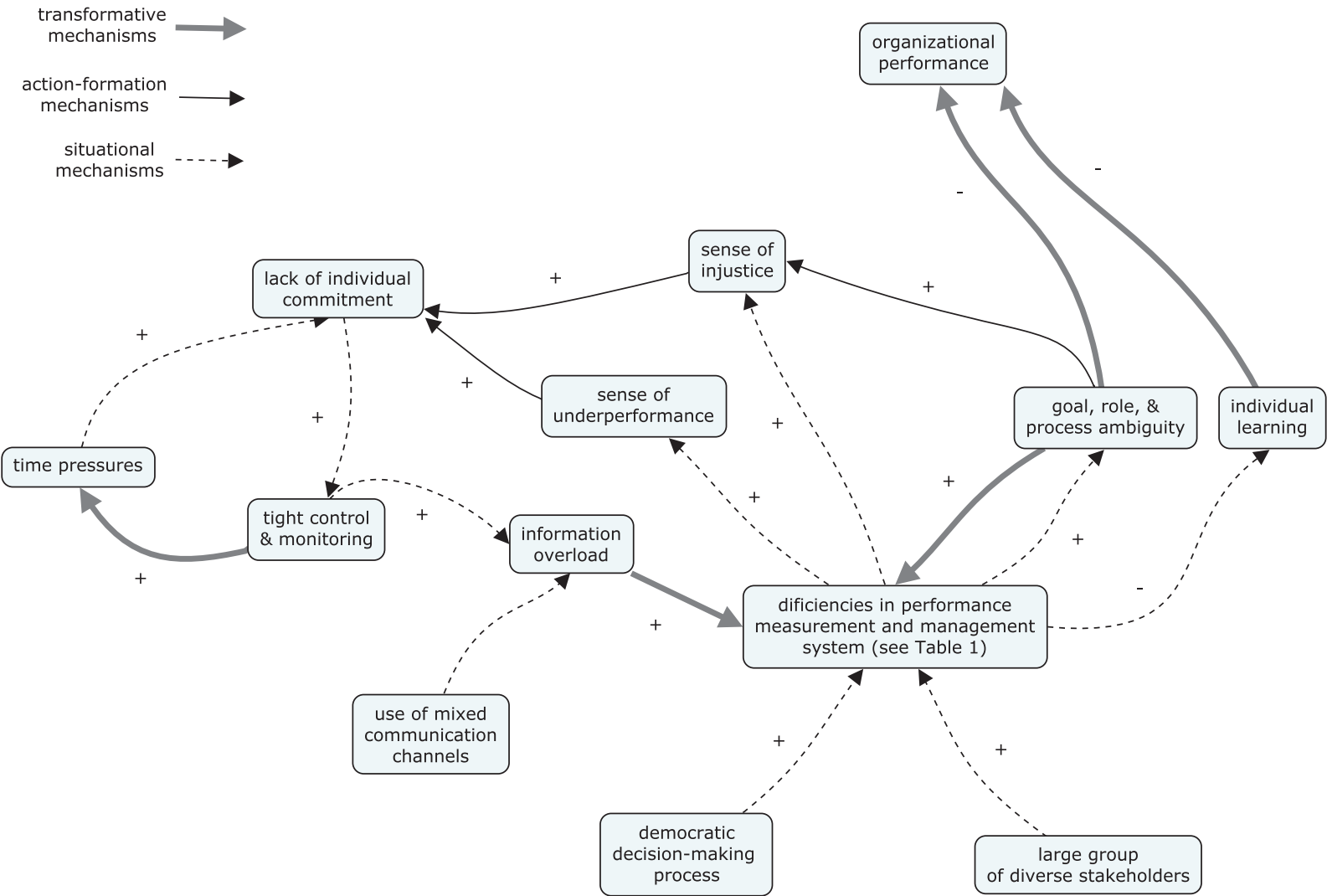


Figure 3

