The Use of Soft Systems Methodology as a Tool for Creativity

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Abstract

Soft Systems Methodology is a tool that is especially useful in diagnosing and addressing organisational problems and designing new systems in cultures that are characterised by pluralistic views and values. This paper demonstrates how SSM workshops in a large government agency resulted in a high level of creativity. SSM is then proposed as a methodology which could enhance group creativity in organizational design contexts.

Key words: Soft Systems Methodology, Systems thinking, Creativity.

Introduction

This paper puts forward the proposition that Soft Systems Methodology (SSM) can be used as a methodology to enhance creativity. It analyses the theoretical basis of creativity, including factors such as the work context, group creativity and individual motivation and personality. It then looks at SSM in relation to its creativity and learning aspects. Later, alternative creativity methodologies and techniques are analysed for comparison with SSM. To demonstrate the practical application of SSM in generating creative outputs, the paper describes several design workshops using SSM conducted by the first author in a large government agency, which resulted in highly creative outputs.

Creativity

Creativity is a psychological process which has interested theorists over the last half- century or so. Barron (1988:80) defines creativity as "an ability to respond *adaptively* to the needs for new approaches and new products". He sees it as consisting of six components, which are (p78): recognising patterns; making connections; taking risks; challenging assumptions; taking advantage of chance; and seeing it in new ways.

Torrance (1988:47) describes the creative thinking process as:

> "sensing difficulties, problems, gaps in information, missing elements, something askew; making guesses and formulating hypotheses about these deficiencies; evaluating and testing these guesses and hypotheses; possibly revising and retesting them; and finally communicating the results".

Creativity is not just one process, but consists of different forms, as proposed by Taylor (1959), who saw five different forms of creativity:

1. Expressive creativity, as in spontaneous drawing.
2. Productive creativity, as in artistic or scientific products.
3. Inventive creativity, where ingenuity is displayed with materials and methods.
4. Innovative creativity, where improvement is made involving conceptual skills.
5. Emergenative creativity, where there is an entirely new principle or assumption developed.

Amabile et al (1996:1154) state that "all innovation begins with creative ideas". Creativity is not innovation, though. It may lead to innovation. Amabile et al (1996:1155) believe that "creativity by individuals and teams is a starting point for innovation" and that creativity is "a necessary but not sufficient condition" for innovation. However, there are other factors, such as management priorities, production practicalities, organisational culture and politics, which will impact on creative ideas becoming innovative products.

The environment and context for creativity

Creativity doesn't exist in isolation. Sternberg (1999) confirms this proposition in his statement that creative contributions must always be defined in some context.

The creative environment is particularly important in being able to generate new ideas through such influences as: an environment of psychological safety and freedom; a toleration of ambiguity and individual differences; and supporting and rewarding creative ideas (Isen et al, 1987; Rogers, 1954; Sternberg and Lubart, 1996).

The social context (Simonton, 1988) or social system (Harrington, 1990) helps create the environment by providing the ingredients for creativity, including the presence of interesting, solvable problems, novel techniques and perspectives to apply to the problem. Clearly related to this is the culture of the society or work organisation involved, and the worldviews which may be dominant (Lubart, 1999). These factors could have a positive, negative or neutral influence on creativity and may contain some elements in the culture that may "foster creativity and others that stifle it" (p346). Lubart (1999:347) finds that creativity is context dependent and that culture is "involved in defining the nature of creativity and the creative process".

The work context for creativity

In the work context, researchers have found a number of factors that either enhance or impede creativity. Those that enhance creativity include: freedom and play in work; good management; sufficient resources; a positive climate for ideas; encouragement from the organisation (includes a licence for employees or project teams to be creative and organisational mechanisms that support the consideration of new ideas); encouragement from senior management, the supervisor and the work group; positive feedback; recognition; accurate communication; sufficient time; and a sense of challenge (Amabile, 1988, 1996; Amabile et al 1996; George and Zhou, 2001; Zhou, 1998). Stimulation and complexity of the work is considered positive by Cummings and Oldham, (1997) as it supports novelty in work. Complex jobs may in fact "demand creative outcomes" by encouraging individuals to "focus simultaneously on multiple dimensions of their

work" (Oldham and Cummings, 1996). Organisations that "have more complex structures that link people in multiple ways" is an additional factor described by Kanter (1988:172) as supporting innovation. Amabile et al (1996) outline many of these aspects that have significant empirical support. Zhou (1998) found that positive support encouraged creative behavior, whereas criticism tended to discourage creative behavior.

The style of organisational behaviour can be an influence, as Williams and Yang (1999:374) found that "traditional concepts of organizations that so heavily emphasize *control* have had the effect of *minimising* employee creativity".

In relation to job complexity, Cummings and Oldham (1997) believe that more complex jobs may encourage employees to be more creative as they can see the significance of the work and can use a variety of skills. By contrast, impediments or obstacles in a work context include: a climate that has little regard for innovation; constraints; disinterest; poor management; criticism and external evaluation; insufficient resources; time pressures; emphasis on status quo; competition (Amabile, 1988, 1996).

Group creativity and mood

Researchers have found that there are a number of conditions where groups will be more effective in creative output. Task cohesiveness, defined as the group's shared commitment to a task (Hackman, 1976), and interpersonal cohesiveness, defined as the group members' attraction to or liking of the group (Evans and Jarvis, 1980) are found as factors which will improve group performance in groups that are required to "create, imagine, or generate novel ideas or products" (Craig and Kelly, 1999). Groups that laughed and smiled more as well as made more verbal support statements and fewer critical statements performed better creatively (Firestein, 1990). The alignment of personal goals of group members is a factor suggested by Ford (1999) in enabling group creativity. King and Anderson (1990) believe that in addition to cohesiveness, other factors in group creativity include a democratic and collaborative leadership, an organic structure, and individual diversity. This latter point is also confirmed by Simonton (2003) who states that a group whose membership is heterogeneous in expertise, experience and status may prove more creative than a homogeneous group.

The mood of a group is also considered an important factor in creativity. According to Fredrickson (2001:219), positive mood "broadens people's momentary thought-action repertoires". It also permits more flexible cognitive processes, leading to a wider variety of behavioral options. Grawitch et al (2003) found that in temporary workgroup settings, groups in a positive mood condition "significantly outperformed groups in the neutral and negative conditions". They presume that positive mood has both "a direct and an indirect effect on creative group performance, due to its effect on individuals and groups".

Individual motivation

Individual motivation is another important aspect of creativity. Hennessey and Amabile (1988:11) state that they "have found that there exists a strong and positive link between a person's motivational state…and the creativity of the person's performance". There are two

forms of motivation for an individual. One is *intrinsic* or "motivation that arises from the individual's positive reaction to qualities of the task itself" and the other is *extrinsic* or "motivation that arises from sources outside of the task itself" (Amabile 1996:115). Intrinsic motivation may occur because the task itself is interesting and involving, and the individual has a drive to engage in the activity. Extrinsic motivation may work when rewards, recognition and feedback confirm individual competence or provide important information on how to improve competence, according to Deci and Ryan (1985).

According to Dudek and Côté (1994), individuals may also be intrinsically motivated by activities they have chosen for themselves, rather than activities that have been selected for them by others, or in which they are obliged to engage in for reasons beyond their control.

Deci and Ryan (1985:85) have also found that the motivational process is determined by its "psychological meaning for the individual". According to their findings, an event can be perceived by an individual as either informational, controlling, or amotivating, and this perception will influence their motivational state. For example, an informational event increases intrinsic motivation is it signifies competence and decreases intrinsic motivation if it signifies incompetence. It is also affected by the perceiver's sensitivities and past experiences as well as by the actual configuration of the event itself.

As a result of the various factors in motivation, Amabile (1996:119) proposes the "Intrinsic Motivation Principle of Creativity":

> *Intrinsic motivation is conducive to creativity; controlling extrinsic motivation is detrimental to creativity, but informational or enabling extrinsic motivation can be conducive, particularly if initial levels of intrinsic motivation are high.*

Individual personality and thinking style

Individual capability and personality are further factors in the complexity of creativity. Woodman et al (1993) state that individual creativity is a function of antecedent conditions, cognitive style and ability, personality factors, relevant knowledge, motivation, social influences, and contextual influences. The individual is influenced by an interaction of the various factors.

Individual characteristics, such as broad interests, attraction to complexity, intuition, aesthetic sensitivity, toleration of ambiguity, and self-confidence are proposed by Oldham and Cummings (1997) as relating positively to measures of creative performance. *Openness to experience* is another factor found to positively influence creative performance by George and Zhou (2001), who claim that people who are high on this characteristic have "greater access to a variety of feelings, thoughts, perspectives, and ideas, may be more adaptable to changing circumstances" and tend to "be willing and able to come up with and think about new ideas".

Personality theory would also indicate that some personality types are more likely to be naturally creative (e.g. intuitive types as described in the Myers-Briggs Type Indicator (Briggs Myers and McCaulley, 1985). Intuitive types are more likely to ignore standard frameworks and reframe the problem, seeking insightful and creative solutions. Creative thinking types tend to think in a way that is "expansive, innovative, inventive, unconstrained thinking" according to Nickerson

(1999:397). It is associated with exploration and idea generation and can be "daring, uninhibited, fanciful, imaginative, free-spirited, unpredictable, revolutionary". He contrasts this with critical thinking, which is "focused, disciplined, logical, constrained thinking" and claims this is "down to earth, realistic, practical, staid, dependable, conservative" (p397). Sternberg et al (1997) call this an "inventing style" of thinking preference. They state that it consists of the use of intellectual abilities of synthetic thinking, analytical thinking and practical thinking. However, the three are independent, so the synthetic ability must be used first to see connections, redefine problems and generate options. Guastello (2002:163) reported on studies of cognitive style in relation to creativity, which found that there were "substantial positive correlations between innovator, synthesizer, and planner styles with productivity, with negative or null relationships for other styles" on the Artistic and Scientific Activities Inventory (Guastello, 1991).

Systems view of creativity

A systems view of creativity is proposed by Csikszentmihalyi (1988, 1999). He proposes that creativity is a phenomenon that results from interaction between three systems: "a set of social institutions, or *field*"; and "a stable cultural *domain* that will preserve and transmit the selected new ideas or forms to the following generations"; and "the *individual*, who brings about some change in the domain, a change that the field will consider to be creative" Csikszentmihalyi 1988:325). Csikszentmihalyi (1999:314) proposes that creativity is "a process that can be observed only at the intersection where individuals, domains, and fields interact".

Unsworth (2001) suggests that there are a number creativity types resulting from and interaction of the type of problem, which is on a continuum between open or closed, and a continuum between externally and internally driven engagement processes. She suggests that this results in four major combinations of creativity types. Responsive creativity is externally driven in a closed-problem field; expected creativity is externally driven in a self-discovered problem. Contributory creativity is self-determined in a clearly formulated problem. Proactive creativity occurs when self-motivated individuals actively search for problems to solve. One of the results of this framework, Unsworth explains, is that the responsive and expected creativity categories require less effort than proactive and contributory creativity. Because of this, "the relationships between motivation (both intrinsic and extrinsic) and creativity will be stronger for those types requiring more effort".

Soft Systems Methodology

Soft Systems Methodology was created by Peter Checkland (1981) as an answer to the lack of specific applicability of other systems approaches to the complex area of human activity systems.

Definition and description

SSM is defined by von Bulow (1989) as:

> "a methodology that aims to bring about improvements in areas of social concern by activating in the people involved in the situation a learning cycle which is ideally never-ending".

SSM is a methodology that extends systems thinking methodologies from their origins in what Checkland (1981) calls 'hard systems thinking' to the human activity systems or 'soft systems'. The word 'soft' indicates the essential sociological, cultural and political elements embedded in systems that have human dynamics. The purpose of SSM in extending systems thinking to incorporate human activity systems has helped to broaden its influence in organisational decision making. SSM is about "applying systems principles to structure thinking about things that happen in the world" (Rose and Haynes, 1999). Flood and Jackson (1991:168) discuss the reason for SSM's development as "for use in ill-structured or messy problem contexts" and Rose (1997) sees SSM as essentially participative and collaborative in nature.

Torlak (2001) claims that SSM is used "when 'interactions' in the system are cultural and the 'situations' are dominated by the viewpoints of the observers". This comment would be in line with Flood and Jackson's (1991) placement of SSM within their framework of systems methodologies that are relevant to situations where the views are pluralist. Le-Saint (1991) states that "SSM works best where a hard approach fails; where the setting of objectives or definition of what constitutes the problem is in itself problematical."

Any use of SSM is seen by Checkland (2000b:821) as involving four elements:

> "(1) a perceived real-world problem situation; (2) a process for tackling that situation in order to bring about some kind of improvement; (3) a group of people involved in this process; and (4) the combination of these three (intervention in the problem situation) as a whole with emergent properties".

The creativity of SSM

In this paper, we are particularly concerned with SSM's creative and innovative characteristics, such as in Checkland and Holwell's (1998:164) claim that SSM can be used as "a sense-making device" and that the methodology itself is inherently creative and flexible. They relate that SSM's principles allow for (ibid:171) "room for creative, innovative use of those principles, use which is specific to a particular situation, particular participants and particular users of the methodology".

SSM's allows for the suggestion of new ideas and changing perceptions (Attwater 1999); enables individuals to be more open to new ideas (Clarke, 2000); and when a process is consciously structured by the use of SSM, it is "more capable of generating insights and producing commitments" (Checkland, 2000b:823).

One of the most creative elements in SSM is the use of rich pictures, which Checkland (2000a) states "are a better medium than linear prose for expressing relationships" and that "pictures can be taken in as a whole and help to encourage holistic rather than reductionist thinking about a situation". He also sees them as "invaluable as an item which can be tabled as the starting point of exploratory discussion with people in a problem situation" (ibid). In one study, the use of rich pictures in an SSM intervention "surfaced some important (and, hithertofore, unarticulated) issues" (Luckett et al, 2001:539). This latter statement is certainly true of the first author's own experience in the use of SSM over several years, both as a participant and facilitator. In our opinion, the building of conceptual models is the other highly creative element of SSM.

Learning and thinking aspects of SSM

SSM's ability to facilitate learning is an important aspect of its usefulness in generating creative ideas. Jackson (2000) states that SSM's cyclic learning process "articulates natural processes of management that occur in organizations" which allows propositions for alternative action and changes to happen. SSM is seen as "a framework which can be used to guide learning" by Davies and Ledington (1991:6).

This purpose of guiding learning has an important place in relation to enabling SSM to work in a practical way. The methodology can open thinking 'doors', enable systemic understanding to occur, and thus help to work out solutions that take into account the whole system incorporating the complex sociological, cultural and political factors that might influence any solutions proposed. In relation to this, Checkland and Scholes (1990:284) state that "…SSM was always perceived as an organised use of systems ideas in a methodology for learning one's way to purposeful action to improve a problem situation".

SSM's ability to facilitate learning is enhanced by its flexibility, as highlighted by Kane and Del Mistro (2003:121) who state that "SSM is a flexible tool which can be used to generate individual knowledge and understanding" and by Taylor and DaCosta (1999) who state that in the process of SSM "as models are constructed, the direction of learning is changed and further questions are prompted about the problematical situation".

SSM is "more flexible in that it can be used as a general guide to thinking" according to Sinn (1998:449), who sees that it can be "incorporated into other systems methods as a tool for exploring…".

To generate creative output in a group, creative thinking may need to be facilitated, and SSM "provides 'thinking tools' to assist in the exploration and interpretation of the complex human or socio-political situations…" according to Kane and Del Mistro (2003:120). Poulter, 2000:815 sees that for him, "the greatest achievement in the development of SSM is its articulation of a *natural* systemic thinking process", which he sees as adding rigour to participants "mental processes and the ability to explain to others what they are doing" (ibid p813).

Fuenmayor (2000:765) talks about SSM as providing a "*space for thinking*—thinking about a plurality of interpretations impinging in a problematic situation". The methodology, then, allows room for creative thinking and Fuenmayor (2000:767) goes on to say "In this order of ideas, one could think that, at a higher level, Checkland's soft systems thinking is a more sophisticated type of instrumental thinking".

Alternative techniques in facilitating creativity

There are a several techniques which are proposed in the creativity literature that enable groups to bring about creative outputs. The effectiveness of these techniques may then be compared to SSM. The technique most common and in widespread use is called "brainstorming", which was originated by Alex Osborn in 1938 as a method for improving group problem-solving. Osborn (1963) believes that brainstorming is most useful for idea-finding. Amabile (1983:190) states that brainstorming "does generally result in a larger number of ideas than do procedures that

admit judgment during idea-generation". However, she also claims that "the quality of ideas does not show noticeable improvement".

Synectics is a creativity-stimulation program developed by William Gordon in 1944 (Gordon, 1961). Synectics, like brainstorming, uses deferment of judgment during idea generation. In synectics sessions, however, there is generally more use of emotion to generate ideas, and there is greater external direction of ideas. The use of various types of analogy is a key part of the process.

Creative Problem Solving is a training program developed by Sidney Parnes (1967). The program comprises both individual and group techniques, including brainstorming and the use of checklists for generating new ideas from old ones. Over several sessions, participants in the program are taught to follow six stages of problem-solving: mess finding, data finding, problem finding, idea finding, solution finding, and acceptance finding. This technique is probably the closest to SSM Mode 1 in its format, but of course does not include any specific techniques for application to problems relating to specified systems.

Rose and Lin (1984) conducted a meta-analysis of nearly 100 studies of major long-term creativity training programs and found that the Creative Problem Solving program accounted for a higher percentage in total creativity scores (approximately 40%) than did the other programs (which varied from approximately 11% to 28%). Amabile (1996:258) reports that other studies on creativity training have found that "brainstorming can be effective in increasing idea generation under some circumstances" and that Synectics training may be effective "only in a favorable social climate and only in the case of a well-defined problem". Amabile adds that "most of the creativity-training programs rely primarily on cognitive mechanisms such as learning to take new perspectives on problems" (pp258-9).

Sutton and Hargadon (1996) have found that people in face-to-face brainstorming meetings are less efficient at generating ideas than working alone, but the brainstorming technique could also be highly effective because of efficiency in idea generation. Guastello (2002:181) raises the issue that in real-time brainstorming groups "some participants have difficulty getting a word in edgewise, particularly if the flow of ideas is heading in another direction". Also, Paulus et al (1995) found that nominal groups generated more ideas than did interacting groups when using brainstorming in a team-oriented organization. Craig and Kelly (1999) state that "the simple additive nature of brainstorming tasks does not allow for the potential benefits of synergy and coordination of action that can occur in groups".

Sternberg and Lubart (1999:5) are more critical as they state that "these approaches lack any basis in serious psychological theory, as well as serious empirical attempts to validate them" although they acknowledge that the "techniques can work in the absence of psychological theory or validation" (ibid, p6).

According to McFadzean (2002), creativity techniques can be divided into three categories, which are: paradigm preserving techniques; paradigm stretching techniques; and paradigm breaking techniques. She states that brainstorming is a paradigm preserving technique as it "encourages participants to build on other people's ideas". The consequence of this is that "ideas

are developed but not significantly changed" and the paradigm boundaries are maintained. However, she includes *rich pictures* in the paradigm breaking techniques, as it "uses unrelated stimuli and forced association to encourage creativity". These techniques, she claims, also "help participants to use all their senses and to express themselves using other modes of communication such as drawing, dreaming and role-playing". However, one drawback of this type of technique, is that "participants can feel uncomfortable and unsafe using these methods".

McFadzean (2002) claims that participants may "feel uncomfortable with this [rich pictures], claiming that they cannot draw, or that they are unable to see the value of undertaking this exercise". Another common complaint by managers, she states, is that they are "attending the session to work not to play". Therefore, McFadzean concludes that "paradigm breaking techniques should only be used if trust has been developed between the participants themselves and the participants and the facilitator". These techniques, therefore, she claims, should only be undertaken by groups where attention is given to team feelings and the facilitator supports the participants regarding their emotions, identity and self-awareness.

Facilitation of groups is a significant issue in enabling creativity. It is a type of intervention itself. Schwarz (1994:4) sees group facilitation as:

> "a process in which a person who is acceptable to all members of the group, substantively neutral, and has no decision-making authority intervenes to help a group improve the way it identifies and solves problems and makes decisions, in order to increase the group's effectiveness".

The Problem Context

The Performance Team of a large Australian Public Service agency had been set the taks by senior management at the agency in redesigning the agency's performance system. A project team had been set up, who were conducting research and consulting with stakeholders. However, the team members were looking for a methodology and a suitable practitioner who could facilitate design workshops for them.

The first author's education of HR graduates in systems thinking techniques was a catalyst for the selection of SSM as a suitable methodology for the redesign of the system. One of these graduates was a member of the agency's performance system re-design project, and approached the first author about using SSM as a suitable methodology for developing new ideas, involving clients and designing new features of the system.

The first author subsequently presented the agency's Performance team, and the major stakeholder, the Director of Performance, with an outline of SSM, a statement of its benefits, and a copy of the paper Molineux and Haslett (2001) which outlined the use of SSM in re-designing the employment system in the same agency.

The corporate Performance team coordinated the performance system within the agency with members of a cross-business line reference group. The use of SSM for the workshops was agreed to by the performance team first, and then the reference group. The author explained the process to the reference group, and distributed outlines of the process and SSM approach.

Dates for four two-day workshops were set for November 2002. The performance team sent out an open invitation through the reference group and other key stakeholders to nominate to attend or invite other interested staff members to attend one of the workshops. Over 60 people volunteered to attend a workshop, which included representatives from each of the agency's 17 business lines. Participants included members of the reference group, the performance team, and managers and staff members from various line areas.

Workshop Design and Outcomes

The design consisted of a two-day workshop, based around an SSM Mode 1 design (slightly modified), with the addition of an analysis from SSM Mode 2 of systemic viability, cultural feasibility, and political acceptability; and a self-evaluation adapted from Checkland and Tsouvalis (1997).

Flood (1999:58) states that Mode 2 SSM is "a conceptual framework to be incorporated in everyday thinking". The reason for its incorporation in this process is the relevance of social system analysis to interventions in human activity systems. Many organisational interventions seem to forget that there is a culture in existence in the organisation and it has significant impact and influence on the behaviour of individuals. As a part of the culture, political influences within an organisation need to be considered. Checkland and Scholes (1990:50) discuss this with the comment that: "any human situation will have a political dimension, and needs to explore it."

The introduction of the workshops included a brief explanation of systemic thinking, an outline of the SSM process to be used, and an outline of the purpose of the project. A statement of encouragement to be creative was relayed from the CEO of the agency, so that participants would not feel constrained by existing organisational processes.

Participants were asked to complete an evaluation form at the end of the SSM workshops. The evaluation form contained both open-ended questions and Likert-type scale questions. Completion of the forms was entirely voluntary. Over 90% of participants completed the evaluation forms. Results from the Likert-scale questions are shown in Table 1. Nearly all (97.1%) participants thought the use of SSM in the workshop was either good or excellent. There was a similar high rating (97.1% either excellent or good) for the delivery of the workshops. Participants also thought they were fully involved (56.3%) or mostly involved (35.4%) in the process and the workshop also largely met their expectations.

The results show an improvement in the results from a previous set of workshops run in the same agency by the author, but for a different set of clients. These results were reported in Molineux and Haslett (2001). Specifically, both the use of SSM and the delivery of the workshop had improved from 87.1% of participants rating SSM good or excellent to 97.1%. Particularly pleasing for the facilitator, was that the "excellent" delivery rating had increased from 48.4% to 62.5%. These results may confirm Checkland and Holwell (1998)'s opinion that experience of a facilitator in using SSM improves its flexibility and performance as a methodology.

%	Excellent	Good	Satisfactory	Borderline	Poor
Opinion on the use of SSM	50.0	47.9	2.1		
Delivery of workshop	62.5	35.4	2.1		
%	Fully	Mostly	Partly	Not well	Did not
Level of involvement	56.3	35.4	8.3		
Met own expectations	50.0	47.8	2.2		

Table 1: Ratings by participants of SSM workshops

The client team were amazed (personal communication) at the enormous creativity of the workshops, with 11 sub-systems created or redesigned and 73 significant changes suggested.

It was this high level of creativity that led the first author to consider that SSM was a significant tool in generating creative solutions, and probably would be able to achieve this in a range of situations and contexts.

In looking at responses to an open-ended question from the workshop evaluation, which asked participants to state the key messages they took away from the workshop, a number of participants discussed the creativity seen in the workshops. For example, one commented "The methodology drew out creativity" and another commented "Innovation; creation; make it happen". Answers to a question which asked participants on the benefits of using a systemic approach (i.e. SSM) also drew on the creative theme, for example, one commented "creating a change in the system for viability". Others stated "It is structured but encourages free and creative thinking"; "Encouraged 'out there' ideas"; and "Encourages creative / innovative ideas".

The ideas and designs from the workshops were presented to a further three-day workshop of the Performance Reference Group in December 2002, which were then evaluated for implementation and categorised as to their probable time-scales. Volunteers from different business lines were called for in January 2003 to trial many of the proposed changes, and a paper was later completed in May 2003 to seek approval from the agency's executive group of the major system changes suggested.

The status as at September 2003 is that many of the ideas related to the short-term have been implemented or are undergoing trial. Other longer-term ideas are awaiting for approval or are consequentially related to those undergoing trial.

SSM is a vehicle for group creativity

SSM, we believe, is a highly suitable vehicle to bring about group creativity, given appropriate context and circumstances. The authors believe that is a better methodology than those used in

common creative practice: brainstorming; synectics; and creative problem solving. It is especially more useful in complex problem solving situations, and in contexts where a 'system' is the major focus of concern. It is especially ideal for situations in systems design. It has also been frequently used in conjunction with other methodologies, thus enhancing its flexibility and usefulness, according to (Mingers, 2000).

The reasons for these opinions favouring SSM as a creative tool are, in part, based on the experience generated from the workshops mentioned in this paper. They are also based on a comparison of the literature surrounding both SSM and creativity.

In reference to other techniques, *synectics* is considered more appropriate for well-defined problems (Amabile 1996); brainstorming is a "simple additive" (Craig and Kelly, 1999) process and is not as suitable for solving complex system problems; which leaves creative problem solving (CPS) as an alternate to SSM. The major drawback in CPS is that it is not necessarily a systemic process, and may miss the complexity that SSM allows for. It also doesn't contain the highly creative mechanisms such as rich pictures and conceptual models, which may weaken its creativity output.

The output from the workshops can be compared to Taylor (1959)'s five forms of creativity, mentioned earlier in the paper. The most probable association is that to "innovative creativity", where improvements to systems have been generated. However, in our opinion, SSM workshops would be quite capable of generating any of the forms of creativity.

The context and process of the SSM workshops in this study closely matched the work conditions that enhance creativity, mentioned earlier in the paper. For example, the workshops encouraged freedom of exploration and play. Play is a fairly natural part of SSM, as noted by Clark (2000:804) who states that in experiencing SSM, individuals enjoy "rediscovering the fun of work". Checkland (2000b:822) also states that "for those taking part in the process, it should be a lively, playful experience; the participants should, in fact, feel it to be serious fun".

Many participants remarked on their "enjoyment" of the workshops. The facilitator noted the high degree of laughter and fun that participants were having, particularly in drawing rich pictures and in building conceptual models. As mentioned earlier, Firestein (1990) noted that groups that laughed and smiled more, performed better creatively. The rich picture aspect of SSM mode 1, particularly as it occurs early in the SSM process, set an enjoyable tone for the rest of the workshop.

Positive group mood is also correlated to creative performance (Fredrickson 2001). The mood created in the workshops was noted as being positive, and the methodology lends itself as a process "encouraging…the creation of accommodations between conflicting viewpoints" leading to 'action to improve' the situation" (Checkland, 2000b:822). In Clark (2000:804)'s view, "it allows people to be heard explicitly and encourages the reduction of fear and anger that can sometimes accompany the discussion of ideas" which "allows measured discussion that enables the reaching of accommodation or agreement". The SSM process, if facilitated properly, creates an environment that reduces conflict and enhances focus on the issue, accommodating various viewpoints.

A focus of SSM workshops is through working in teams or small groups. Leemhuis (2000:812) states that in SSM, "engaging in these processes encourages teambuilding and enhances team-

work, which is relevant for tackling real-world problematical situations". This emphasis on working in small teams is certainly aligned to the factors for group creativity, particularly that of interpersonal cohesiveness, which was found by Craig and Kelly (1999) to be a key condition.

The following conditions were also noted as factors in the workshops that may have positively enhanced the creative output (refer to the earlier sections on work context and group creativity):

(1) Diversity, or heterogeneity of group members – the group was quite diverse, with a range of personality types and work roles represented.
(2) Encouragement from organisational mechanisms – the workshops were a part of a larger process that would assess and implement changes.
(3) Sufficient time – the workshops had two full days to complete the task, and participants were freed from other work responsibilities.
(4) Encouragement from senior management – a statement of encouragement was given on behalf of the CEO to participants before the commencement of each workshop.
(5) A positive climate – the facilitator created a positive climate at the start of the workshop and continued this by providing encouragement and positive and constructive feedback during the sessions.
(6) A sense of challenge – the task itself was quite complex and difficult and presented a significant challenge for participants.

Intrinsic motivation is an important factor, and elements such as self choice bring about enhanced creativity (Dudek and Côté,1994). In this case, the workshop participants were volunteers, who all had some interest in the topic. Also, the workshops were informational (Deci and Ryan, 1985) about the context of the system, the methodology, and systemic thinking, which is another factor that is more likely to enable creativity (Amabile 1996).

Sternberg et al (1997) refer to the synthetic thinking ability which is essential in generating creative ideas and options. SSM is a naturally synthetic thinking process, and is designed in such a way as to enhance connections, to see wholes, and bring together disparate ideas.

In relation to Unsworth (2001)'s classification of creativity types, the SSM workshops clearly fitted into the "contributory" form of creativity, as the outputs were self-discovered, but the problem context was presented. However, it is our opinion that SSM could also be used in the other three of Unsworth's classifications, depending on the problem context.

It is important to have a safe environment for people to experiment. However, as McFadzean (2002) noted, participants may feel uncomfortable in drawing pictures and 'playing' at work. Checkland (2000a) also notes that "producing such graphics is very natural for some people, very difficult for others" and suggests that "users need to develop skill in making 'rich pictures' in ways they are comfortable with, ways which are as natural as possible for them as individuals". In the design workshops, the facilitator encouraged small groups to select volunteers to do the drawing. In this case, others who were reluctant, or who felt uncomfortable, could still participate by suggesting ideas for drawings, without having to actually draw them. This actually defused the issue for these particular workshops, but we note that this technique would probably not work in a homogeneous group that consisted of non-creative personalities.

McFadzean (2002) claims drawing rich pictures is a paradigm breaking technique, and that only groups that the facilitator supports in their emotional context are able to do this effectively. This may be true, however, SSM allows a safe place for this exploration to happen, particularly if it is facilitated well.

For example, Callo and Packham (1999) state that "based on our experience [in SSM] we would argue that the role of facilitation and/or facilitator has an equal, if not more important part in ensuring genuine participation" and that "the personality of the researcher-facilitator will certainly have a strong bearing on how well participation can be achieved".

Much of the learning by participants in using SSM stems from the richness of the process when used by a skilled facilitator, which also seems to be claimed as necessary by Wang and Smith (1998:17), where they state that SSM is "very sophisticated and mature: it requires highly experienced analysts and is dependent on a high intellectual input."

However, SSM has a broad approach and can cope with many diverse situations, as indicated by Fielden and Jacques (1998:110):

> "With complex unstructured problems, there is no single analytical technique or approach that can solve these kinds of problem. A number of skills are required to understand such situations (analytical, application, creative, communication, social, self-analysis, model building). SSM offers an overall approach.

SSM has had wide success. For example, Mingers and Taylor (1992) and Ledington and Donaldson (1997) have both conducted surveys of OR and systems practitioners and have discovered that SSM is in wide use. In the first survey, over 90% of 300 respondents reported their success with SSM as reasonable, good, or very good. These users covered a wide range of occupations and organizations, and the application areas included organizational design, information systems, performance evaluation, education, and general problem solving.

Conclusion

There is little evidence of research into the relationship between SSM and the psychology of creativity.

In this paper, we have attempted to show that SSM is a methodology that is inherently creative. The SSM workshops conducted in a large Australian government agency delivered a large number of creative ideas. Many of these ideas have since been implemented or are undergoing trial.

A comparison with other creative techniques has shown that SSM has significant advantages over the others, particularly in complex problem and system contexts.

We would therefore recommend that SSM be used as a methodology for enhancing creativity in a variety of organisational contexts. It should be particularly relevant for enabling creative options when designing systems, processes and practices.

However, further empirical research should be conducted into the relationship between SSM and creativity, and the comparison with other techniques to enable our contentions to be confirmed.

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