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A systemic framework based on Soft OR approaches to support teamwork strategy: an aviation manufacturer Brazilian company case

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The paper reports on the application of a combination of Operational Research (OR) approaches to a real-world case of re-designing the strategy of a department management team, in an aircraft manufacturing organization in Brazil. We combine approaches from 'Soft' OR Problem Structuring Methods in a multi-methodological framework arguing that this helps to discuss, develop and implement a new departmental strategy. The proposed framework uses elements of Soft Systems Methodology; Strategic Options Development and Analysis to understand and structure the situation; Value-Focused Thinking to define the means and objectives; and Value-Focused Brainstorming to highlight the potential solutions. We conceptualize a four-phased systemic framework linking elements of the above four 'Soft' OR approaches and apply it to a real-world case in a department where a new team leader was appointed with the specific brief to improve the departmental strategy and its performance in general. Findings suggest that combining the approaches into a framework encourages trust and participation from stakeholders which, in practice, is translated into an improved strategy for the organization. A reflection on the multi-methodological approach is proposed. Conclusions and points for further research are suggested.

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1. Introduction

This article reports on a systemic intervention conducted in a strategy department of a Brazilian Aircraft Manufacturer. The aim was to assist a recently appointed leader in making a full assessment of the roles of the team with the view of re-designing the department strategy. The organization was founded at the end of the 1960s to develop, manufacture and support aircraft and other high-technology products. It is currently among the ten largest Brazilian exporters, employing about 20000 people. The strategy department boasts a seemingly well-structured work team which has worked reasonably well for about 20 years. On the surface, it was just a question of continuing the well-established work routines and no additional worries needed. However, this was not the view of the new leader appointed to head the department. This person had moved from another department in the same organization. They realized that there was an opportunity to introduce change and to unleash potential for growth, progress and an updated legacy for the division.

The paper proposes a systemic framework for a systemic intervention in which a combination of Soft OR/MS belonging to the Problem Structuring Method (PSM) suite was used to first, make sense of the situation; debate issues regarding the different views of stakeholders about to how to re-design the company strategy; and finally, how to implement and to monitor it. We report on the application of the systemic framework to structure a complex situation: one from the field of 'Soft' Operational Research: Strategic Options Development and Analysis (SODA); and a methodology from the field of decision making, that is, Value-Focused Thinking (VFT). We seek to demonstrate the democratic participation of the work team as a fundamental source of information for full review and analysis and primarily to show that the use of Problem Structuring Methods (PSMs) is a valued way to address real management issues.

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Essentially, the paper proposes the use of Soft OR methods to enhance a complex organizational situation. We propose a systematic framework based on a combination of 'Soft' OR methodologies, in this case, to improve the management change process after a new departmental manager was appointed and, a substantial change in the strategy design was expected. Two well-known UK-originated PSMs (SSM and cognitive mapping) are used in combination with two intervention facilitators' techniques. Value-Focused Thinking and Value-Focused Brainstorming were used to tease out the complexities of this new situation and to design, implement and monitor a new strategy.

To those in the OR/MS community interested in multi-methodological practice and the application of a combination of systemic methodologies, the main contribution of this paper is that it advances a general framework for intervention in complex and problematical situations. The framework, with clear steps to follow, not only helps the analysts (i.e. decision makers) to make sense of the problematical situation but also to model the real case of strategy design.

The structure in this paper is as follows: it includes five sections beyond this Introduction. First, we start in Section 2, and we conduct a literature review in which the main PSMs used in the construction of the framework are outlined; the main features of: Soft Systems Methodology; Strategic Options Development Analysis; Value-Focused Thinking and Value-Focused Brainstorming are sketched. In Section 3, using a Rich Picture (an SSM device), we describe the problematic context. We follow with Section 4, where we describe our proposed model and how the combination of these four approaches has been applied to the case of re-designing a teamwork strategy. In Section 5, we report on the main findings of the application, outlining the practical results obtained. Finally, in Section 6, we offer our conclusions together with limitations of the application and provide guidelines for future research.

2. Literature review: systemic approaches to tackle complexity

In this section, we review the four main Soft OR methodologies that will configure the proposed framework. We outline in turn cognitive mapping/SODA; Value-Focused Thinking; SSM; and Value-Focussed Brainstorming. In particular, we consider some applications of these methods that are similar to our case. We conclude this section with a discussion on the OR Multi-Methodology practice and argue that the proposed framework (which combines the above Soft OR methods) is an appropriate contribution to Multi-Methodology practice in Operational Research.

2.1. Soft Systems Methodology (SSM)

Peter Checkland's Soft Systems Methodology (SSM) is one of the most developed Systems Methodologies in terms of its theoretical premises and philosophical underpinnings, Checkland (1981, 1999, 2000). It is also one of the most widely used in the UK and in other parts of the world, see Mingers and Taylor (1992), Ledington and Donaldson (1997), Macadam and Packham (1989), Macadam *et al* (1990), Brocklesby (1995) among others. During the 1970s, Checkland and his colleagues at Lancaster University questioned the use of hard systems thinking to real-world situations. Based on real-world action research, they crafted a new methodology that shifted the systemicity from the real world to the process of enquiry itself.

Essentially, SSM articulates a learning process which takes the form of an enquiry process in situations where people are concerned. This process leads to action in a never ending learning cycle: once the action is taken, a new situation with new characteristics arises and the learning process starts again. The original methodology layout is summarized in Figure. 1. This approach to SSM is in general the best known, and although Checkland has presented a more flexible way of applying his ideas, in Checkland and Scholes (1990) and Checkland and Poulter (2006a, b), the 7-stage methodology is still an easy way to start using SSM.

The basic structure of SSM rests on the idea, that in order to tackle real-world situations, the 'real world' should be separated from the 'systems thinking world'. This distinction is crucial for SSM because it assures that we will not see systems 'out there'; that is in the real world. SSM urges us to consider 'systems' as abstract concepts (preferably, the word 'holons' should be used) which, when used against the real world, can eventually help to bring some improvements to the situation concerned.

SSM follows an interpretive perspective. This can be summarized as follows: according to Checkland, the real-life world is an ever-changing flux of events and ideas and 'managing' means reacting to that flux. We perceive and evaluate, take action(s) which itself becomes part of this flux, which lead to next perceptions and evaluations and to more actions and so on. It follows that SSM assumes that different actors of the situation will evaluate and perceive this flux differently, creating issues that the manager must cope with. Here, SSM offers managers systems ideas as a helpful tool to tackle problematic situations arising from any issues at hand. From this perspective, the world outside seems highly interconnected forming wholes; therefore, it seems that the concept 'system' can help us to cope with the intertwined reality we perceive.

Over the past 30 years, the seven steps of SSM have been adjusted into two modes, 'Mode 1' and 'Mode 2', of the methodology. SSM consists of these four main elements: 'find out about the situation', 'design of purposeful activity models', 'ideas for change' and 'take action to improve'. In constructing the systemic framework, we have borrowed elements of SSM' steps 1 and 2 from the first SSM phase: 'find out about the situation' and specifically, the SSM Rich Picture (which is the first attempt to structure a problematic situation).

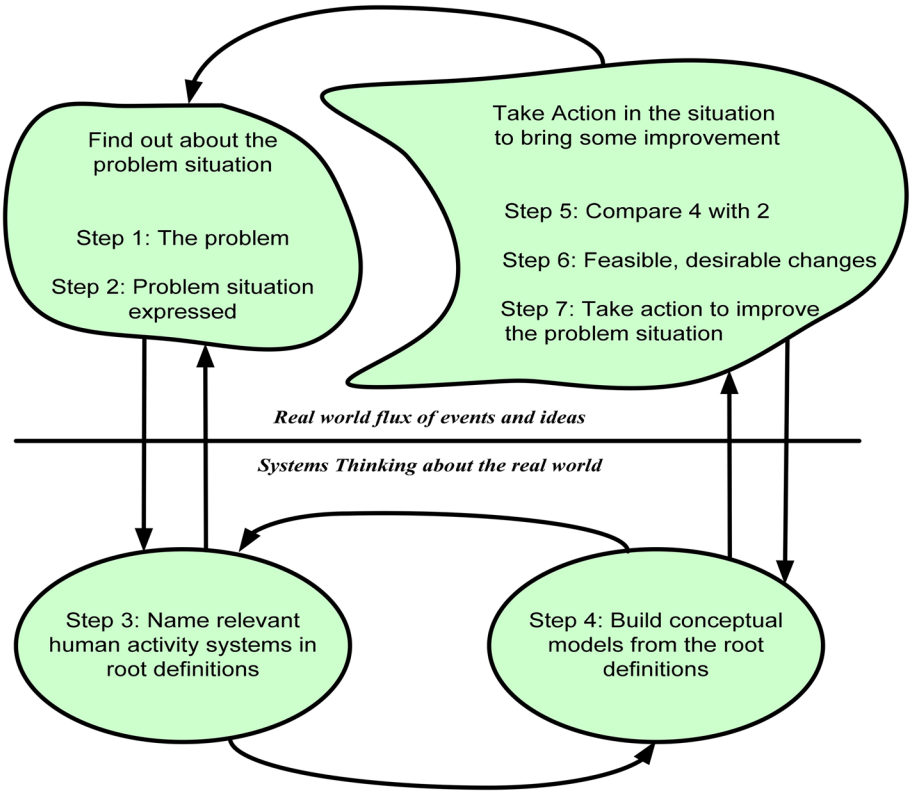

Figure. 1 The basic structure of Soft Systems Methodology—SSM. Adapted from (Checkland 1981, p. 163).

2.2. Cognitive mapping and Strategic Options Development Analysis (SODA)

Cognitive mapping is a modelling technique developed by Eden *et al* (1983). It has been incorporated as an integral part of SODA methodology which uses interviews and cognitive mapping techniques to capture individual views of an issue. It helps as a modelling device for eliciting and recording an individual's point of view, in relation to the problematic situation. This is depicted in the form of a map which is derived from interviews constructed through the aggregation of individual cognitive maps. This is then used to facilitate negotiation about value/goal systems, key strategic issues and option strategies or difficult issues. It establishes a mutual understanding of each individual and their subjective world, thus, making sense of discourse (Eden, 2004). The final result is a hierarchical structure, a joint map, in the form of a means-ends graph with a goal-type statement at the top of the hierarchy, where attention is paid to the affective, political, and process dynamics in the group (Mingers and Rosenhead, 2004; Eden, 1990, 2004).

SODA is a well-established and valid approach for structuring messy problems (Eden *et al*, 1983; Ackermann *et al*, 1992). SODA involves a social process where dialogue, reflection and knowledge-sharing among participants are encouraged, to support the identification of the problem and forthcoming agreement on actions (Shaw *et al*, 2004).

Together with SSM, SODA has been widely used in the UK and other countries, in various settings but primarily with the aim to provide a management team with a model as a device to aid negotiation. Both methods share their interpretivist underpinning in the sense that they use individuality and subjectivity as the basis for problem structuring. In the process of forming the maps and defending them, SODA tends to generate increasingly rich models/representations of ideas through the complex chains of argument, and these are convenient for a wide analytical application (Montibeller and Belton, 2006). Practical examples where SODA has been applied include: a holistic understanding of railway development in Brazil (Georgiou, 2009), policy analysis for prison services (Eden and Ackermann, 2004) and towards a supermarket technology strategy development (Ormerod, 1995).

Georgiou (2009) reports a Brazilian case, where the central issue is the need for a holistic understanding of the railway development in the country. SODA mapping is used to group the perceived opinions of different experts in such industry. The main source of information came from a selection of published opinions and articles of a certain period of time from recognized authorities in this industry. Notably, the mapping documents provide an opportunity to reach unavailable either inaccessible actors.

The complexity of messy problems in a public sector is the setting for another SODA application in which Eden and

Ackermann (2004, 2006) counted on the use of the software 'Decision Explorer' as a support tool for an easily mapping. The context for such study was to explore potential policy options for the Prison Department of England and Wales. An earlier SODA implementation (dated 1989 and reported in Ormerod, 1995) shows similarities to this article with regard to the mix of several methods and the participative approach. The main goal is to develop an information system strategy for Sainsburys; a leading supermarket chain in the UK. In this paper, the modelling mapping facilities that SODA offers will be used to map stakeholder's perceptions of strategy.

2.3. Value-Focused Thinking (VFT)

VFT is a structured approach to address decision-making about opportunities and problems in creative ways. It connotes proactive thinking firstly, by focusing on values and secondly, by attention to the alternatives. Keeney defends values as more fundamental to deciding on situations than the alternatives, and each identified value can be represented as an objective (Morais *et al*, 2013; Mondadori *et al*, 2014). The reactive thinking (the opposite way) is referred to as the 'alternative-focused thinking' (AFT) (Keeney, 1992, 1996). Unfortunately, it is still the most commonly used method (Selart and Tvedt, 2011).

VFT is a valuable approach for problems with multi-objectives and multiple parts decision analysis. By structuring the objectives, it could be helpful for providing better understanding of a decision context (Morais *et al*, 2013; Almeida *et al*, 2014; Selart and Tvedt, 2011). VFT has been widely applied to various and diverse fields: (a) in safety performance of marine transportation (Merrick *et al*, 2005); (b) in prioritization of improvements in watersheds management in central Virginia (Merrick and Garcia, 2004); (c) in an electric utility in Canada (Keeney, 1992); and (d) in three environmental scenarios concerning the northeast of Brazil (water management, information technology strategic planning in a public energy company and in the disposal of plaster waste from building sites) (Morais *et al*, 2013). It has also been applied to study as to how cognitive factors impact the effectiveness of model-supported group decision-making among postgraduate student groups (Franco *et al*, 2016).

The main purpose of this paper's scenario is not to evaluate some existing alternatives but to create them. This is in order to identify potential breakthrough opportunities. For example, the benefits of the VFT include improving communication among people and groups. It is a transparent approach that often leads to hidden and unrecognized objectives (Morais *et al*, 2013, Merrick and Garcia, 2004) that are essential in a case study.

Overall, VFT has a positive effect on the quality of ideas, creativity and innovation (Selart and Tvedt, 2011). When facing such an important decision, this could impact the future and performance of the work group, the company and each individual career professional. It is definitely worthwhile to spend additional time on creating better alternatives besides the existing ones. Above all, the quality of contending alternatives is more important than the quantity of them (Keeney, 1996, 2012).

The VFT process includes not only the identification of objectives but also the development of an 'objectives map' that will distinguish 'means' from 'fundamental' objectives. This is assessed via cause-and-effect relations relevant for the decision context (Franco *et al*, 2016). Usually, the generation of alternatives for a decision brings to each individual memory the past experiences in similar situations. Such an objectives map could be very useful guidance for a more productive process. In other words, we would start the process by specifying the objectives to be achieved and, then use these, in turn, to drive the search for alternatives (Keeney, 1992). We will rely on the power of VFT to organize the stakeholders' perceptions of strategic paths available to the company.

2.4. Value-Focused Brainstorming (VFB)

Value-Focused Brainstorming (VFB) is a group creativity technique introduced by Osborn (1953). Although it has its own characteristics, its conception is underpinned by VFT principles. VFB aims to deal with the creation of alternatives for complex decisions. It seeks to enhance the quality and innovativeness of the created alternatives, and to do that, value-focused brainstorming incorporates two features of Value-Focused Thinking into the traditional brainstorming procedures. Keeney asserts: 'First, it explicitly identifies the valued aspects of potential alternatives, specified as distinct objectives, to guide brainstormers to create alternatives of greater value. Second, all participants in a brainstorm individually create alternatives prior to any anchoring on group discussions, which will enhance getting the full range of each individual's thoughts articulated'. (Keeney, 2012).

The second feature refers to the individuals' creation of alternatives prior to any group interaction. According to Keeney, there are two reasons for this: once alone, the individual is not distracted or immediately affected by the ideas of others. Additionally, it is easy to recognize every individual contribution (Keeney, 1992, 2012). As such, this is good opportunity for persons to have their viewpoints fully expressed (Phillips and Phillips, 1993).

It is worth noting that all of this contributes to building an inclusive process, as neither the shy personality nor the expansive personality would escape participation in the exercise. Moreover, brainstorming is a simple, open, affordable, participative and limitless way to generate ideas. As a well-known, easy-to-use tool, there are elements which are suitable for group work, without any previous training. The process also promotes the discussion of individual ideas within the working group. This opens up a rich negotiation and convergent phase, when the group will seek to define a

common reality towards a proposed action plan (Morton *et al*, 2007).

Thus, the group has the power to enhance the capability of individuals, and to bring about a result that is (in some sense) better than what could have been achieved by any one individual (Phillips and Phillips, 1993). All participants have opportunities to express their views and, differences of opinion can be used by the group in constructive ways, to generate new perspectives (Phillips and Phillips, 1993). The solutions presented in this article are only a collective summary of the agreed alternatives. In this case, the group discussion would have already accommodated sieving through ideas and collaboration on better alternatives (Keeney, 2012), with a shared understanding of each issue (Phillips and Phillips, 1993). Features of VFB will be drawn in the systemic framework we proposed in this paper, helping us to assess a range of potential feasible alternatives.

2.5. *Soft OR/Problem Structuring Methods and Multi-Methodology Practice in Operational Research*

During the 1990s, there was a great debate in the Systems and OR communities concerning the use of more than one methodology (combinations of them or parts of them) when intervening in complex situations. The general term of Multi-Methodology, Mingers and Brocklesby (1997) Mingers (1997a), Paucar-Caceres and Rodriguez-Ulloa (2007) has been coined to group systemic practices that combine and link various methodologies or some stages of two or more methodologies. Mingers (1997a, 1999) takes the view that any intervention should gain benefits from being approached with a variety of management science methodologies (in what he calls 'strong pluralism'), arguing that agent(s)/person(s) intervening in the situation would benefit, if the intervention is tackled using a 'blend of methodologies'.

In Mingers' view, the following arguments favour an application of a multiplicity of methodologies: (1) any situation is in itself so complex that no single methodology can claim to be able to tackle it completely. Rather, we should pay attention to three aspects involved in any intervention: material, social and personal. Some methodologies will bring more enlightenment to some of the three aspects than others. Additionally, an intervention is not a discrete event but continuous and therefore, some methodologies are more suitable to certain phases of the intervention. We should not disregard the possibility of combining methodological stages, methods or tools from different methodologies serving to different paradigms.

Finally, there are practical reasons in favour of Multi-Paradigm Multi-Methodology and many systems practitioners are utilizing these approaches. Mingers provides numerous examples supporting his claim and uses five dimensions to characterize the different types of Multi-Methodology practice: (a) one/more methodologies; (b) single/multi-paradigm; (c) same or different intervention; (d) whole/part methodology; and (e) imperialist/mixed (Mingers, 1997b).

Munro and Mingers (2002) have conducted a survey of the actual use of Multi-Methodology. They report that the survey revealed information about which methodologies were used, as well as information about 'if' and 'how' they were combined. From the analysis, Munro and Mingers state that:

> "(…) although most users of multimethodology are based in a single paradigm, there is a small but significant movement within OR/MS that is both multi methodological and multiparadigmatic". (Munro and Mingers, 2002 pp. 374–375).

> "(…) that multidisciplinary is the norm within practitioners of multimethodology anyway", (Munro and Mingers, 2002 p. 371).

Furthermore, it was found that Multi-Methodology approaches consisting of two or three methods/methodologies were the most common. Finally, the survey indicates that SSM is the method most commonly used in combination with others:

> "SSM is distinctive in that it appears to be the predominant methodology used as part of a multi-methodology, in combination with other techniques. (…) A variety of exploratory techniques can be used to argument SSM, e.g. cognitive mapping, critical systems heuristics, statistical analysis and scenarios", Munro and Mingers (2002:374, 375).

Although the term 'soft', as introduced by Checkland (1981, 1999), was initially associated with his 'Soft Systems Methodology', it quickly came to be common currency within the Systems community, when other interpretative approaches emerged. The term then travelled to the OR camp and the label 'Soft OR' started to appear in OR literature, even though this was never fully accepted by OR practitioners and researchers. In 1989, Rosenhead published 'Rational Analysis for a Problematic World' and coined the term 'Problem Structuring Methods' (PSM) to group the increasing number of 'soft methodologies' used in Management Science/Operational (MS/OR) practice in the UK (Rosenhead, 1989). The book compiled the theoretical basis and applications of the key 'soft' approaches advanced by Checkland, Eden, Friend, Rosenhead and Bryant, among others.

According to Rosenhead (1989, 2006), 'Problem Structuring Methods' are a family of processes that aim to tackle and to provide analytical assistance to problematic situations that are characterized by: (a) multiple actors; (b) differing perspectives; (c) partially conflicting interests; (d) significant intangibles; and (e) perplexing uncertainties. A revised version of the book—'Rational Analysis for a Problematic World Revisited' (Rosenhead and Mingers, 2001)—updates current and adds new developments regarding the soft approaches, including Multi-Methodology (Mingers 1997a, b). As a result

of the two editions of this book, the use of 'soft methodologies', under the banner of Problem Structuring Methods (PSM), has now become widely accepted within OR, Systems communities in the US and UK.

Nowadays, the OR community has been accepting many terms for the way in which we deal with messy, unstructured and complex problems not directly handled by the traditional and quantitative OR techniques (the 'hard' OR). Terms such as *Soft OR* (adopted in this article), *Soft Systems*, *Problem Structuring Methods* (PSM) (Rosenhead and Mingers, 2001) and *Facilitated Structuring Methods* have been widely used (Paucar-Caceres, 2010; Kotiadis and Mingers, 2006). Additionally, Multi-Methodology is the term used for the combination of two or more methodologies for problem solving (using a part or the total of each approach). In the case of combining two Soft approaches, this can be considered relatively unproblematic if compared to the arrangement of Soft and Hard techniques. The real-world application reported in this paper demonstrates that Multi-Methodology can bring significant benefits to problem resolution (Kotiadis & Mingers, 2006).

3. A multi-methodological framework combining Soft OR: supporting teamwork strategy in an aviation manufacturer Brazilian company

The present article is a successful example of empirical evidence using a combination of SODA and SSM, two of the most well known with clearly European origins; and Value-Focused Brainstorming (VFB) and Value-Focused Thinking (VFT). The latter approaches have their roots in the USA. These four approaches are linked together in a four-phase systemic framework to tackle the complexity of a real-world case.

Figure 2 illustrates the systemic framework featuring the linkages among all the concepts used in this article. We proposed a model that joins the three methods reviewed in the previous sections in a sort of 'enrichment' when mixing elements from different methods (Ormerod, 1995). The methods are connected in such a manner that we structured the problematic situation, explored possible alternatives and aligned action to improve the situation. The entire process reported here lasted about one year—including interviews, data compilation, validation and presentation of the results. The process and the way it was used as a model are explained in the next section.

3.1. The context

As it was stated in the introduction, we report on the work conducted in a strategy department of a Brazilian Aircraft department. The organization was founded at the end of the 1960s to develop, manufacture and support aircraft and other high-technology products. It is currently among the ten largest Brazilian exporters, employing about 20000 people.

The new appointee soon realized that although promotion to leadership may mean recognition of professional competence, such privilege comes loaded with many challenges and responsibilities. Put simply, it meant having a group to manage while also being accountable to a boss. It also entailed communicating across the generational divide to persons with different perceptions of the situation.

The task of integrating these different views for the same purpose is a daunting prospect to any newly appointed leader. This is especially so, when trying to make the most of each staff member, to deliver satisfactory outputs and results for the company. The new leader of the department in question found herself immersed in a situation that we regarded as 'a problematic situation'. A situation in which there seems to be a number of problems that are intertwined. This scenario has been described by Ackoff (1981) as a 'mess'—a situation full of 'hard' complexity that is exacerbated by what it can be called 'soft' complexity mainly arising from the different perspectives and interests of the people involved.

3.2. The task ahead: re-designing team work strategy

The situation that the newly appointed faced was characterized by a host of problems. The depth and full scope were largely unknown. This is the reason why we refer to the situation as a 'mess' (Vidal, 2003; Ackoff, 1981). According to Vidal (2003), what we *do* know is that the problematic situation originated from the expectation of the newly promoted leader to formulate a fresh vision for the future of the group (and consequently, it arises from the business strategy itself). The point of departure in our discussions is to try to broach the situation by addressing the problem through some inter-related questions about the general situation:

- How do you get employees out of their 'comfort zone', preparing them for task-related learning and development?
- How do you position the team to face the uncertainties of volatile markets in the future?
- How do you make employees more productive?
- How do you make employees more satisfied?
- How do you envision and execute a fair and effective (collective and/or individual) professional growth path?

3.3. The process of making sense of the situation

We describe this problematic context by illustrating the messy situation using an SSM device: the 'Rich Picture'. This apparently simple device can facilitate the expression of many visual and connected subjective characteristics of the situation (such as feelings, conflicts and pre-judgements). Soft Systems

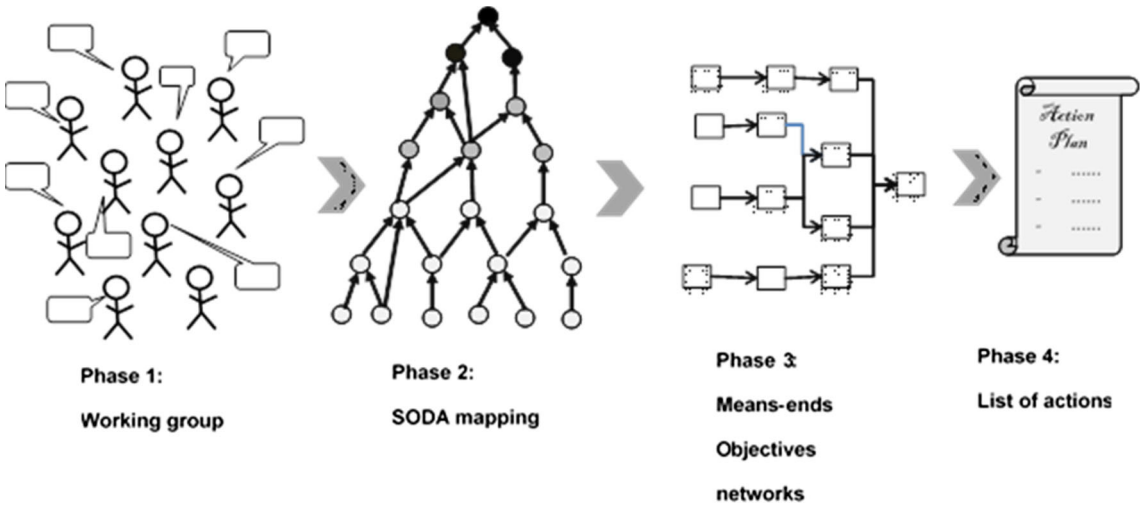

Figure. 2 Proposed Systemic Framework combining Soft OR/PSM methods.

Methodology (SSM) designed by Checkland (1981, 1999) states that a good way of capturing the complexity of a problematic situation is by using a Rich Picture, which is drawn freely, without preconceptions. This is further enriched by talking to the different stakeholders and people involved in the situation.

Apart from the fact that a picture is indeed worth a thousand words (Armson, 2011), this mechanism encourages the creativity of a team or of an individual (Open University, 2000). It is one of the most used SSM elements as a way of articulating preliminary vision, common issues and concern (Bell and Morse, 2010). Using no guidelines except a few rules, the power of a Rich Picture lies in giving voice to our own understanding of the situation and in provoking a debate (Open University, 2000).

An initial version describing the current problematic situation is depicted in the Rich Picture (Figure. 3). One of early features emerging from the Rich Picture was the lack of integration among employees. In reviewing the picture, each individual is 'isolated' in his/her own work desk. The office layout certainly contributes to this, with one person sitting behind the other, as in a classroom. Moreover, this is ordered according to length of service in the field and also affected by some hidden barriers (beyond the walls!) such as generational differences. In this case, the Personal Assistant can be regarded a 'human obstacle' who filters issues through to the boss (who is likely to be jostling a full agenda and workload).

A rather frustrating one-way communication is also observed in the Rich Picture. On the one hand, this attitude prevents quick decision-making and a continuous flow of work. On the other hand, empowerment is not assigned for any independent decision-making. We also see the usual individual worries related to professional (and personal) issues. While some are searching through challenges, others are worried about 'surviving' until retirement, thus creating barriers for their own further development. Naturally, this does not augur well for the company.

4. A four-phased systemic framework to support teamwork strategy

4.1. Structuring the situation, facilitating the process and Mapping the stakeholders' perceptions (phases 1 and 2)

4.1.1. Phase 1: structuring the situation As a first step, it was essential to define a working group. Their main role was to provide input information for the next phases. A working group, also called a 'Facilitated Work Group' (FWG) (Phillips and Phillips, 1993) and more recently referred to as a 'Problem Structuring Group' (PSG) (Bell and Morse, 2013), was appointed to deal with the problematic situation. This group is purposely oriented and focused upon the assessment and analysis of the messy situation and suggestion of an action plan to help address any perceived problems emerged out of the evaluation (Bell and Morse, 2013; Phillips and Phillips, 1993). Such plans may be subject to the approval by the decision makers.

As recommended in these situations, a facilitator (with some technical knowledge) supports the group in the problem solving process. This is in order to ensure that the process ends with effective alternatives (Vidal, 2006). The facilitator plays an important role in the problem structuring process: contributing to the discussion, effectively facilitating activity, managing the limits and boundaries and providing direction for the group (without inhibiting the creative exploration of the issues or interfering in the content). The facilitator should guarantee that the final results are completely owned by the group, excluding any of their own personal reflections (Shaw *et al*, 2004; Phillips and Phillips, 1993).

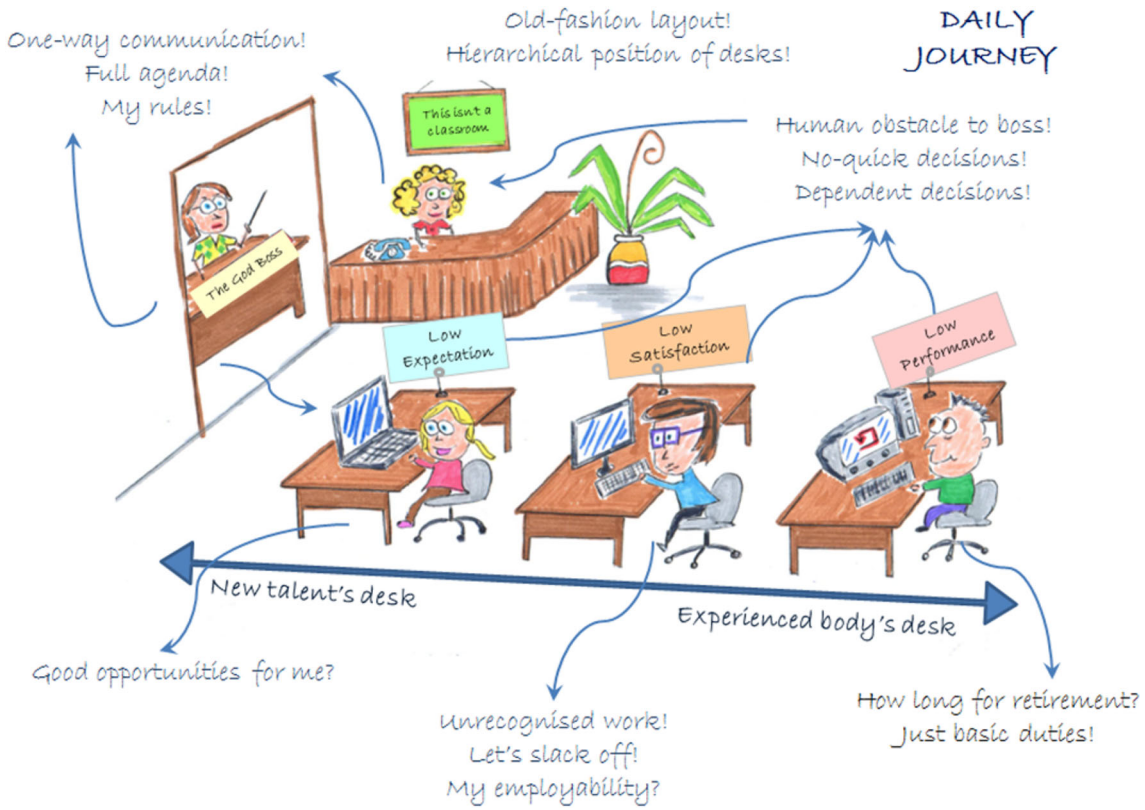

Figure. 3 Rich picture—reflecting a daily journey.

As the effective application of the soft methodologies depended on the experience and know-how of each person, the individuals' participation was essential for the success of this problem solving process (Vidal, 2006). However, not every employee or individual was interviewed. A representative sample is usually sufficient (Bardwick, 2008). This makes it possible to balance a creative work and respect the time schedule. Consequently, a consensus on the issues is achievable, while representing the major perspectives of the group (Phillips and Phillips, 1993).

The involvement of the working group in the decision process engages employees on the terms that are really important to them and to their company's success. This is a way of, interpreting the company's business mission, vis-a-vis its employees' values. Additionally, it is an opportunity for interaction across different management levels. Thus, vibrant employee input and finding solutions to business challenges are among the principles of the participative leadership approach which also improves the innovative behaviour of employees. It is central to all the processes discussed in this article (Bardwick, 2008; Timmerman, 2012).

4.1.2. Phase 2: mapping stakeholders' perceptions The use of Strategic Options Development and Analysis (SODA) is the second step of our proposed modelling. SODA, the selected methodology, entailed an essentially cognitive mapping approach (Georgiou, 2009) because the fundamental need was to understand the actual work environment. As there was not a single, unique problem, we sought to account on each individual's perception in an attempt to structure the problem situation. Before thinking through the possible alternatives, we took time to focus on defining values as paramount, when facing complex situations.

4.2. Organizing the stakeholders' perceptions and generating solutions to the problematic situation (phases 3 and 4)

4.2.1. Phase 3: organizing stakeholders' perceptions The third step is the application of Value-Focused Thinking (VFT), which was used to organize the problem structured into a hierarchical 'tree of means and ends' (objectives) (Keeney, 1992). Apart from being both participative methodologies, SODA and VFT share special commonalities in the use of a hierarchical structure to drive what is ultimately vital for a problem solution. As collective work is effectively more satisfactory than anything proposed by an individual working alone (Phillips and Phillips, 1993), the action group was designated to be interviewed for the cognitive mapping construction and to participate in a Value-Focused

Brainstorming (VFB) session. This was in order to generate alternative solutions to the problem.

4.2.2. Phase 4: generating possible solutions This is the fourth and last step of the process. In short, in this stage we will draw from two elements of Value-Focused Thinking (VFB) to add to the traditional brainstorming through (VFT): (1) the identification of values through distinct objectives and; (2) the execution of an individual brainstorming to create alternatives prior to any group discussion (Keeney, 2012).

The application of the multi-methodological approach also provided opportunity for participative leadership. In reality, this had quite a low-cost but high-impact factor in the creation of a differentiated, productive and creative working environment (Timmerman, 2012). Additionally, it was an occasion for achieving compromise solutions (for the not so uncommon conflict between organizations and individuals), thereby ensuring that any dilemmas could be transformed into win–win games (Phillips and Phillips, 1993).

5. Findings and analyses of results

In the previous section, we conceptualized and outlined the systemic framework. Through the process of presentations and workshops, the framework was adapted to group needs. Once the framework was understood and assimilated by the facilitators and stakeholders, the group felt confident to apply it to our case. In this section, we report on the main findings of the series of workshops carried out to accomplish each of the four phases of the framework depicted in Figure. 3.

5.1. Phase 1: forming and developing the working group

The first stage of the framework helped us to structure the situation and set out the working team which comprised ten persons. This group size may be considered 'small' (between 7 and 15 people), but it is a number in which individuality is maintained, yet real group processes emerge and exert considerable influence. Eye-to-eye contact is maintained, and this makes it difficult for any participant to be anonymous (Phillips and Phillips, 1993). The group was set to work and tackle the second phase.

When we started stage 2 of the framework, the above strategy suited our intervention, in particular because SODA workshops are designed for small groups (Eden and Ackermann, 2004). In this case, there were: one Director, one Senior Manager, six middle-level employees and two Trainees. The length of term for working in the field averaged 7 years (except for the Trainees who had from one to two-year background during their trainee program). Although three persons within the group stopped working in the project remit, they remained in the organization. Their participation was considered important enough as these persons could still bring different points of view and practices from the other departments of the company. In the next section, we discuss the findings

5.2. Phase 2: mapping stakeholders' perceptions

Each individual interview with each member of the work group dedicated to this methodology was initiated using a non-structured and open question: 'What should we do in order for this work team to successfully survive in the coming years?' We concluded with ten interviews and built each individual SODA map. Subsequently, upon reaching an agreement and consensus on the now structured problem, we aggregated all SODA maps into a singular SODA map. We present in Figure. 4 the aggregated SODA map.

In drafting this large and detailed SODA map, we employed a pattern of clusters. In Operational Research, the purpose of analysing in clusters is to identify the 'system of problems' that make up the 'issue' being addressed. Each cluster represents a relatively separable part of the issue which may also be addressed independently of other parts (Eden 2004).

Ten main clusters were identified. These were a good representation of the problems that the work team was facing and were noted (and shown in Figure. 5) as: appreciation, rewarding, succession, team work, performance, autonomy, work routines, work tools, CRM and layout.

We summarized in just one word/expression the name of each identified cluster. However, in order to make clear the sort of problems raised during the interviews, we detailed below the classification for each cluster:

(a) *Appreciation*: Lack of an employee recognition program, that is, for an individual or group achievement (even simply for a task well done). It is really necessary to make employees feel truly valued and appreciated. Moreover, each employee has a different perception in relation to job satisfaction. This means that the recognition should be individual and personal instead of generic.

(b) *Rewarding*: Lack of a clear and honest reward system (both intrinsic and extrinsic rewards). Effective rewards require leadership to know their employees in order to set meaningful, individual outcomes (e.g. through a reliable, personalized milestones plan). Appropriate reward is important as an incentive and also, for the aspiration and development of subordinate staff.

(c) *Succession*: Lack of a career plan for career development for new and current employees, young talents or experienced workers. This is closely linked with management succession issues: The leadership, senior managers and director, have been at the same job for a long period of time. It is strategic to have a well-prepared team to fill future job openings, replacements (due to any reason such as a promotion but especially retirement) or just ready for a work challenge. Developmental assignments are ways

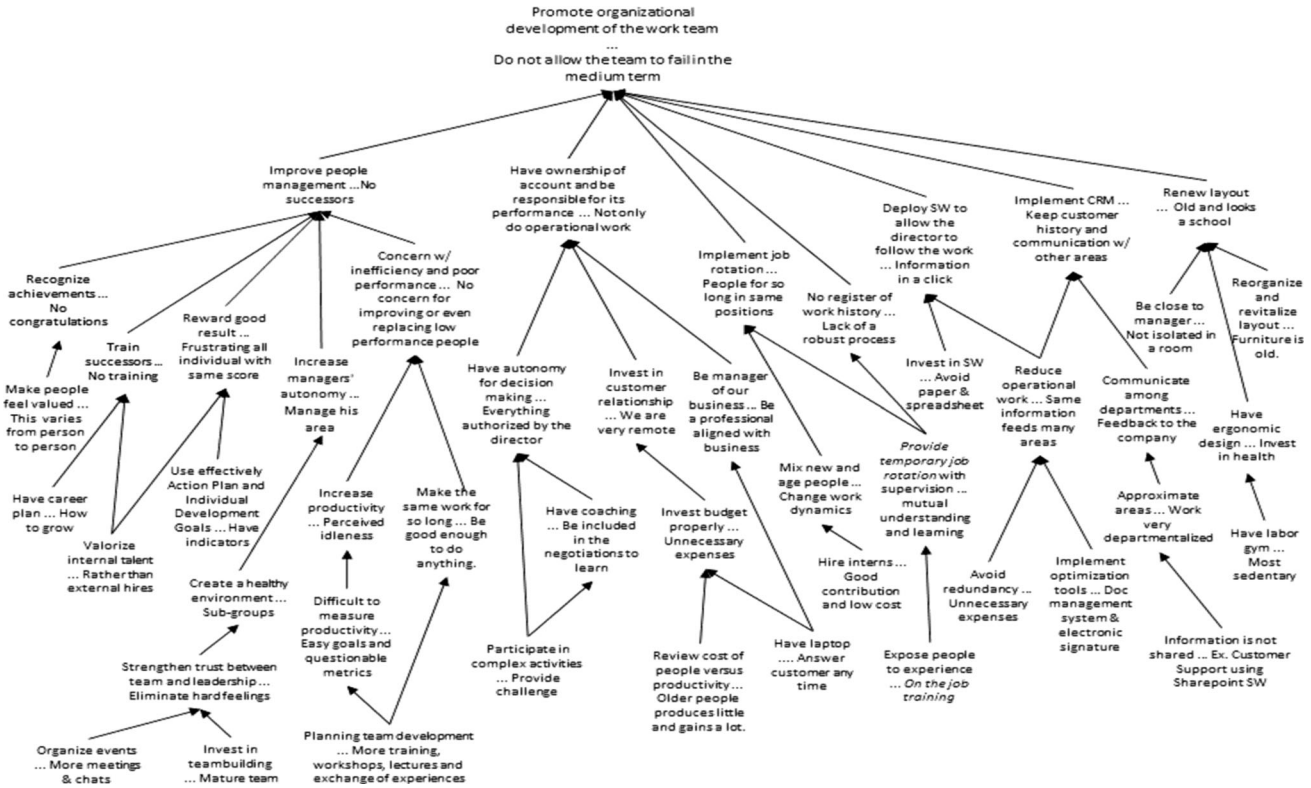

Figure. 4 SODA map of the stakeholders' perceptions.

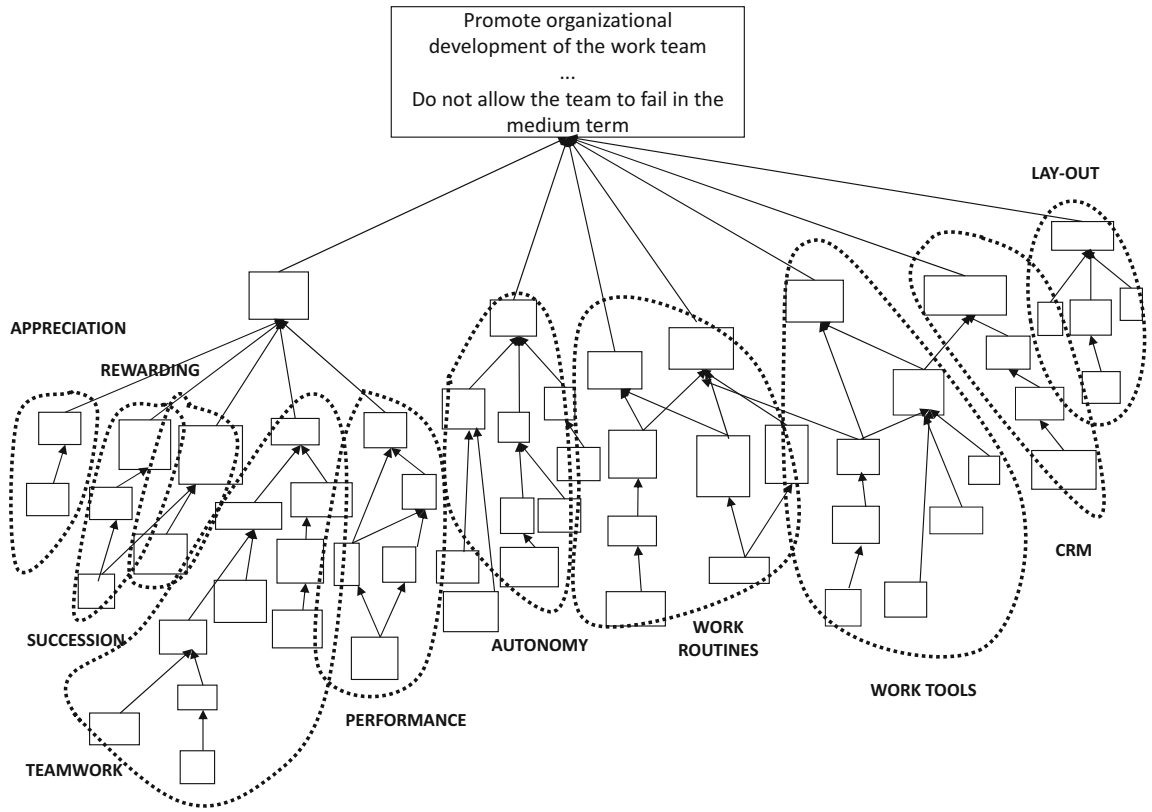

Figure. 5 SODA map of perceptions grouped in clusters.

to prepare an employee for a large role in the organization.

(d) *Teamwork*: Lack of a team building program. It is necessary to enhance and to strengthen the relationship of trust and ties between leadership and employees and among employees themselves. All team work should be collaborative. The environment should be harmonious. The long working hours allow frequent employee exchange, constant relationship and interaction with their colleagues and leadership. In most instances, this was greater than the time dedicated to their personal lives.

(e) *Performance*: Lack of concern with low-performing employees who should be either replaced or their work should be improved. Some employees have been doing the same job for many years, resulting in low productivity. This is currently difficult to measure due to meaningless and ill-defined goals (also affecting evaluation). The distribution of work should be also improved (workload re-engineering). Additionally, personnel development planning and retraining of employees should be considered.

(f) *Autonomy*: Lack of autonomy for employees (and for the Managers as well), regardless of their experience in the area. Each employee should be the responsible 'owner' of their work tasks. Experienced employees should be given autonomy for a certain level of decision-making. The young employees could be coached by experienced colleagues and/or allowed to take initiative in other complex and challenging work situations. More autonomy can help to generate more productivity. An autonomous work environment can create a workplace of trust. Such autonomy also refers to giving input regarding how the annual budget of the department will be allocated.

(g) *Work routines*: Lack of a robust system for sharing and passing on knowledge. The explicit knowledge is disseminated through many files in the network, sometimes even in personal filing. Leader and any employee should have this information in a 'click'. With regard to tacit knowledge (which is acquired by experience), it is necessary to have methods for encouraging team work, interconnection and knowledge exchange related to: job rotation, on the job training, coaching, shadowing, mentoring, communities of practice, and opportunities for task challenges and so on.

(h) *Work Tools*: Currently, some work tools (or the lack of them) prevent remote working, and it is not possible to respond to customers' demands quickly. In an increasingly fast-paced, online business world, this raises the question of being technologically out-of-date. It precludes high-standard practices and fostering relationships with customers or even other company departments. A second issue concerns an excess of paperwork generated and unnecessary task replication. Some investment is needed for acquiring efficient software, in order to make information readily available and reliable, anytime and anywhere.

(i) *Customer Relationship Management (CRM)*: Currently, other company departments have direct relationship with customers through use of CRM software. Despite the daily communication with customers, the department under investigation is still not part of this CRM system. It is therefore necessary to invest in acquiring the CRM software used by these other departments, in order to become a more robust part of the business flow.

(j) *Layout*: The existing work layout is old fashioned and reflects the hierarchical position of the work team. It veers employees away from the leadership (who are isolated in dedicated offices). It is important to refresh the existing physical layout (including furniture and considering ergonomic aspects). After all, this is the place where the team spends many hours of the day.

5.3. Phase 3: the means-ends objectives network for the work team

We used the perceptions of the work group as the base for the SODA mapping, in order to identify and to structure their values, through to the objectives. The objectives for a particular decision situation should come from those individuals who are interested in and knowledgeable about that situation. (Keeney, 1992). Figure 6 shows relationship across objectives, in a hierarchical organization of 'means and ends' objectives for the work team.

5.4. Phase 4: possible alternative solutions recommended towards improving the strategy and teamwork

The final outcome of the systemic intervention was used in a final discussion group in which a number of possible actions were suggested and debated. The portfolio of actions already expanded is summarized below; it contains a complete proposed list of alternative solutions, ready to be put into practice. The team agrees to implement them; a monitoring event was greed to be carried out after a year. The possible alternatives solutions towards improving the strategy and team work were:

(a) Give each member of the team the option of replacing their desktops by laptops, thus bringing the opportunity of agile working and greater mobility to the employee. This solution can be immediately implemented. It has no impact on cost, considering that the leasing prices for desktops and laptops are the same. However, there are implications for more responsibility, as a result of the company's equity (portable) being carried everywhere (customer office, home office, business travels) and an information security program would be needed.

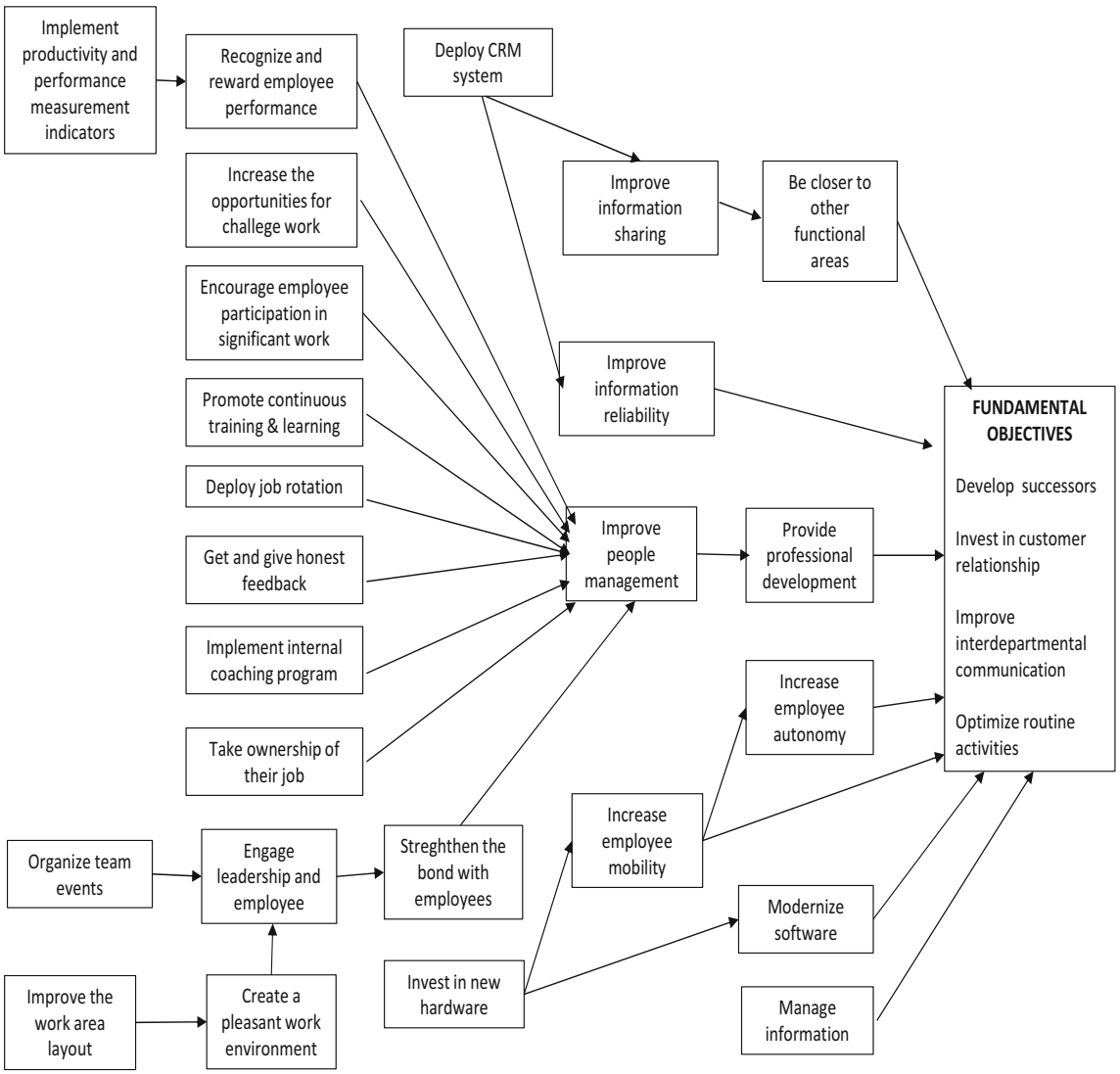

Figure. 6 Means-ends objectives network for the work team.

(b) Rearrangement of the workplace, in order to make it more modern and dynamic. This is one of the higher cost alternative solutions. However, when considering that it has been about 30 years with negligible investment in refurbishing, it is time for change. The proposal here is to reduce the number of work stations. As there are always employees in business travels, home office, meetings outside the office and even on holiday, this reduction would allow more space for team integration and meeting. Moreover, an assigned space dedicated to storing all paperwork is suggested.

(c) Improve relationship and integration with other departments of the company, becoming part of the Customer Relationship Management. In this case, investment should be made towards purchasing CRM software licenses. Additional work would be assigned to each employee, in order to keep the database updated. In the medium and long term, everyone would see the benefits of this solution such as: online information, up-to-date reporting, warnings for required actions and so on.

(d) Hire an IT intern to automate some routine and operational activities. It is a low cost investment that most departments should adopt (at least to contribute to the training of young students). If well used, the returns could be significant. For example, there could be a customized application, computerization of control spreadsheets and the benefit of having the information in a 'click'.

(e) Recognize and manage underperforming employees. It is essential to have a mature and honest conversation with such employees, outlining the facts and figures. Specific actions and challenging scenarios should be conducted, in order to help these employees to break out of their comfort zone and to engage more with others. Finally, it is necessary to assign greater responsibility to these employees with clear targets for results.

(f) Enrichment of the work for a better job satisfaction. We believe that in a mature team, employees should be able to engage in any activity and to achieve satisfactory results. Nowadays it is also a question of employability. However, the existing organizational culture (where each employee has been designated a certain job over a long term) should be broken and the leadership should promote a new environment of opportunities.

(g) Implement job rotation among the sub-groups or just specific activities. The leadership should consider any employee's ability to execute required work, at any time. This is particularly since tasks are mainly cross-functional (multidisciplinary), yet, not reliant on academic acumen.

(h) Adopt a more modern and flexible organization structure, allowing greater autonomy to the team. These modifications could be initially informal, keeping the same hierarchy, but with some allowance for independent decision-making, while under supervision. It is critical to first assess whether employees are really prepared for such a management style.

(i) Use the experience and expertise in internal coaching and mentoring programs. All employees should participate in this program as we believe that everyone has something to teach-including the intern. In order for this to be successful, there need to be allotted timeframes and employee workloads should be revised to accommodate these changes.

6. Conclusions and recommendations

The paper proposes the use of Soft OR methods to make sense and improve a complex organizational situation. We specify a systemic framework based on the combination of 'Soft' OR/PSM methodologies. The goal is to improve the management change process that has become apparent when a new departmental Manager has been appointed and a substantial change in the strategy design is expected.

Although the combination of SODA and VFT has been the focus of some recent articles (Almeida *et al*, 2014; Mondadori *et al*, 2014), in this paper we propose a systemic framework that explicitly combines elements of Soft OR methodologies. Two well-known UK-originated PSMs (SSM and cognitive mapping) are used in combination with two intervention facilitators techniques, Value-Focused Thinking and Value-Focused Brainstorming to tease out the complexities of this new situation and to design, implement and monitor a new strategy.

The final outcome of the systemic intervention using the proposed framework produced a comprehensive list of possible solutions to the issues related to strategy possibilities open to the company. These were the base for group discussion; the group then adopted and adapted by the group. Actions were open to a monitoring process after a year. By reporting on a real-world case, we have demonstrated the democratic participation of the work team as a fundamental source of information for full review and analysis; and primarily, to show that the use of Problem Structuring Methods (PSMs) is a valued way to address real management issues. The use of these complemented the need for a satisfactory solution in the problem assessment and structuring of this real-life case. Since these kinds of applications always involve multi-faceted situations, the findings seem to suggest that Multi-Methodology was essential to deal effectively with the complexity of the real world.

The framework has proven to be useful. Involving the particular work team in the decision-making process also helps to engage them in implementing any agreed solutions. It is a way for them to decipher and to highlight what is real important to the group and consequently, to the company's success (Timmerman, 2012). Although not the main focus of this work, the evaluation of the behaviour of actors across the methodology used can be a source of future studies, highlighting the growing number of publications in Behavioural Operations Research (BOR) in recent years (Franco and Hämäläinen, 2016; Franco *et al*, 2016; Hämäläinen *et al*, 2013).

A follow-up of the project took place one year after the whole process. Some of the actions, suggested by our intervention, that the organization implemented during the first year were: a more even distribution of workloads and assignments which prevented 'burn-out' of already hard-working employees was reported; strategic action also encouraged joint support for underperforming employees and periodical monitoring and progress reporting on related projects. Whether through spontaneous effort or not, this has resulted in behavioural change. The Manager is more open to engagement and dialogue, within a proactive atmosphere, and the subsequent annual job satisfaction survey showed better results.

We suggest that the organization repeats this exercise with deliberate frequency such as every two years. It would be prudent to have this interval slotted into the company's strategic plan. This would address the reality that while values are usually consistent, business objectives, priorities and the composition of work teams may change.

7. Limitations and future research

The systemic framework favoured a participative approach that mobilized latent skills, knowledge, judgements and wisdom that were already resident in the group members (Phillips and Phillips, 1993). Apart from being a way for solution customization, this stimulated deeper commitment and engagement within the team. However, there is no guarantee that *all* actions taken will definitely satisfy *all* individuals within the group. The framework suggested here as the base for a multi-methodological practice may be well

suited to the type of facilitators and characteristics of the company in terms of their open style, other organizational settings may not be conducive to the same results.

Furthermore, with access to the internet, other IT communication systems and the work team's growing capacity to implement problem structuring intervention, we believe that there might be an opportunity here for remote HR training. This would help to support group work and facilitate ongoing staff engagement. We believe this strategy would optimize time, assist by extending participation and breaking through any existing HR barriers (Morton *et al*, 2007). It would be prudent to anticipate challenges with such step changes (Shaw *et al*, 2004), but this could be the subject for a future research.

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