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Sustainability management: insights from the Viable System Model

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ABSTRACT

A review of current literature on sustainability standards reveals a significant gap between their adoption and the implementation of sustainability into every level of the organisation. In this paper, it is argued that in order to overcome this challenge, an appropriate model of an organisation is needed. The Viable System Model (VSM) is proposed as such a model and, in order to illustrate this argument, it is used to interpret the ISO 26000 standard on Social Responsibility (SR). First, the VSM theory is introduced and presented by modelling the hypothetical company Widget Co. Then, the clauses of ISO 26000 are mapped on the Widget Co. model, together with detailed descriptions and examples on the organisational and managerial implications of its adopting the standard's guidelines. The result is the identification of generic SR functions that need to be performed by the various organisational governance systems, as well as their dynamic interrelations, thus clarifying implementation issues. Moreover, by identifying different SR management layers, VSM is suggested as a way forward to develop an integration model for SR issues and respective sustainability tools. Finally, a discussion is given on the implications of using this approach to integrate sustainability standards and the way this research contributes to recent developments in sustainability research.

1. Introduction

In recent years, the emphasis on sustainable development has increasingly been placed on the individual organisation or company. Corporations are indeed capable of significant impacts on environmental, social and financial systems, often at a global scale. Following the Rio Conference (United Nations, 1997) and even before that (Asif et al., 2013) several efforts were made to help organisations be more sustainable, both at a theoretical and practical level. Concepts such as Corporate Sustainability (CS) or Corporate Social Responsibility (CSR), have been adopted by businesses worldwide (Montiel, 2008), and practices, such as Environmental Management (EM) and CS or CSR reporting, are widely implemented.

The relevant literature however, suggests that a significant gap exists between the adoption of a standard or tool and the implementation of sustainability practices into every level of the organisation, so as to become part of its daily operations and management (Asif et al., 2013). What is more, a multitude of approaches, theories, definitions, concepts and tools (Waage et al., 2005) has been developed, creating a confusing landscape for organisations wishing to implement more sustainable practices. Organisations are therefore facing a double challenge 1) integrating sustainability in their management and operations, 2) taking advantage of and effectively implementing available sustainability tools, such as life-cycle analysis.

This paper argues that in order to deal effectively with these challenges, they need to be considered in the context of an appropriate model of an organisation, capable of representing the key issues implicit in sustainability standards and related management functions. The authors have suggested elsewhere an interpretation of Beer's Viable System Model (VSM), as a comprehensive way of modelling organisations to deal effectively with the complexity involved with sustainability issues (Espinosa and Walker, 2011, 2013). This interpretation is also proposed here, as a framework to respond to the aforementioned challenges.

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For this purpose, the prominent sustainability standard ISO 26000 is interpreted using the authors' VSM Framework. The arguments are developed in the context of the hypothetical Widget Manufacturing Company, mapped using the VSM, which helps to clarify the whole argument. In the final sections a discussion is given on the implications, advantages and limitations of using this approach to integrate sustainability standards and the way this research contributes to recent developments in sustainability research.

2. Integrating sustainability

In terms of the first integration challenge presented above, Ranängen and Zobel (2014) provide a comprehensive review of the literature on the efforts to integrate CSR in the everyday management of an organisation. A common root for this integration is the **Plan-Do-Check-Act (PDCA)** cycle, which is the base of most Management Systems (MSs). There are various MSs, which focus on specific aspects of sustainability, such as ISO 14001 (ISO, 2004) for environmental management and OHSAS 18001 (OHSAS, 2007) for Health & Safety among others. Therefore, a number of integration frameworks expand the scope of one of these MSs to cover more sustainability aspects, while others attempt to integrate multiple MSs into one Integrated Management System (IMS) or Sustainability Management System (SMS) (Maas and Reniers, 2014; Ranängen and Zobel, 2014).

In terms of the second integration challenge, Finnveden and Moberg (2005) use three classification attributes for environmental assessment tools: a) the *types of impacts* considered (resources, wider environmental or economic), b) the *object of study* (e.g. policies, nations, organisations, products etc.), and c) whether the tools are *analytical* (technical) or *procedural* (focussing on connections and context). Hacking and Guthrie (2008) attempt to provide a basis for comparing the different sustainability assessment techniques found in the literature, by identifying the main features underlying them — rather than their often misleading labels. They employ three main properties for characterizing the assessment features: a) *Comprehensiveness*, b) *Integratedness*, and c) *Strategicness*.

The frameworks of Finnvenden and Moberg, and Hacking and Guthrie provide good understanding on how the various methods are differentiated; however, they do not provide an *operational* model that could help in their synergetic application. Towards this direction, Robèrt (2000) and Robèrt et al. (2002) introduced the **Framework for Strategic Sustainable Development** (**FSSD**), that attempts to operationally integrate the various sustainable development models and tools. The authors identify the principles of planning within any system, and then apply them in the context of sustainable development. Waage et al. (2005) and Waage (2007) further elaborated on the FSSD by incorporating more tools, criteria and actions on the models framework, and by focussing on their impact on the product design process. More recently Hallstedt et al. (2010) use the FSSD to assess the capability of decision making systems of an organisation in relation to sustainability.

Closer to the logic of this paper is the analysis of sustainability tools or initiatives by Lozano (2012), which is based on how they relate: a) to the *company system*, and b) to *sustainability dimensions*. The former is analysed in *primary* (core competencies) and *secondary* (support) *activities*, which is similar to the VSM distinction of operational and meta-systemic components presented next. Lozano's analysis concludes that most initiatives focus on the Operations & Processes, as well as the Management & Strategy elements of the organisation, while addressing the environment dimension of sustainability.

3. The Viable System Model

Stafford Beer, the inventor of the VSM, described it as a "holistic model involving the intricate interactions of five identifiable but not separate subsystems". The model was developed during the 1950s as a practical tool capable of dealing with issues of organisational structure. The VSM is firmly grounded in systems theory and is inspired by the way the brain co-ordinates the muscles and organs.

What emerges from Beer's work is a body of knowledge which describes the way that all viable systems work. Beer identified the **invariances** which apply universally, regardless of the size or nature of the viable system. In all its many and varied applications over the last 50 years, the VSM has provided insightful diagnosis and has directed organisational restructuring to deal with the original problems in useful and clear ways.

3.1. Sustainability applications

Schwaninger (2003) used his model of organisational fitness to discuss about ecological management and in Schwaninger (2006), he explained how the VSM theory contributes to explaining complex relationships between multi-level actors aiming towards sustainability. Leonard (2008) reflects on how communities foster adaptation to environmental changes, at three levels: the household, the neighbourhood and the city.

In the field of industrial management, Kouloura et al. (2008) used a VSM inspired methodology to implement sustainability principles on a fertilizers production plant. Also, Panagiotakopoulos and Jowitt (2007) use the VSM as a conceptual model to allow the comparison between sustainability standards, i.e. the Triple Bottom Line, The Natural Step, and the Ecological Footprint.

Pérez-Ríos (2012) summarises the different aspects in which the VSM supports business viability and sustainability. In Espinosa and Porter (2011) there is a comparative analysis of the VSM and complex adaptive systems theories to support sustainability and self-organisation. Also, Ben-Eli has continuously worked on using the VSM in the context of sustainable businesses (Ben-Eli, 2012). Espinosa & Walker have been developing a comprehensive toolkit of theory, methodology and applications of the VSM in the context of sustainability (Espinosa and Walker, 2013, 2011; Espinosa et al., 2015, 2008).

3.2. Theory and organisational scenario

In order to illustrate the logic of the VSM and to facilitate the subsequent interpretation of ISO 26000, the example of the hypothetical company "Widget Co." is used. Fig. 1 shows the VSM diagram of this company. Widget Co. is a manufacturer of widgets, a fictitious industrial product used by consumers.

3.2.1. Operations

Three main elements can be initially distinguished in Fig. 1: Operations, Management and Environment. Operations (red ellipse) consist of the **production departments** or processes (Systems 1), which are necessary to manufacture and distribute widgets, i.e. realise the company's purpose. In this case these are the *Assembly*, *Packaging* and *Widget Storage* departments (red circles). Each production department is controlled by a dedicated and semi-autonomous local management unit (blue square).

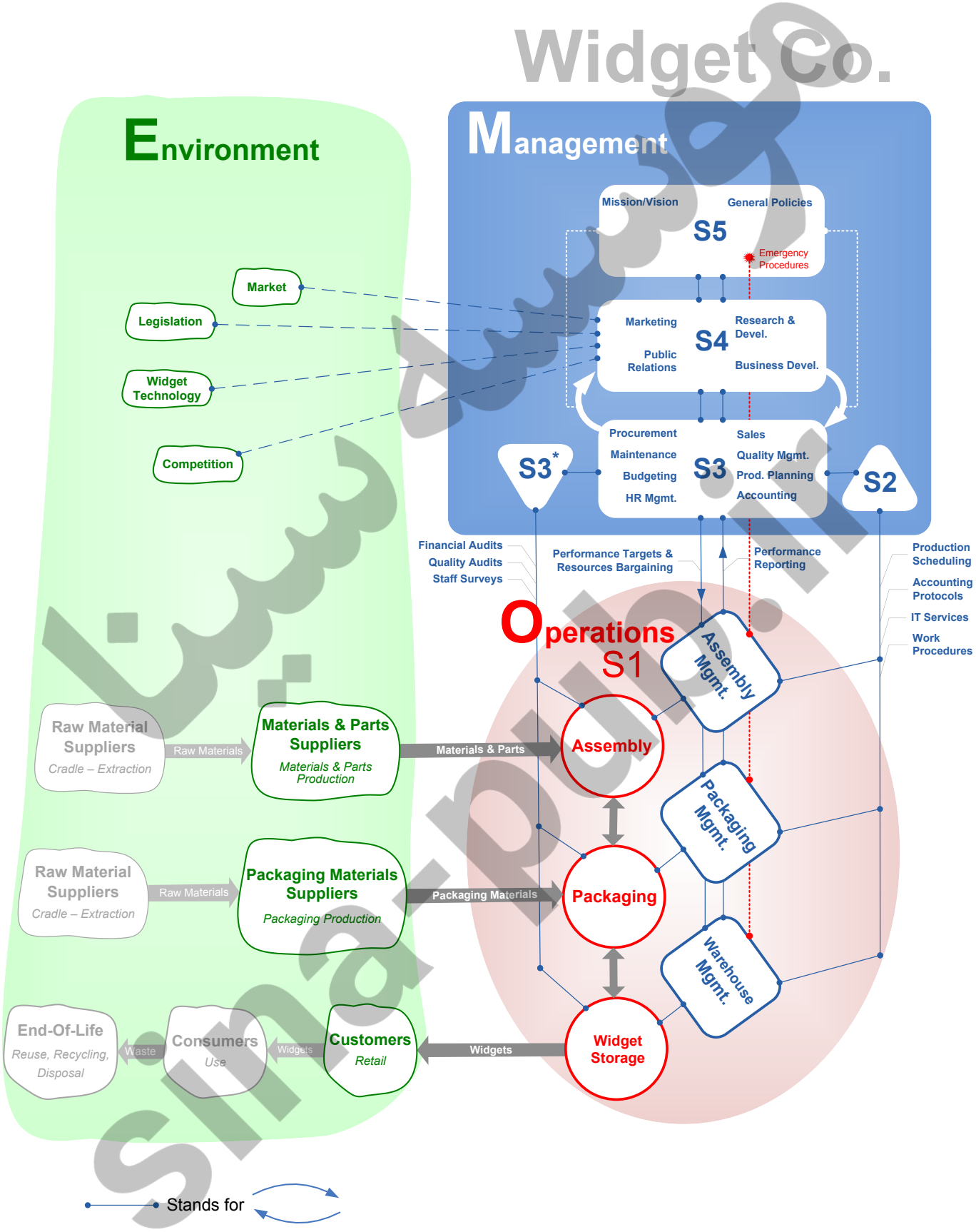

Fig. 1. The VSM of the hypothetical Widget Co.

Each department depends on material and other flows (grey arrows) that are provided from suppliers located at the organisation's environment. In Widget Co., Assembly and Packaging depend on two separate supply chains consisting of two tiers: *direct suppliers* (material & parts and packaging suppliers), and *indirect suppliers* (raw material suppliers). This is a simplification, as more complex arrangements are possible with suppliers forming networks rather than chains (Frostenson and Prenkert, 2014) and supplying more than one department. Internally, production departments are interacting, through material and other flows (grey vertical arrows), according to the specific production arrangement of the company. At the end of this arrangement, the widget storage department ships completed widgets to customers.

3.2.2. System 2

System 2 (S2) includes processes, such as *Production Scheduling*, *Accounting Protocols, IT services* and *Work Procedures* that support the harmonious interaction of production departments and ensure cohesiveness. Without a System 2, the system would shake itself to pieces. For example, if Assembly faces a technical problem and needs to go offline, an effective Production Scheduling process, will ensure that the rest of the departments are notified on time and their operation is not seriously affected.

3.2.3. System 3

System 3 (S3) manages the *overall* performance of Operations, by creating synergy. System 3 ensures the whole system works better than the operational parts working in isolation. Beer talks about an "explosion of potential" which emerges from collaboration and symbiotic relationships. Without a System 3 this could not happen. This is performed through the *Production (or tactical) Planning* process, by means of allocating specific **performance targets** to each production department. Moreover, System 3 processes, such as *Budgeting*, *Procurement*, *Human Resources management* and *Maintenance* distribute to production departments the **resources** and services (money, materials, employees and machine services) that are necessary for the realisation of their performance targets. Since the performance of a department (or any system) is a function of the resources available to it, performance targets and resources should be jointly negotiated between System 3 and Systems 1, in what Beer called the *resource bargaining*.

System 3 needs to have information on the performance of each production department, for example, via a routine *performance reporting* process. This process will first of all include appropriate output **performance indicators** for each department, such as number of units assembled, packaged and stored. It may also include **efficiency indicators** in relation to the various resources provided, such as cost per unit, materials consumption, workdays and number of machine failures. Beer called this process the *accountability loop*, which can support the autonomy of Operations, when effectively implemented.

In addition to performance reporting, System 3 needs an alternative more reliable view of Operations. This is provided by System 3* processes, such as *Quality and Financial audits,* as well as *Staff Surveys* that sporadically provide direct information on the status of production departments, without the interference of local management.

3.2.4. System 4

Systems 1-2-3 are mainly concerned with current affairs happening in the internal part of the organisation (inside and now). In contrast, System 4 (S4) includes processes, such as *Business Development*, *Research & Development*, *Marketing* and *Public Relations* that help the organisation **adapt** to the changing external environment (outside and future). System 4 scans the outside world and identifies **opportunities and threats** that may affect the viability of the whole organisation. Without a System 4, the system would be unable to cope with changes in the outside world.

For example, the Business Development process may realise that competitors are about to introduce a new kind of widget in the market, posing a threat to Widget Co. As a response, this process could come up with a plan that will allow Widget Co. to produce the new type of widget to beat competition. In order to do so, it will need to gather more information from the external environment. In addition, in order for this plan to be realistic, it will also need to obtain information from the internal environment about the current situation (financial, technological etc.) of the company, which can be provided by System 3.

3.2.5. System 5

System 5 (S5) provides closure to the whole organisation. It defines and develops the vision and values of the organisation through policies. System 5 creates the identity, the ethos, and the ground rules under which everyone operates. For example, Widget Co. may have an anti-corruption policy that should be respected by all members of the company. Organisational entities, such as a Board of Directors, or the President are usually responsible for System 5 processes.

System 5 has to manage the **interaction** between Systems 3 and 4 and to **decide** on the right balance for the organisation (white dashed lines in Fig. 1). This balance determines the course and **strategy** of the whole organisation.

Finally, Operations may face **emergency situations** that could threaten the viability of the whole company, such as a fire incident in the widget storage department that destroys a significant part of production. In these situations, a fast intervention from System 5 is usually needed, which would have to bypass the slower intermediate processes between Systems 1 and 5 described above. An emergency direct connection between Systems 1 and System 5 is therefore needed (dashed red line of central axis in Fig. 1), which Beer called the *algedonic channel*.

4. VSM interpretation of ISO 26000

According to ISO 26000 (ISO, 2010), the objective of SR is to contribute to sustainable development. The standard provides guidance to organisations of all types on the underlying principles of SR, and on ways to *integrate* socially responsible behaviour into the organisation. Moreover, ISO 26000 uses its framework of core subjects and integration practices in order to classify 40 cross-sectoral and 35 sectoral voluntary SR initiatives and tools.

4.1. Interpretation method

The VSM interpretation is based on a qualitative analysis of the standard's clauses and sub-clauses, which involved three steps:

a) qualitative assessment of the clause content,[1]
b) identification of closely related VSM elements
c) description of relationship between the clause and the VSM elements.

[1] The analysis of clause content is crucial, since certain clause titles may be misleading in regards to VSM mapping. For example, clause *7.7.5 Improving Performance* suggests a System 3 relationship, but its content is more related to System 4.

Certain clauses were omitted from the analysis, since they are of an introductory, or informative nature and hence not useful, such as clause 1 on the scope of the standard.

Two types of relationships were described in the analysis:

- *Responsibility*: when a VSM element is mainly responsible for implementing the activities described in a clause. For example, System 4 is responsible for the activities in clause *5 – Recognising SR and engaging stakeholders.*
- *Contribution*: when a VSM element is contributing to the implementation of the activities described in a clause. For example, System 2 is contributing to the activities described in clause *7.7.2 Monitoring activities on SR.*

The results of the VSM analysis are presented in four forms:

a) a *VSM Relationship Table* showing the aforementioned type of relationships (see Appendix),
b) a *VSM Mapping Diagram* (Fig. 2) showing how each clause maps onto the VSM structure of the Widget Co. example,
c) a *detailed description* of how sustainability is integrated within an organisation (next sections), with references to related ISO 26000 clauses (clause numbers in parentheses and italics), accompanied by
d) *implementation examples* using an organisational scenario for Widget Co (in italics).

It must be noted, that the VSM Relationship Table and VSM Mapping Diagram are indicative, and should only be understood in the context of the detailed description and implementation examples. The reason is that the majority of ISO 26000 clauses relate to more than one dynamically interacting VSM systems, and this cannot be properly conveyed by the Appendix and Fig. 2 alone, which suggest a one-on-one static mapping.

4.2. System 5

4.2.1. Purpose alignment

System 5 provides the general direction or purpose of the whole organisation (*7.4.2*) by determining its mission and vision. Therefore, System 5 should first make a commitment to adopt ISO 26000, understand the basic concepts, and examine how they affect its purpose. In particular, it is important to gradually align the organisation's purpose with the overarching **objective** of SR, to contribute to Sustainable Development (ISO, 2010).

Widget Co.: *The current mission statement mentions the goal of producing excellent quality widgets that meet and exceed the customer's needs. The President expands this statement by including the goal of producing widgets in a socially responsible manner that benefits society and the environment. Likewise, the vision of the company is updated to include the aspiration to become recognized as a leading company for its excellent and* ***sustainable*** *widgets.*

4.2.2. Establishing SR culture

System 5 determines the **ethos and values** of the organisation – the codes of conduct, behaviours and general policies. Thus System 5 must adopt the ISO 26000 Seven Principles of SR (*4*) and also the more specific SR principles (*6*) that are identified as relevant to its particular activities (see next section). The Organisational Governance core subject (*6.2*), in particular, is the main responsibility of System 5, since it is about incorporating SR principles into decision making and implementation *(7.4.3)*.

Widget Co.*: The President introduces a generic SR policy incorporating the Seven Principle of SR and a more specific Environmental policy, which provides direction on relevant and significant environmental issues (see §4.3 next), such as Pollution Prevention (see* section 4.7*).*

Finally, System 5 is responsible for promoting and integrating SR within the organisation, by means of raising awareness on related issues (*7.4.1*). A high degree of commitment at the top of the organisation, through serious adoption and implementation of SR principles and policies, sets an example for the whole organisation. All of the above activities of System 5 should ideally build up a culture that encourages SR practices throughout the organisation.

Widget Co.*: The President is personally very passionate about SR, and is convinced that this is an opportunity that can transform Widget Co. and strengthen its viability. Apart from her managerial decisions, this is reflected in her conversations with people inside and outside the organisation, as she frequently promotes SR as the way forward. She has also encouraged the creation of a group of like-minded people from within the organisation and from key stakeholders to push the SR agenda forward.*

4.3. System 4

System 4 plays a crucial role in managing the SR of an organisation, as it is responsible for the two fundamental practices of SR according to ISO 26000, i.e. Recognizing SR and Engaging Stakeholders (*5*).

4.3.1. SR model development

The first practice is part of System's 4 continuous process of scanning the external environment to identify opportunities and threats to the viability of the organisation. In the case of SR, System 4 needs to recognize how the organisation relates to its **external environment**, and what are the SR impacts, interests and expectations (*6, 7.2*). In other words, System 4 needs to build a **model** of the external environment in relation to SR (Panagiotakopoulos, 2005).

A fundamental aspect of model building is the definition of its **boundaries** (Decleris, 1986). Building on the general concepts (*3*) and principles (*4*) of SR, this model needs to be relevant to the organisation's particular operational context and include those issues (*6*) that are considered by the organisation as significant (*7.3.2*). Three overlapping concepts are useful in boundary definition:

- the organisation's *stakeholders* (*5.3.2*), which involves organisations or individuals that have interests in any decision or activity of the organisation (ISO, 2010)
- the organisation's *sphere of influence* (*5.2.3, 7.3.3*), which involves the impacts over which the organisation has control (ISO, 2010).
- the *life-cycle* (*6.5*) of the organisation's products or services, which involves all consecutive and interlinked stages, from raw material acquisition or generation from natural resources to final disposal (ISO, 2006a).

The practice of recognizing SR is essentially a process of *widening the traditional model boundaries* of System 4, across all of the above concepts, to consider SR elements, issues and impacts.

Widget Co.*: Following the new mission and vision, System 4 has to examine additional aspects of the external environment (see Fig. 1). Following a stakeholder identification exercise, it realizes that the local community is seriously concerned about the level of pollution and emissions of Widget Co's operations. In addition, an international NGO is conducting a campaign to raise awareness on the life-cycle impacts of widgets and influence consumer behaviour. System 4 realizes that it*

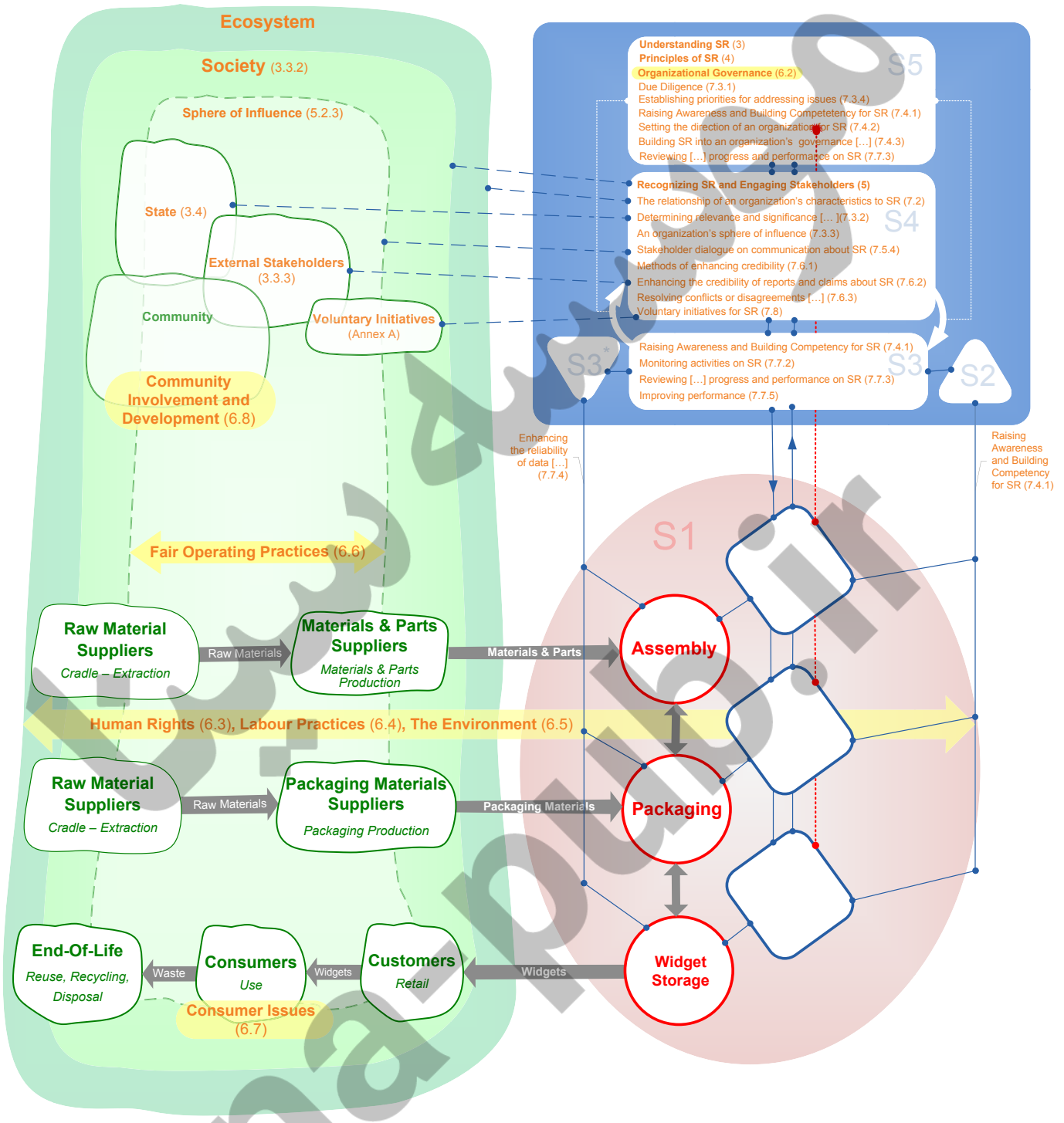

Fig. 2. VSM Mapping of ISO 26000. Orange elements represent the standard's clauses. Yellow elements represent the SR Core Subjects. Contributing elements are not shown for simplicity. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

needs to widen its scope and know more about the life-cycle of widgets, from the upstream stages of Raw Material Extraction to the downstream stages of Use and End-Of-Life (grey elements in Fig. 1).

Apart from the external, the System 4 model of SR should also consider the organisation's **internal environment**. This information can be compiled and provided by System 3. It may be expressed through high-level, aggregated Key Performance Indicators (KPIs) on various SR issues (e.g. organisational carbon footprint). The results of sustainability tools, such as Life Cycle Assessment (LCA) (ISO, 2006a), which can reveal the

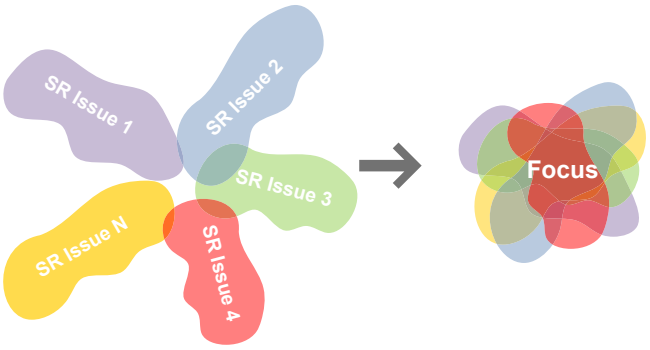

Fig. 3. System 4 focus on SR issues.

environmental "hot-spots" along a product's life-cycle (Panagiotakopoulos, 2005; Panagiotakopoulos et al., 2015). This interaction between Systems 3 and 4 (white arrows in Fig. 2) is crucial in developing feasible and realistic SR strategies based on factual data (see next section).

***Widget Co.**: In terms of the local community pollution concerns, System 4 needs to understand which operational processes (Systems 1) are mainly responsible for emissions. It therefore asks the General Manager (System 3) to provide information on last year's emission levels and also conduct an LCA study to understand the whole life-cycle impacts of widgets.*

The quality of the organisation's SR model is of paramount importance to its SR performance, since it forms the basis on which the organisation will develop its SR (adaptation) strategies and responses (see §4.3.2). In order for these strategies to be effective, this model should correctly express the specific challenges and opportunities facing the organisation relating to every SR issue (*6*), or in other word it should possess **requisite variety** (Conant and Ashby, 1970).

Since SR issues are complex and interdependent (ISO, 2010), specialized surveys and studies should be integrated and considered as a whole to provide the **focus** of System 4 activity. This is shown in Fig. 3.

4.3.2. SR strategies and improvement programmes planning

Having built the SR model, System 4 needs to identify the **significant issues** that need to be addressed by the organisation (*7.3.2*). This process should involve Systems 3 and 5 and be based on pre-determined criteria (e.g. extent of impact, risk of inaction etc.). However, the final decisions on criteria and **prioritization** (*7.3.4*) is the ultimate responsibility of System 5. Specific SR strategies and programmes are then developed by System 4 with the aid of System 3 (*7.7.5*). These strategies have to abide by the SR policies of System 5 (*7.4.2*).

***Widget Co.**: The LCA results show that 30% of a widget's environmental impacts can be attributed to the Assembly process (System 1) and 40% to the production and end-of-life impacts of packaging material. According to the Pollution Prevention policy theses impacts should be minimized. System 4 investigates alternative mitigation actions and consults with the General Manager and the Finance Director (System 3) to assess their implementation feasibility and costs. Four alternative strategies are identified:*

i) *minimize Assembly's environmental impacts by introducing more efficient filtering technology*
ii) *purchase packaging materials with lower life-cycle impacts*
iii) *re-design widgets to have lower environmental impacts and require less packaging*
iv) *continue with business-as-usual and conduct a PR campaign to improve Widget Co.'s image in the local community*

System 4 ranks alternative strategies according to performance, cost and duration and presents them to the President. She immediately rejects the fourth strategy, as it is against the company's SR policy and specifically the principles of Accountability and Respect for Stakeholder Interests. She feels that priority should be given to Widget Co.'s own impacts, so she decides to immediately implement the first two strategies, and re-consider the third in two years. Finally, System 4 with the aid of the General Manager develops in more detail the implementation plans of the first two strategies.

4.3.3. Stakeholder Engagement

Stakeholder Engagement is the second fundamental SR practice (*5*) performed by System 4. System 4 needs to identify stakeholders, enter into a continuous dialogue and build a relationship, at least with the most significant ones (*7.5.4*). This relationship will provide the organisation with valuable information and alternative viewpoints and thus increase the variety of its SR model.

In order for this relationship to be meaningful, it will also have to be reciprocal, i.e. the organisation will have to be **transparent** (*4.3*) and provide information regarding its own SR issues. A common practice towards this end is the issue of a sustainability or SR report (*7.6.2*), which should cover most of the relevant and significant SR issues of the organisation, and can serve as a stakeholder communication platform. A similar practice is to participate in certification schemes, such as ecolabels (*7.6.1, 7.8*), which communicate the performance on specific SR issues (e.g. fair trade, carbon footprint etc.). System 4 has to guarantee the **credibility** of such practices, by following established tools and guidance (*7.8*), such as the G4 Sustainability Reporting Guidelines (GRI, 2013) and examining the trustworthiness of certification schemes.

Finally, in case disagreements or **conflicts** emerge between the organisation and its stakeholders, System 4 should have in place mechanisms to resolve them, and ensure these are known and made available to stakeholders (*7.6.3*).

***Widget Co.**: In view of recent developments, System 4 decides to organise a meeting with local community representatives, in order to discuss their pollution concerns and Widget Co.'s respective strategy to minimize emissions. Moreover, System 4 gets approval from the President to issue a Sustainability Report on an annual basis, according to the recent GRI guidelines, which will be communicated to all stakeholders. Finally, since an initial LCA study has already been realized, System 4 gets approval to issue a verified Environmental Product Declaration (EPD) (ISO, 2006b) on the life-cycle impacts of widgets. System 4 regards this as a competitive advantage strategy, since it has detected an increasing demand for verified EPDs from the market.*

4.4. System 3

4.4.1. SR policies implementation

System 3 must ensure that the SR policies of System 5 are being followed by Operations (*7.4.3, 7.3.1*). This involves making these general policies more specific to the operational context of each System 1, by providing **specialized SR procedures, rules and directions**. This may also involve **integration of SR policies to** System 3's own processes, such as HR management and procurement,

which are responsible for managing different aspects of Operations, and providing the respective resources. A particular form of resource is the provision of **training** that will build the capacity of Operations to manage demanding SR issues (*7.4.1*).

***Widget Co.**: In order to implement the new Pollution Prevention policy, the General Manager first needs to know how it affects Operations and what sort of adjustments should be made. He therefore organises an internal audit (System 3*) to assess first-hand the pollution sources and risks associated with each department. Next, he arranges a meeting with the production departments' managers (System 1), as well as with the Maintenance Manager (System 3), to discuss the audit results and develop new or modify existing operating procedures that avoid, minimize or mitigate existing pollution and potential polluting incidents. The newly agreed procedures are circulated to all affected parties. Following a demand by the Assembly Manager, the HR department arranges that more staff is allocated to Assembly and that special training is provided to relevant employees on the new procedures.*

4.4.2. SR strategies and improvement programmes implementation

System 3 is also responsible for planning in more detail the agreed SR strategies and programmes. This involves analysing the more general SR plans and strategies of System 4 into **more specific objectives and targets** that should be allocated to each operation department (System 1) (*7.4.2*). Ideally, their feasibility will have to be discussed and negotiated with Systems 1, taking into consideration the required **resources** that should be provided by System 3 for their realization.

***Widget Co.**: The General Manager has agreed with System 4 that a 20% reduction target in overall emissions seems feasible within a year. The Assembly Manager believes that with his current budget a 20% reduction target is not feasible within a year, and that there is a risk of seriously interrupting production. Therefore, the General Manager decides to create a working group consisting of the Assembly, Finance, Procurement and Production Planning Managers to develop the cost, schedule and technical plans of the strategy and continue with its implementation upon reaching an agreement.*

4.4.3. SR performance monitoring

In order to effectively implement the SR policies, as well as the SR strategies and programmes, System 3 needs to "close the loop", i.e. monitor the status and performance of Operations on relevant SR issues (*7.7.2*). This monitoring requires the development of **sustainability indicators** (quantitative or qualitative) appropriate for each SR issue that will encourage performance and self-regulation of Operations. These indicators may develop along three different channels:

i) *Central Channel*: on a regular basis via performance reviews and reports by Systems 1 (*7.7.3*),
ii) *System 3**: sporadically, via SR audits and surveys (*7.7.4*) (see also §4.4.1 above)
iii) *System 2*: on a regular basis via IT or similar coordinating systems (e.g. Enterprise Resource Planning – ERP, databases etc.) (see §4.5 below).

This information allows System 3 to continuously negotiate with Systems 1, and intervene to modify their SR implementation plans only if it is affecting the viability of the whole organisation. Beer suggests that monitoring of performance on the Central, as well as on the System 2 channel, should be as close to **real-time** as possible (Beer, 1979).

Finally, System 3 compiles and processes the performance information and forwards it to System 4. This information should not be too detailed, but rather provide a **high-level view** of Operations that will allow System 4 to update its SR model (see §4.3.1).

***Widget Co.**: In order to monitor the Pollution Prevention policy, the General Manager asks production departments' managers (System 1) to include in their weekly performance reports the following indicators: i) department emissions, ii) number of polluting incidents. Additionally, in order to make sure these indicators are measured accurately and honestly, he arranges for an annual audit to check that measuring procedures and protocols are followed correctly. He also asks the Quality Manager to use these data along with data provided by the company's ERP system to calculate a number of aggregated indicators, such as total company emissions and total emissions per widget, and identify potential hot-spots that could be improved. These aggregated indicators are presented by the General Manager to System 4 and the President in their quarterly strategy meetings.*

4.5. System 2

System 2 is responsible for damping oscillations. In the case of SR, Operational units might attempt to implement SR actions and practices that affect other units, e.g. by using resources available to other units, or by altering shared conventions, protocols and procedures that help all units cooperate. .

4.5.1. Conflict management

In terms of SR, System 2 involves practices that deal with resolving conflicts of interest that emerge in the implementation of SR policies and programmes. This includes **negotiation** processes among Systems 1 that make sure no operational unit will be in a disadvantaged position.

***Widget Co.**: The new anti-pollution filters in the Assembly department require a significant amount of space from the adjacent Warehouse. Moreover, their installation may last for a month, during which the operation of the Warehouse will be seriously disrupted. The Warehouse manager is very concerned about this development and meets with the Assembly manager, in order to find ways to minimise impacts to his department. They identify an alternative less obstructive location and they co-ordinate the installation and Warehouse schedules to minimise disruptions.*

4.5.2. SR management consistency

Another harmonisation process of System 2 is ensuring the consistent management of SR issues across Operations. This may involve the adoption of specific data collection and measurement protocols, operating procedures, as well as other forms of standardization.[2]

***Widget Co.**: After a few weeks of implementing the Pollution Prevention strategy the Quality Manager starts complaining that Operations keep sending their emissions data in different formats (spreadsheet, text, hardcopy) making it difficult to process data. After discussing the matter with the production departments' managers they all agree to use a standard reporting spreadsheet template.*

4.5.3. Emerging organisational culture

As Beer (1985) notes, it is also useful to think about the *work environment* that will foster a certain kind of culture, such as one for SR, for example through posters, announcements etc. Several SR programmes focus on creating these kinds of environments to raise awareness and drive engagement on specific SR issues. Again, IT can be very useful in creating an SR culture, for example through

[2] Similarly, so-called policies (e.g. car policy, recycling policy etc.) are System 2 consistency agreements rather than rules promulgated on the Central Channel (Beer, 1985).

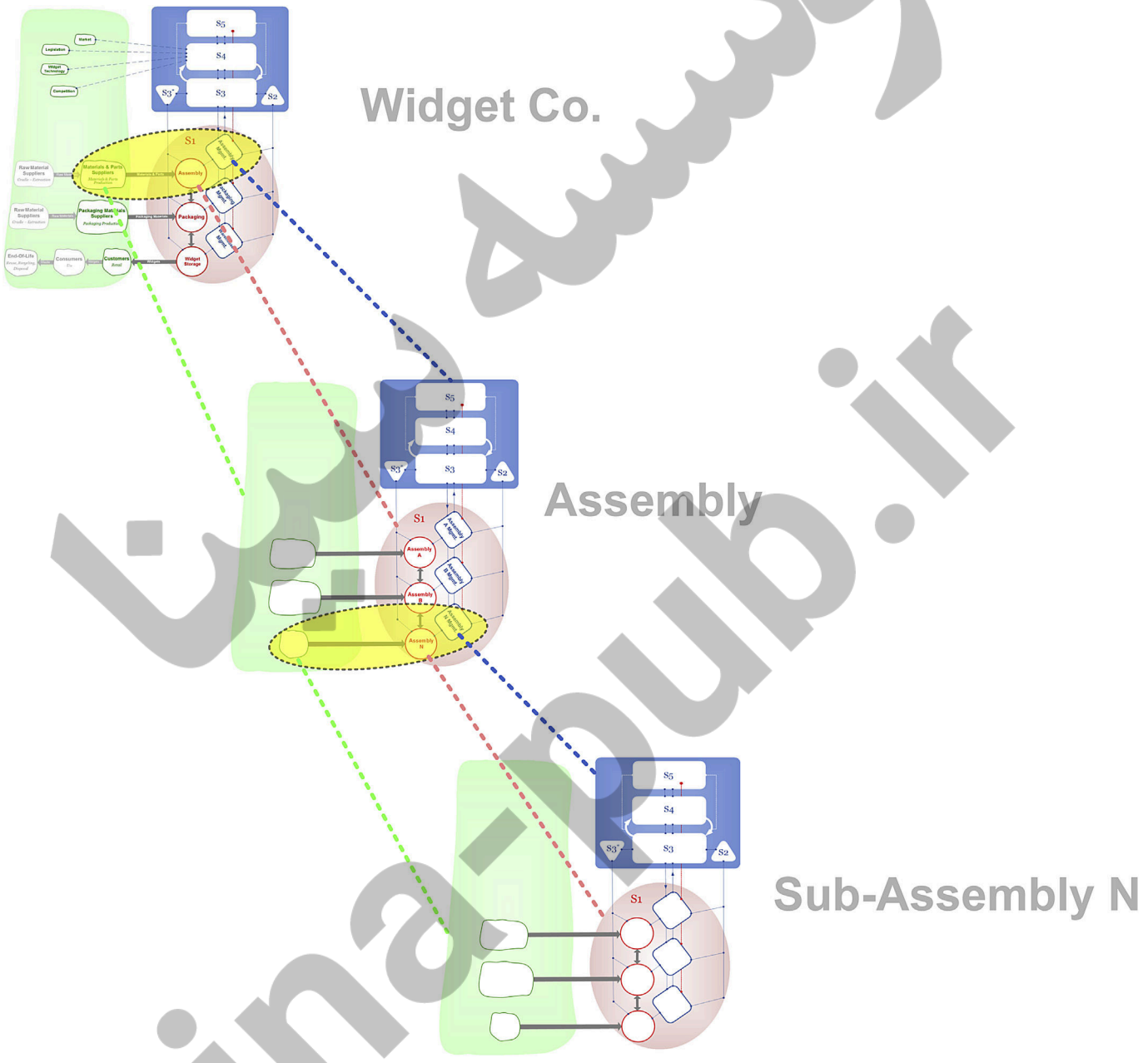

Fig. 4. Recursive structure of Widget Co.

relevant employee forums, social media (Reilly and Weirup, 2012), or even gamification (Stevens, 2013).

***Widget Co.**: Following the encouragement of the President, an SR Team is established, which is open for all employees to join, with the purpose of discussing SR issues, raise awareness and change employee attitude. One of the first decisions of the group is to setup a dedicated SR discussion forum on the company's intranet in order to encourage engagement. Additionally, the HR manager with the help of the SR Team print awareness raising posters about the new Pollution Prevention strategy, along with tips on how to minimize pollution and what should be done in case of a pollution incident.*

4.6. Systems 1 — recursion

Modelled as a VSM, Widget Co will exhibit a *recursive* structure as shown in Fig. 4. The lower-level Systems 1–5 will have a similar function to those of the parent organisation, but with a different lower-level focus.[3]

In terms of SR, the Recursive System Theorem implies that each Operational unit, and in particular its local management, should develop *similar* SR functions to those detailed in the paragraphs above (*7.4.3*). The focus of these functions should be *adapted to the particular lower-level context and purpose* of the Operational unit.

***Widget Co.**: The Assembly Manager needs to implement the Pollution Prevention policy and improvement programme in his department, which is comprised of three sub-departments corresponding to different phases of the assembly line. He holds a meeting with the sub-department supervisors to explain the new policy and what is generally expected of them (System 5). They then discuss the details of the improvement programme, including the resources they will need, the methods to monitor their performance (System 3), and his personal checks on processes (System 3*). Moreover, he encourages them to discuss among themselves any implementation issues, before asking for his help (System 2). The Assembly Manager also decides to attend a short conference on environmental management in order to better understand the environmental issues of the assembly process (System 4).*

4.7. SR Issue Management

Operations or Systems 1 form the part of the organisation which delivers its purpose and produces its output, therefore, a significant part of the organisation's SR impacts occur at this level. Correspondingly, three of the ISO 26000 SR core subjects, namely *Human Rights* (*6.3*), *Labour Practices* (*6.4*) and *Environment* (*6.5*) relate to Operations and respective local environments (see Fig. 2). The remaining three core subjects, namely *Fair Operating Practices* (*6.6*), *Consumer Issues* (*6.7*) and *Community Involvement and Development* (*6.8*), are related to specific elements of the organisation's environment, while Organisational Governance (*6.2*) is related to the whole organisation and in particular System 5 (see §4.2.2).

ISO 26000 provides general principles and considerations for each core subject, and specific actions and expectations for the related SR issues (36 issues in total). Similar to the analysis of the previous paragraphs, the clauses of each issue could be interpreted with the same method by the VSM. An example of such an interpretation is shown in Fig. 5 for the Pollution Prevention issue (*6.5.3*) of the Environment core subject, which was also used in the Widget Co. example above.

[3] The same will hold for higher systems the organisation might be a part of.

5. Towards holistic SR management

ISO 26000 opens new horizons for Widget Co. Previously it was concerned with markets, technical innovations and financial matters, now it has widened its remit to involve the environment, community, consumer issues and so on. Essentially the variety of its environmental niche has suddenly exploded and in order to restore Requisite Variety (RV), there is an urgent need to ramp up the variety of its operation.

One way to visualise this is presented in Fig. 6, building on the analysis of sections 3.2 and 4 above. An organisation wishing to integrate SR into its structure will have to integrate the following management layers:

1. the usual Business Management layer as presented in section 3.2 and Fig. 1,
2. the General SR Management layer, as presented in paragraphs 4.2 to 4.6 and Fig. 2, and
3. the specific SR Issue Management layers, as presented in paragraph 4.7 and Fig. 5.

The repercussion of Fig. 6 is that the more SR issues an organisation considers relevant, the more variety it will need to possess in order to manage them effectively. A possible response would be to indeed create a new structure for each SR issue. This is currently the case with dedicated management systems focussing on specific SR issues or management layers, such as ISO 14001(ISO, 2004) for Environment and OHSAS 18001 for Occupational Health and Safety (OHSAS, 2007), This approach, however, may pose a significant financial and bureaucratic burden on the company, and would render difficult the identification of **interdependences** among the various SR and Business Management layers.

In contrast, the authors believe that this integration should not be based on creating distinct roles for each management layer, but rather incorporating these values and ways of making choices and decisions, in the day-to-day Business Management, resulting in a more systemic (Sustainability) Management. In a recent work (Panagiotakopoulos et al., 2015), the authors have attempted to use the VSM interpretations presented above, in order to integrate ISO 26000 with other management tools, towards creating an integrated sustainability management system. This paper goes further regarding sustainability management practice in the context of ISO 26000 standard.

6. Discussion

The sustainability framework presented above allows us to map the organisational and managerial implications of ISO 26000, clarifying the way that the various elements of the standard are related to key business processes, roles and decision-making mechanisms. This approach offers a clear route to explain how sustainability standards can be integrated into the day-to-day operations of an organisation, and therefore constitutes a clear contribution to sustainability implementation. More importantly, the framework attempts to address the need for *a common organisational model or theory for corporate sustainability* as proposed in the literature (e.g. Asif et al., 2013; Lozano et al., 2014; Lulfs and Hahn, 2014). It also complements previous research, such as Boons' (2009, chap. 1), by suggesting that the design of more balanced structures can significantly reduce uncertainty and improve the management of resources relating to SR.

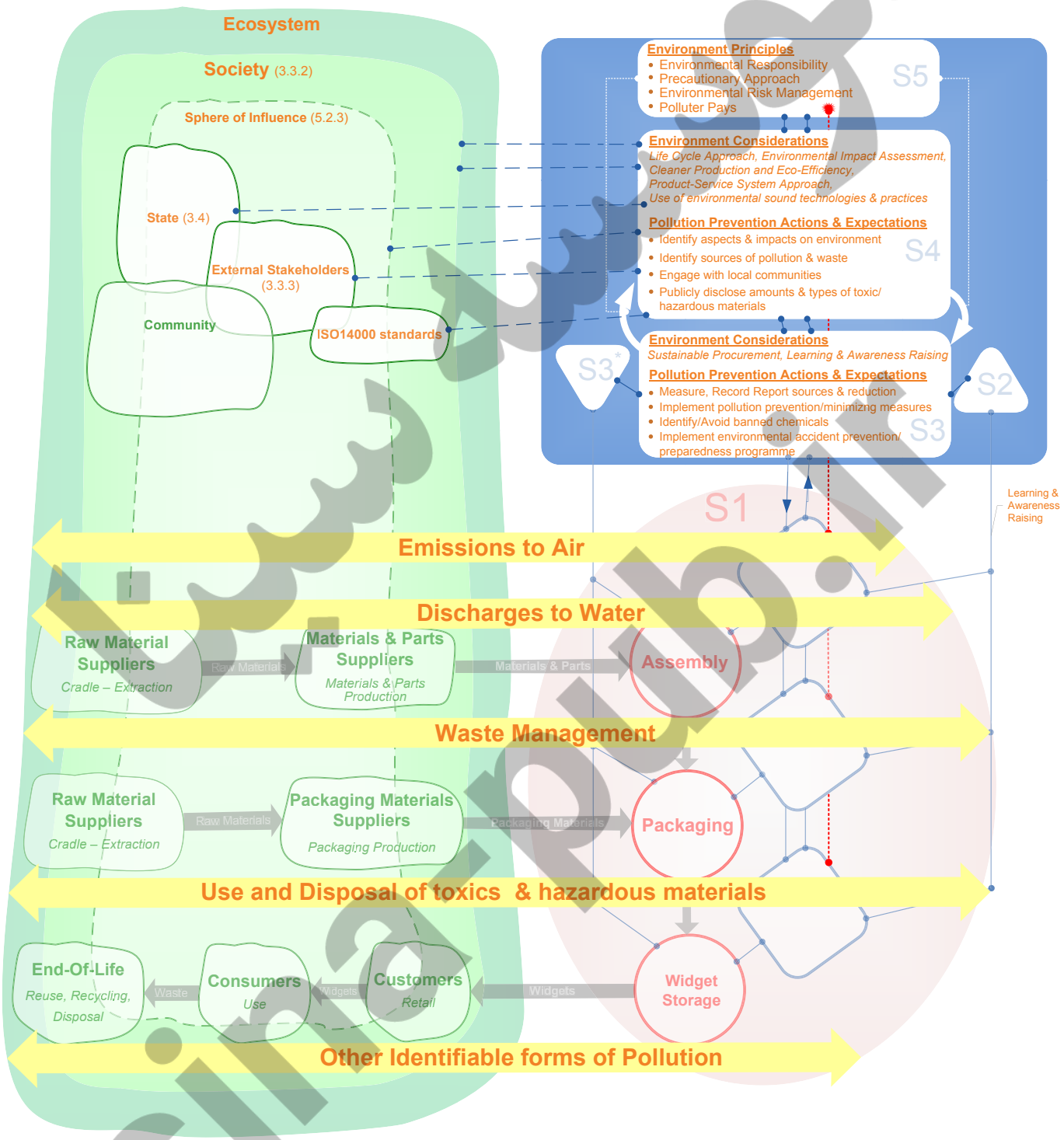

Fig. 5. VSM graphical representation of Pollution Prevention Issue. Yellow arrows indicate the different aspects of this issue that may relate to any part of Operations and extend to respective local environments. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

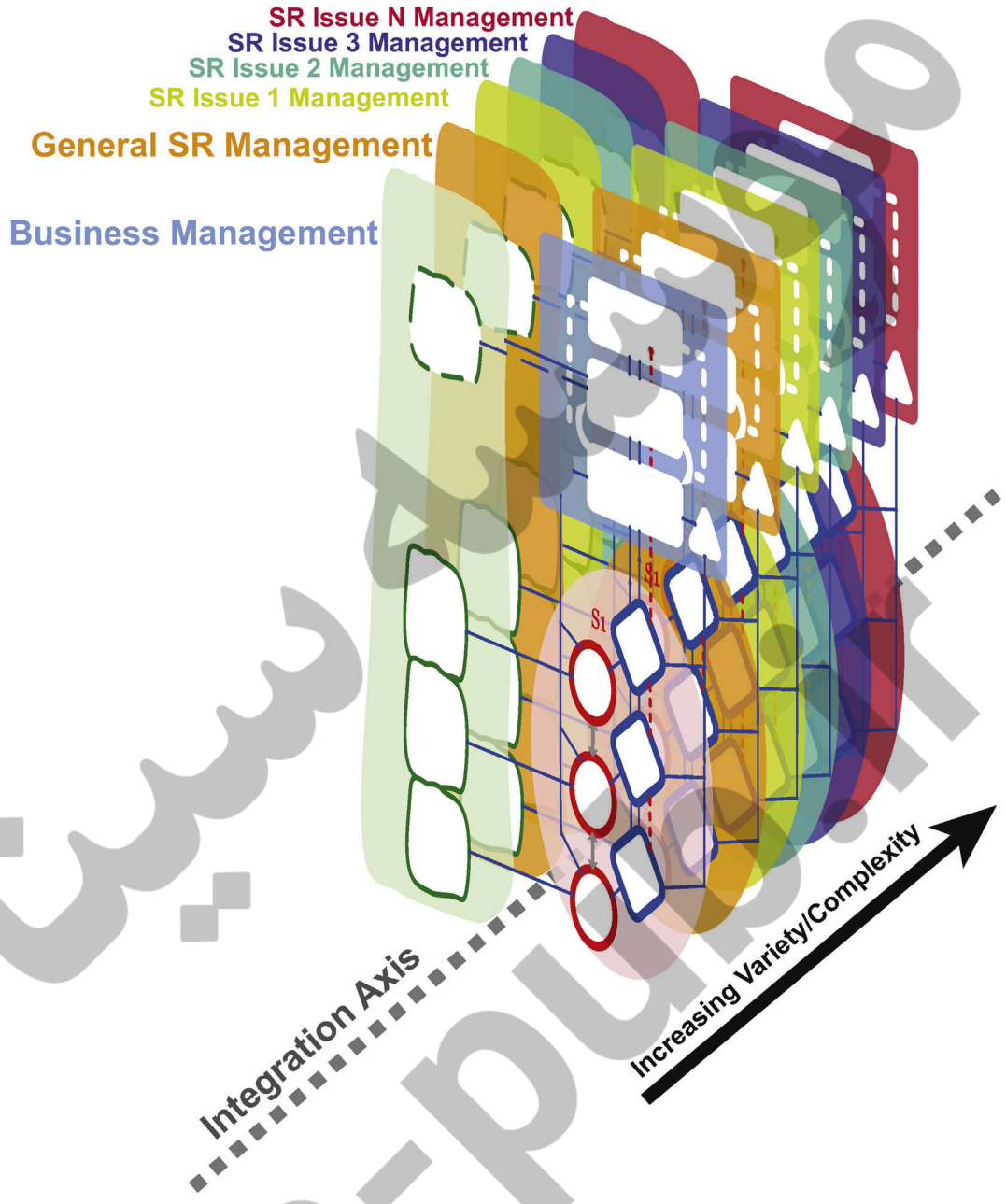

Fig. 6. Integration of management layers.

The proposed model is based on complexity management, and in particular organisational, second order cybernetics, as developed by Beer in the VSM. The VSM along with its supporting cybernetic concepts, such as variety and self-regulation, could serve *as a unifying language* to improve the implementation of sustainability in organisations of different types and scales (Espinosa et al., 2008). Based on VSM distinctions, the proposed method examines more rigorously and methodically the structural aspects of SR implementation, focussing on mapping interactions between different types of roles (Systems 1 to 5, Stakeholders etc.). For example, the analysis of the framework above has shown that an organisation is faced with serious problems of **requisite variety**, as it embraces massive amounts of new variety from its environment, regarding sustainability management practice. As Beer (1985) notes, a very effective response to this challenge is to increase the variety of operational units and their leaders, dealing directly with the environment, by giving them more autonomy. At the heart of this is the need for real-time measurement and self-governance systems (Espinosa and Walker, 2011).

Espinosa and Bohorquez (2015) have explained the generic differences and complementarities between the VSM and other approaches to manage complexity in organisations. The next

sections describe complementarities of the proposed viability and sustainability approach with other current complex system approaches.

6.1. Organisational learning

Other researchers have suggested that the lack of institutionalization of sustainability in organizations is in part due to barriers to organisational learning. For example, Benn et al. (2013), offer an organisational learning framework to help address particular challenges that sustainability poses in terms of integrating new ideas at the group and organisational levels. The framework suggested here complements this stream of research, as it approaches organisational learning from the point of view of dealing with the complexity of core tasks. The implementation of sustainability standards in an organisation is regarded as the result of group learning and adaptation, complementing other authors (e.g. Clarke and Roome, 1999; Karadzic et al., 2013; Lozano, 2008). However, the understanding offered by the VSM goes further, as it explains the **structural conditions** required to support second order learning (Espinosa et al., 2015).

6.2. Sensemaking

Van Der Heijden et al. (2010) adopt a different approach to complexity management by applying Weick's theories on sensemaking (Weick, 2000, 1995) to companies' SR processes. They conclude that sensemaking is a three stage process: exploring, translating and embedding. More research on this approach could be used to evolve the framework presented here, in order to strengthen sensemaking in the VSM learning process. This research could explore the initial motivation for sustainability practice (as in Bansal and Roth, 2000), elaborate on the decision-making and agreement processes that take place throughout the VSM framework, and develop awareness of the dilemmas and paradoxes of sustainability strategies and actions (e.g. Snowden and Boone, 2007). Recent VSM interventions in organisational sustainability (Espinosa and Walker, 2013, 2011; Espinosa et al., 2015, 2008) have also taken a social constructivist approach, progressing Beer's original theory and methodology closer to Weick's theories: during their VSM interventions – carried out as action research projects – participants fully engaged in key aspects of sensemaking.

6.3. Paradoxes–dilemmas–ambiguities

In order to be more comprehensive, the framework presented here may need to address not only the roles and processes necessary for sustainability management, but also the skills and awareness required to deal with the inherent paradoxes and ambiguities of current sustainability practice. For example, the framework focuses on a single organisation and how it strives to be socially responsible, by adopting an international standard such as ISO 26000. However, regardless of how well it integrates the standard in its management structure, its sustainability performance *is ultimately determined by its relationship with the socio-economic environment, within which it operates*. For businesses in most countries the market economy is determined by the prevalent (non sustainable) neo-liberal economic paradigm (Lozano et al., 2014). This inevitably creates a number of paradoxes and dilemmas for the organisation, as the goals of SR may be in conflict with those dictated by the market.

Paradox research (see Rahardjo et al., 2013; Starik and Kanashiro, 2013; Van der Byl and Slawinski, 2015) could therefore complement the framework, by getting deeper into the **cognitive and social complexity** of the interactions emerging in the implementation process; in other words delve into the complexity of how to make specific decisions within and among VSM subsystems at different levels of recursion. On the other hand, the VSM framework itself could help decision makers, by more **clearly mapping the dilemmas** of sustainability practice. In the example above, a paradox could be identified as taking place in Systems 4 and 5 of the organisation's highest recursion, during the building of its SR model (see section 4.3.1): what are the organisation's higher system's rules? Should it be the market rules or should it be the organisational ethos (i.e. for achieving SR)? This exercise could help decision makers better realise their boundaries, involve the right roles (those having requisite variety to address such dilemmas and paradoxes) and avoid the reductionist belief that SR alone can guarantee sustainable development (Panagiotakopoulos, 2005).

7. Conclusion

In this paper, the VSM has been used to model the hypothetical Widget Co. and the implications of its adopting the ISO 26000 guidelines on social responsibility. By so doing, the VSM is proposed as an effective model to base the analysis of organisational sustainability (long-term viability). The VSM interpretation of ISO 26000 has identified several generic SR functions that need to be performed by the various organisational governance systems, as well as their dynamic interrelations, thus clarifying implementation issues faced by any company which decides to become more socially responsible. Finally, by identifying different management layers that correspond to the various SR issues of an organisation, the VSM has been put forward as an integration model for SR issues and respective sustainability tools, from an organisational point of view.

The suggested methodology aims to develop '*a systemic model to encompass the dynamic interactions between different levels within the organization around issues of sustainability and the implications for its implementation*', a recognised gap identified by Benn et al. (2013). Moreover, it contributes to filling the implementation gap identified by Asif et al. (2013), by identifying the linking pins of the ISO 26000 clauses with the organizational systems responsible for their implementation.

The conceptual integrity of current sustainability standards combined with the soundness of VSM theory on complexity, sustainability and performance management, opens a research route that would potentially allow us to also integrate more sustainability standards in a holistic Sustainability Management System. Towards this end, examples of recent systems and complexity approaches that could contribute to address more specific issues of implementation were presented.

Finally, it is evident that only through applying the suggested methodology to real case studies, where real-life organisational challenges and complexities may hinder sustainability aspirations, can the diagnostic power and usefulness of the suggested framework be fully revealed. This sets up the authors' research agenda in the near future.

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Appendix. VSM Relationship Table of ISO 26000

ISO 26000 Clause	System 5	System 4	System 3	System 3*	System 2	System 1
3 Understanding SR	**R**					
4 Principles of SR	**R**					
5 Recognizing SR and engaging stakeholders		**R**				
6 Guidance on SR Core Subjects						
6.2 Organisational Governance	**R**	C	C	C	C	C
6.3 Human Rights		**R**	**R**			
6.4 Labour Practices		**R**	**R**			
6.5 The Environment		**R**	**R**			
6.6 Fair Operating Practices		**R**				
6.7 Consumer Issues		**R**				
6.8 Community Involvement and Development		**R**				
7 Guidance on Integrating SR throughout an organisation						
7.2 The relationship of an organisation’s characteristics to SR	C	**R**	C			
7.3.1 Due Diligence	**R**	C	C	C	C	C
7.3.2 Determining relevance and significance of core subjects and issues (…)	C	**R**	C			C
7.3.3 An organisation’s sphere of influence		**R**	C			
7.3.4 Establishing priorities for addressing issues	**R**	C	C			
7.4.1 Raising awareness and building competency for SR	**R**		**R**		C	
7.4.2 Setting the direction of an organisation for SR	**R**	C	C			
7.4.3 Building SR into an organisation's governance systems and procedures	**R**	C	C	C	C	C
7.5.4 Stakeholder dialogue on communication about social responsibility		**R**				
7.6.1 Methods of enhancing credibility		**R**	C			
7.6.2 Enhancing the credibility of reports and claims about SR		**R**				
7.6.3 Resolving conflicts or disagreements between an organisation and its stakeholders		**R**				
7.7.2 Monitoring activities on SR			**R**	C	C	C
7.7.3 Reviewing an organisation's progress and performance on SR	**R**	C	**R**			
7.7.4 Enhancing the reliability of data and information collection and management			C	**R**	C	
7.7.5 Improving performance		**R**	**R**			
7.8 Voluntary Initiatives for SR	C	**R**	C			

R: Responsible VSM element, C: Contributing VSM element

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