

The Adaptive Quadruple Bottom Line Scorecard: Measuring organizational sustainability performance

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Abstract: Organizational sustainability is driven by effectiveness and adaptation. To be sustainable, an organization needs two things: (1) knowledge of its impacts on the world and (2) the capacity to learn and innovate in response (McElroy, 2006a). However, most learning and innovation systems in mainstream business are dysfunctional and unsustainable. In this paper, we propose to measure organizational sustainability performance with a new strategic map: the Adaptive *Quadruple Bottom Line* Scorecard (AQBLSC). This is our contribution to the dialogue about the next generation of Performance Scorecards. Based on the principles of the New Knowledge Management and the Triple Bottom Line, we also adopt a capital-based view. We focus on the impacts of organizational operations on vital capitals. We advocate the use of a quotient-based Footprint Method (McElroy, 2008) as an impact measurement tool, and the use of system dynamics as an impact modeling tool. The AQBLSC provides necessary tools for thinking about indicators, measurement models and metrics for learning, adaptation and (stakeholder) sustainability.

Keywords: Knowledge management, sustainability, performance measurement, metrics, Balanced Scorecard, triple bottom line.

1. Introduction

This paper proposes a performance measurement system that provides a new strategic map to enable leaders to better measure organizational performance in achieving greater sustainability in more systemic ways: The Adaptive Quadruple Bottom Line Scorecard (AQBLSC). Organizations have a crucial role to play in helping societies to become more sustainable and competitive. Many leaders are responding to these challenges by reducing the extent of their organization's social and environmental impact on the world, as well as limiting the potential risks they pose to global systems. This is being done through improved environmental management practices, efficient use of human capital and stewardship of natural resources. Executives are now beginning to recognize the value of demonstrating transparency and accountability in ways that extend beyond the use of traditional financial performance measures. This trend is a consequence of increasing expectations for organizations to take greater responsibility for their non-financial impacts on the world. Many executives use Kaplan and Norton's (1996) Balance Scorecard model (BSC) as a map to guide strategic initiatives. We will evaluate its effectiveness in supporting strategic organizational transitions from using conventional performance measures to broader integral sustainability performance systems. We propose a new approach with a framework that uses a next generation performance scorecard designed to increase organizational intelligence and achieve greater alignment with the Triple Bottom Line (TBL) (Elkington, 1997).

There are three basic elements underlying this paper and this new scorecard: thinking, acting and systems, all related to learning. While our analysis is at the organizational level, these

elements are equally important at an individual, group, or community level. Let us first explore what some authors have said about these elements and their relationship.

Doppelt (2008) describes the mess we are in as the greatest failure of thought in human history. Our “Take-Make-Waste” thinking has led to unsustainable behaviour that has brought the world to the precipice of disaster. We have been blind to the ecological and social systems we are part of. Overcoming systems blindness requires a fundamental change to what can be called “*sustainable thinking*.” This means a shift to a “Borrow-Use-Return” mind frame where people understand that humans only temporarily borrow resources from nature, briefly use them as goods and services, and then must return them to the natural environment through a continuous circular process that is life on Earth.

Peter Senge (1990), founder of the concept of the learning organization wrote “The Fifth Discipline: The Art and Practice of The Learning Organization.” He claims that a new way of thinking and acting is needed and systems thinking (the fifth discipline) is the possible conceptual framework to do so. In more recent books Senge *et al.* (2005, 2008) describe the idea of “presence” (a concept, borrowed from the natural world, in which the whole is entirely present in any of its parts) and introduce this to the realms of business, government, etc. They describe new ways of thinking about learning from experience. All experiential learning integrates thinking and doing. But most of our learning is routine or reactive learning, whereby thinking may be seen as being governed by established mental models and doing is governed by established habits of action. By encouraging *deeper levels of learning*, we create an increasing awareness of the larger whole—both as it is and as it is evolving—leading to actions that can help to shape its more viable evolution and our sustainable future. That is to say, actions increasingly serve the whole and become part of creating alternative futures. How can living institutions learn to tap into a larger field to guide them toward what is healthy for the whole?

McElroy (2002) explores the notion of “*deep*” *knowledge management* and sustainability—based, in part, on the Deep Ecology movement and the work of Arne Naess—and argues for the beneficial impact that deliberately managing corporate (epistemological) values can have on sustainability practices and outcomes. McElroy differentiates between business- and knowledge-processing behaviours, where business behaviours are seen as really nothing more than business *knowledge in use*. Our learning systems are dysfunctional and he claims that if we change our epistemic and knowledge processing system first, more lasting and beneficial change expressed at the level of operational behaviours will follow in due course. High quality (sustainable) organizational outcomes depend on high quality action, which depends on high quality knowledge, which depends on high quality learning, which depends on a high quality epistemology, which for McElroy ultimately means the use of critical rationalism as advocated by Karl Popper. He coins this as the epistemological dimension of sustainability, next to the transformative dimension of sustainability.

What these authors show us, is that our operational business processes and behaviours may have a positive, neutral or negative impact on ecological or social sustainability, which in turn affects the health and well-being of active, living ecological or social systems; the wholes of which they are part. If outcomes are unsustainable we need deep thinking and learning, intelligence and “*deep*” knowledge (and a high quality epistemology) in an ever-continuing process of sustainable innovation and adaptation to restore a dynamic balance with this whole (our environment). All this is closely linked to an emerging need for new open organizational architectures capable of facilitating greater knowledge-creation for

achieving sustainable behaviour (Firestone & McElroy, 2004). How can such systems be designed to blend social, environmental and financial missions together at their very core? This is the main organizational design challenge of the twenty-first century.

In this paper, we will use an Adaptive Maturity Model (Firestone, 2006b) to describe the evolution or developmental levels of Performance Scorecards leading to the introduction and more detailed description of our AQLSC. This Adaptive Maturity Model reflects the shift from routine, reactive learning with financial performance indicators (= level 0) and the BSC (= level 1, see Section 3) to deeper levels of learning and measurement with the Adaptive Scorecard (=level 2, Section 4), up to the Adaptive-*Quadruple Bottom Line*—Scorecard (= level 4, Section 5), including and serving the whole. The AQLSC combines deeper ways of thinking and acting with a (whole) systems view in a “life cycle” Scorecard (combining the Knowledge Life Cycle with the cycle of life on Earth—that is, the Deep Ecological “Self”). In Section 6 we will describe two tools associated with our AQLSC. We end with conclusions in Section 7.

It should be clear, that organizations do not have to go through all these levels; they can just jump to the level they want. But while mainstream business is mainly focused on simple scorecards and measurements, this emerging deep learning will lead to more complexity. Then again, life is not simple, and it may take a while before more complex “adaptive and sustainability” scorecards will be used, but there really is no choice and there is some consolation. It was not that long ago that people said that “quality” could not be measured, and look at TQM now!

As it is our goal to measure organizational sustainability performance with a new strategic map, we will first explore in Section 2 the theoretical background of “organizational sustainability.”

2. Organizational Sustainability

No agreed definition of “sustainability” has yet emerged. Voinov & Farley (2007) state that, in literature, most definitions originate from the relationship between humans and the resources they use, following the lines of the original definition of the Brundtland Commission for sustainable development, as the one that meets the needs of the present without compromising the ability of future generations to meet their own needs. However, this definition does not actually define what sustainability is. Norton (1992) argues that “sustainability is a relationship between dynamic human economic systems and larger, dynamic, but normally slower changing ecological systems, such that human life can continue indefinitely, human individuals can flourish, and human cultures can develop—but also a relationship in which the effects of human activities remain within bounds so as not to destroy the health and integrity of self-organizing systems that provide the environmental context for these activities.” Costanza (1992) defines the sustainability of a system as the system’s ability to maintain its structure (organization) and function (vigour) over time in the face of external stress (resilience). Jorna (2006) argues that an artifact (thing, construct, issue) is sustainable if its structure is in a dynamic balance with its environment. A dynamic balance means that the environment can be used, but that the environment itself also “uses” the artifact. Solow (1991) claims that the system is sustainable as long as the total capital (human made plus natural capital) of the system is equal or greater in every next generation. Costanza & Daly (1992) argue that sustainability only occurs when there is no decline in natural capital. Holling (2000) argues that sustainability is the capacity to create, test and maintain adaptive capability. There is one common component in all these definitions. They all talk

about maintenance, sustenance or continuity of a certain resource, system, condition or relationship; in all cases, the goal is keeping something at a certain level, of avoiding decline.

The concepts underlying sustainability and knowledge at an organizational level provide a foundation for the *AQBLSC*. We view organizations as being complex, adaptive social systems. People tend to fulfill two types of roles in such systems: (1) an internal instrumental role (e.g., a worker contributing to the realization of the organization's functions) and (2) a role as external stakeholders (judging and sense-making).

In some approaches, an organization's "health" is determined by both *effectiveness* and *adaptation*. Executive concerns about improving organizational effectiveness have been present since Drucker (1966) first published *The Effective Executive*. Hrebiniak and Joyce (1985) and Burgelman (1991) regard organizational adaptation as strategically similar to effectiveness in the minds of executives. In this view, an organization's effectiveness results from managers consistently making strategically correct decisions. Getting things done in ways that are consistently right requires continual alignment of the organization's systemic policies (goals, resources and priorities), with both internal and external dynamics. Therefore, sustainable social systems need to be both adaptive and effective.

Effectiveness is not just success rate in reaching the right goals; it can also be measured by a quotient in which the actual result is divided by the desired result (goal state) (McElroy 2008). In a broader sense, system-effectiveness deals with two questions simultaneously: (1) to what degree is the social system (organization, department) effective in using its means (instrumental role)? and (2) to what degree is the social system, as a means itself, effective in fulfilling the needs of stakeholders? Determining effectiveness is not limited to financial and economic results, but includes environmental and social bottom-line results as well, directed at ecological and social system's "health," or the whole of which the organization is part of.

Adaptability resides in an organization's potential for changing its essential characteristics to enable more effective problem-solving responses to emerging internal and environmental dynamics. This process of self-renewal draws upon an organization's innovative capacity. The notion of adaptation infers a type of problem solving in which organizations are effectively able to handle each step of the decision cycle—from problem detection through implementation.

However, social systems are often not both effective and adaptive enough to cope with extreme environmental complexity. Too often, they lack the sorts of requisite receptiveness and responsiveness (e.g., insufficient intentions, knowledge for action), and have insufficient learning capacity to generate effective knowledge. In other words, over time, they transition toward becoming progressively less sustainable—that is, they do not renew enough and finally end their life cycle.

The essential idea of *sustainability* is that of maintaining or enhancing some valuable feature (of life) into the future. Theories of sustainability are infused with two dominant ideas about the meaning of this term. Hooker & Brinsmead (2005) analyze sustainability as (1) maintaining and enhancing adaptation and resilience (natural and human) and (2) maintaining and enhancing capital (natural and human). Below we will describe an adaptation-based theory of sustainability combining both adaptability dimensions. Then, we will describe a capital-based theory of sustainability combining effectiveness with a capital-based approach.

- (a) An adaptation-based theory of sustainability

Viewing sustainability as a process of adaptation is an approach closely linked to General Systems Theory and Complexity Theory on the self-maintenance of identity in complex systems. Maturana & Varela's work (1980) especially relates to the maintenance of the internal pattern of the organization of such systems, in the context of their interaction with the environment. In order to maintain its defining characteristic pattern, the organization reconstructs itself while also co-evolving with the environment. So there is stability and change at the same time. Organizations have to keep their identity intact as they adapt (Cavaleri & Seivert, 2005).

Adaptation, in turn, depends on problem solving, learning, and knowledge processing, including both knowledge production and knowledge integration. However, the quality of organizational knowledge processing is an effect of Knowledge Management (KM) policies. These policies set in motion various activities designed to enhance knowledge processing. But that is not all. Sustainability and high quality knowledge processing involve sustainable innovation which means: (1) producing solutions to current knowledge problems without costly side effects and (2) maintaining or enhancing the capacity of the system to solve problems, communicate solutions, and adapt (Firestone & McElroy, 2003; Jorna et al, 2009).

Sustainable innovation is a necessary pre-condition for successful organizations to operate; often being expressed in patterns of organization, learning styles adopted, and organizational behavior, types of products and services they make, kinds of energy and resources they use, and the sorts of wastes they produce. However, patterns of innovation in most human social systems today are dysfunctional and incapable of helping them become more sustainable. They often have the unintended consequence of limiting human actors in numerous and significant ways that alter organizational viability. These include tendencies to hinder people's ability and willingness to learn effectively, recognize and solve non-trivial problems, and operate in sustainable ways (McElroy, 2008).

(b) A capital-based theory of sustainability.

Viewing sustainability as effectiveness is often linked to the TBL and to vital capitals. In business literature, the capital-based view of effectiveness is becoming a dominant notion of organizational sustainability (Porritt, 2005). Corporate sustainability encompasses strategies and practices that aim to meet the needs of stakeholders today while seeking to protect, support and enhance the human and natural resources that will be needed in the future. An emerging question with regard to corporate sustainability and sustainability reporting is: What is its theoretical basis? What does it mean to say that companies, or its operations, are socially sustainable? Or ecologically sustainable? From Daly & Cobb (1994), Donella Meadows (1992), Porritt (2005), McElroy (2008) and many others, the sustainability of a human population, or organization, is a function of its impact on (the stock of) one or more types of vital capital. This conclusion rests upon a *capitals-based theory of sustainability*.

Capital is here considered as a stock of anything that can yield a flow of beneficial goods or services into the future as required by humans and/or non-humans for their well-being. In sustainability theory and practice, vital capitals generally consist of natural or ecological capital and anthro capital (a term coined by McElroy in 2006 (McElroy, 2006b; McElroy et al., 2007; McElroy, 2008), which includes human, social, and constructed capital). The use of this notion of capital goes far beyond the classical economic interpretation of capital (McElroy, 2008; McElroy, Jorna & Van Engelen, 2007). *The sustainability of a population, or an organization, then, is simply the proportionate impact of its operations on the carrying capacities of these capitals on which people rely for their well-being. Carrying capacity is*

the extent to which flows of beneficial goods and services from a stock of capital can satisfy a population's basic needs.

The relationship of internal and external stakeholders with the company can be seen as an implicit *social contract* (McElroy, 2008). The revival of the social contract (White, 2007) is also one of the most pressing issues for 21st century business. The content of the contract specifies what a company's duties and obligations are to society, expressed in terms of its relevant stakeholder groups. The theoretical basis of a social contract is "the license to operate" that a company receives from society, in return for which it arguably owed certain duties and obligations to help ensure human well-being. Generally speaking, the duties and obligations of a company to help ensure the satisfaction and well-being of its stakeholders will be expressed in the form of normative principles and policies regarding what its impact on vital capitals should be.

Corporate strategic leadership has a prominent role to play in managing internal and external human and social capital (Hitt & Ireland, 2002). The social contract and performance outcomes regarding vital capitals are closely linked to management and leadership fairness (Hadders & Miedema, 2009). High quality sustainability performance can also be seen as a function of its leader's fairness: distributive justice, procedural justice and interactional fairness regarding internal and external stakeholders.

We end our theoretical survey with the conclusion that organizational sustainability is a capability with two distinct aspects. The first is the organization's ability to *adapt* to environmental challenges, while maintaining its own basic pattern of identity. The second is the ability to *interact* with the environment in such a way that it does not degrade levels of natural and anthro-capital beyond levels required by humans (and their future generations) for their well-being (McElroy, 2008). These are also the internal and external dimensions of organizational sustainability, linking knowledge ecology with natural and social ecology.

In order to be sustainable, an organization needs two things: (1) knowledge of its impacts on the world (receptiveness), and (2) the capacity to learn and innovate in response to problems (responsiveness) (McElroy, 2006a). The quality of sustainable performance is, in part, a function of the quality of "deep" knowledge processing. KM is precisely the management function that exists to control the quality of organizational knowledge processing and its immediate knowledge outcomes (McElroy, 2003). KM is also about not exploiting and depleting social capital, but maintaining and investing in it.

But how to measure organizational sustainability performance? What kind of scorecard reflects deep learning, as a leading indicator? What does the evolution of Performance Scorecards look like, including the organization's environment in more holistic ways?

3. The Balanced Scorecard

Many companies using the Balanced Scorecard may want to revise their Balanced Scorecards gradually, and an Adaptive Maturity Model (AMM) is offered for use in developing the next generation of Performance Scorecards. The AMM views financial performance measures as Level 0 of an envisioned Adaptive Scorecard evolution. Table 1 illustrates the categorization scheme for level 0.

	Operational Performance Measures
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Financial	
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Table 1. Level 0: Financial Measures

The Balanced Scorecard is level 1 of this model with its four-perspective framework of indicators, designed to measure organizational performance in a way that is more holistic than conventional financial approaches. It adds the customer, internal business process, and learning and growth perspectives to the financial (see Table 2).

	Operational Performance Measures
Financial	
Customer	
Internal Business	
Learning and Growth	

Table 2. Level 1: The Balanced Scorecard

It is however not designed to consider organizational sustainability performance issues like: sustainability, broader arrays of stakeholders, adaptation and KM. It's therefore not an Adaptive and Sustainability Scorecard. Its focus is narrow, dealing with a limited set of stakeholders such as customers, shareholders and employees. And next to the financial bottom line, other significant performance metrics are conspicuously missing.

The Balanced Scorecard has gone through two stages of evolution: a business indicators stage focused on performance measurement and a strategic modeling stage focused on integrating performance measurement into organizational strategy. This approach to performance measurement has been remarkably successful in getting widely adopted and applied by organizations, and with software tools for strongly supporting its two stages readily available. However, Firestone (2006, 2006a) has noted that the record of Balanced Scorecard progress has not been one of unmitigated success since the field faces at least five highly visible challenges (see Table 3).

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| <ol style="list-style-type: none"> 1. Dissatisfaction and perceived failure involving Balanced Scorecards appear to be too high, and reports of a lack of impact seem too plentiful; 2. The strategic component of Balanced Scorecards often lacks concreteness and undermines strategy mapping efforts; 3. The Balanced Scorecard framework is conceptually inadequate as a guide to specifying key performance indicators (KPIs) because the basic framework is not comprehensive enough; 4. Balanced Scorecards are characterized by measurement modeling weaknesses that lead to either too many indicators or a set of indicators that don't encompass important variation in organizational behavior; 5. Balanced Scorecard implementations have substantial impact modeling and evaluation research weaknesses that prevent testing of strategy maps. |
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Table 3. Limitations of Kaplan and Norton Balanced Scorecard

Due to these challenges, a third stage of Balanced Scorecard practice is now emerging. But the form it will take is not entirely clear, because we are the ones who must take that decision. The third generation may involve major modifications to incorporate ‘destination statements’ (a much more operational version of a strategic vision), an emphasis on systems theory, computer simulation tools, formal dynamic models, use more explicit measurement tools, and an emphasize on facilitation sessions to generate information to use in modeling processes (Firestone, 2006).

In this paper, we offer solutions to two of the five challenges: the conceptual framework underlying Balanced Scorecards (sections 4 and 5); and the problem of strengthening its measurement models (section 6). We think the initial four-perspective Balanced Scorecard framework (level 1) is best seen as a beginning. This paper suggests that the third-generation Balanced Scorecard will be an Adaptive Scorecard. We need to go beyond the BSC to develop a better and expanded ontology framework for metrics, and this paper develops three additional levels. We will outline a framework for a more comprehensive socially responsible Adaptive Scorecard. In section 4 we describe the first and second level of this Adaptive Scorecard linked to our adaptation-based theory of sustainability and in section 5 we describe the third and final level of the Adaptive Scorecard, expanding and combining it with the Triple Bottom Line and capital-based theory: The Adaptive –*Quadruple Bottom Line*-Scorecard.

4. The Adaptive Scorecard

Firestone (2006a) introduced the idea of an Adaptive Scorecard, based on the distinction between single and double-loop, or routine and creative (deeper) learning. Routine learning occurs when we’re trying to close a gap between what we want and what we have, or between the way we think the world is and the way we think it should be. In routine learning we make new knowledge (that is, we learn) only by applying *old* knowledge in the form of rules or mental models we’ve already developed. Routine learning is non-problematic in nature. It gives way to creative learning when things become problematic and we recognize that there’s a knowledge gap. In order to close that gap, we have to create *new* knowledge. Creative learning is adaptive in a way that routine learning is not. Routine learning uses previous knowledge (rules and mental models) to learn about specific conditions surrounding operational process activity. But creative learning -as a deeper level of learning- focuses on learning new general rules and models for transforming the ways in which we perform operational process activity.

The enhancements of the BSC we propose can be illustrated by adjustments leading to a new level of the AMM: the Adaptive Scorecard (level 2). We start with the original BSC (level 1) which is about operational performance measures regarding Financial, Customer, Internal Business and Learning and Growth. Level 1 BSCs do not recognize the distinction between routine and creative learning. They do not recognize that we can distinguish operational performance measures related to routine learning and intelligence performance measures related to creative learning. By intelligence performance measures, we mean measures of the capacity of an organization to learn about problems and the solutions in the various frames of the BSC -- as well as measures of actual success in creative learning. The distinction between operational and intelligence performance measures is the basis for the idea of the Adaptive Scorecard, see Table 4.

Creative, deep learning at the organizational level is at the heart of organizational adaptive functioning, and this idea involves the following categories of intelligence performance measures: decision processing; knowledge processing; knowledge management processing; their information and knowledge outcomes, etc. These intelligence performance measures cannot be easily measured using the range of indicators and the very simple measurement models used in the first and second stages of the Balanced Scorecard. Instead, intelligence performance measures must be developed using group decision process, panel-based human judgment methods, and content analysis methods using text sources. Creating the Adaptive Scorecard by introducing measures and indicators of intelligence performance is no trivial task. It involves adding to the conceptual framework underlying scorecards, adding measurement modeling, and adding other new tools to the kit bag of Scorecard practitioners (Firestone, 2006a).

	Operational Performance Measures	Intelligence Performance Measures
Financial		
Customer		
Internal Business		
Learning and Growth		

Table 4. Level 2: The Adaptive Scorecard

An Adaptive Scorecard distinguishes measures of the capacity for creative learning and actual success in creative learning from business function measures. In other words, it draws a clear distinction between operational performance and intelligence performance measures, but still retains the original four BSC factors in its framework. It also includes a set of categories of intelligence performance measures parallel to the original set of categories of operational performance measures (Firestone 2006a). Level 3 of the Adaptive Scorecard AMM arises while incorporating measures connected to the dichotomies: process/outcome and managing/doing, see Table 5.

The breakdown of all scorecard perspectives into process and outcome measures in level 3 highlights the fact that outcomes are produced by processes and that organizational strategy models that directly link outcomes without going through processes are missing some vital links. The process/outcome distinction is incorporated in the initial BSC framework by restricting the financial, customer, and learning and growth perspectives to outcomes, while the internal business process perspective incorporates all the process measures and indicators in the enterprise. This distinction, however, has many conceptual disadvantages reviewed in Firestone (2006), and in addition it fails to acknowledge the trend in organizations toward cascading Executive Scorecards. The inclusion of the doing/managing distinction highlights the problem of evaluating the quality of managing in a Scorecard context.

	Operational Performance Measures	Intelligence Performance Measures
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	Doing		Managing		Doing		Managing	
	Process	Outcome	Process	Outcome	Process	Outcome	Process	Outcome
Financial								
Customer								
Internal Business								
Learning and Growth								

Table 5. Level 3: The level 2 Adaptive Scorecard plus the Process/Outcome and Managing/Doing Dichotomies

We now have an Adaptive Scorecard connected to our adaptation-based theory of sustainability, with KM metrics in its Intelligence Performance segment. But what about the Triple Bottom Line and capital-based theories? What about their relationship to Corporate Sustainability Management? One thing that is striking in the BSC framework, is the absence of any external-facing perspectives other than the customer perspective. Others also recognize the importance of impact on the environment and propose a fifth perspective, a ‘community perspective’, which accounts for the organization’s relationships with the community in which it is embedded. We think an *external impact* perspective is essential because organizations are open, complex, adaptive systems that co-evolve in interaction with their natural, social, and cultural environments. If we don’t measure such impact, as well as the response of the environment to the organization, we cannot take into account side effects of organizational strategy that may threaten its very survival. In the next section, we’ll discuss this fifth perspective and clarify several new distinctions, leading to additional measures not considered before.

So far previous levels of the Adaptive Scorecard framework, in not including an external impact category, give a free pass to organizations to avoid measuring the degree to which their organization is socially responsible. The level 4 Adaptive Scorecard (see next section) is the first scorecard that would explicitly provide a foundation for tracking organizational social responsibility over time. We think the introduction of level 4 is another major development in scorecard progress, but it will require much effort. One consolation is that the organization is much less likely to be blindsided by unexpected external side effects that threaten its very survival. The other is that Adaptive Scorecards will be balanced between internal and external impacts for the first time.

5. The Adaptive *Quadruple Bottom Line* Scorecard

Many have adapted the BSC to address sustainability concerns – either by adding a fifth external perspective, or by incorporating sustainability issues in each of the four original perspectives. However, a more fundamental transformation is needed. McElroy (2009) suggested the idea of an AQBLSC (level 4) linking the Adaptive Scorecard to Triple Bottom Line theory. This constitutes the final level of our Adaptive Scorecard, connecting business processes with deeper “learning” and “sustainability” feedback loops. The following enhancements are made:

1. Replacing the original four BSC perspectives by four new perspectives: four Bottom Lines, each differentiated by an internal and external area of impact (see McElroy, 2008 for a taxonomy of sustainability metrics), and
2. Adding “impact” to the process-outcome category and linking both to a capital-based view. In Table 6 we show the end result, leaving out the “process” category to highlight our approach.

Table 6. Level 4: The Adaptive *Quadruple Bottom Line* Scorecard

It reflects the view that organizational performance can be seen in terms of a Quadruple Bottom Line (financial, environmental, social and economic). This is the logical extension of what Kaplan and Norton have been talking about in past years. Their financial perspective pertains to a financial bottom line, and their customer, internal business and learning and growth perspectives all pertain to a social and/or economic bottom line. As a consequence, the measures in the intelligence and operational part of the scorecard now become more connected to the notion of *exploitation* (or business processing and management) and *exploration* (or knowledge processing and management). It combines deeper levels of acting and thinking of the organization aligned with its environment: the monetary, economic, social and ecological systems (and their stakeholders).

The AQBLSC accounts for an “external impact” perspective and indicators (Firestone, 2006), while acknowledging that such an external impact can actually occur in three areas of impact. The Financial Bottom Line is not differentiated between internal and external areas of impact. This is because an organization's duties and obligations to have impact on monetary capital are not differentiated between internal versus external stakeholders, whereas they are for the other kinds of capital. Whether a shareholder, for example, is an employee or not is irrelevant to the organization's duties and obligations to have impact on shareholder value. This is not the case for the other categories, where an organization's duties and obligations to have impact on the respective capitals involved can, in fact, be very different for employees versus non-employees. Thus, we need separate categories, for separate metrics, or indicators in such cases.

Beyond Kaplan and Norton, new alternative approaches emerge linked to tangible and intangible resources: Value Creation Maps and Value Dynamics Frameworks. We propose to use a vital capital framework as a lens to look at the internal and external areas of impact and to calculate impact as capital-impact. In Table 7 we show the relationships of the different form of capitals with the four bottom lines. This is another way of looking at things. For example, knowledge as part of the original learning and growth perspective, is here seen as part of human and social capital. Exploiting knowledge and not investing in it, therefore means depleting human capital (individual) and social capital (collective).

Area of Impact Bottom Line		Monetary Capital	Natural Capital	ANTHRO Capital		
				Human Capital	Social Capital	Constructed Capital
Financial Bottom Line		●				
Environmental Bottom Line	Internal Stakeholders		●			
	External Stakeholders		●			
Social Bottom Line	Internal Stakeholders			●	●	●
	External Stakeholders			●	●	●
Economic Bottom Line	Internal Stakeholders			●	●	●
	External Stakeholders			●	●	●

Table 7. Quadruple Bottom Line and Areas of (capital) Impact

We added *impact* as a separate category, since impact is not the same as *outcome*. The impact that an organization has had on any given outcome can be calculated by measuring the actual outcome and subtracting what would have happened anyway. Or by using capital-impact statements and performance targets reflecting thresholds, the “sustainability gap” can be calculated as: the gap between actual performance and what could be considered a sustainable level of impact. This shows what it would take to become sustainable, highlighting the shadow costs, and how these would affect the bottom line(s). Accounting for environmental, social and economic impacts encompasses internal practices as well as externalities – the wider social, environmental and economic impacts of the organization’s activities and operations on these system’s health. Impact measurement in social processes is still problematic, but space considerations prevent us from dealing with it here.

In short, each bottom line is connected with its own capitals and introduces its own accountability, accounting and auditing issues, next to indicators, reporting, risk rating and benchmarking (Elkington, 2001). Our level 4 adaptive scorecard can also help to highlight the fact that knowledge processing, for example, is too often geared towards improving financial performance and impacts only, and not environmental, social, or economic ones. In the next section we discuss the use of two tools connected to the AQBL scorecard: quotient based footprints for impact measurement and System Dynamics for impact modeling.

6. Impact measurement and modeling

To use the AQBLSC one needs to formulate goals, measure performance, and collect relevant data. The conventional BSC approach is weak in terms of measurement and impact modeling. Its literature has not reflected much concern for measurement models relating indices to indicators, or creating dashboards by using measurement modeling, rather than by only selecting a small set of indicators to populate one. We expect further improvements in the next generation of Performance Scorecards, and will discuss here two specific promising approaches that address the issue of “impact”.

(1) Quotient based footprints

A good example of an impact measurement and reporting tool is the *ecological footprint* (Wackernagel & Rees, 1996). A more recent example is the *social footprint*, McElroy (2008). McElroy proposes to codify social and ecological sustainability in the form of a quotient, $S = A/N$, that makes it possible for sustainability managers to operationalize the idea in organizational settings. The sustainability performance (S) of an organization is a measure of its *actual* social and/or environmental impacts (A) on the carrying capacities of vital capitals, relative to what its *normative* impacts (N) on the same carrying capacities of capitals must or ought to be (in order to ensure stakeholder well-being). The latter is typically determined by reference to environmental limits or social conditions in the world. In other words, the numerator of this quotient represents an organization’s actual impact on a vital capital, and the denominator represents a norm for this impact. One can do this calculation for all sustainability duties and obligations an organization may have. Once a quotient has been determined, the resulting score can be plotted on a common sustainability performance scale. For social and economic impacts, scores of ≥ 1.0 signify sustainable operations (performance meets or exceeds stakeholder needs); for environmental impacts, scores of ≤ 1.0 do the same (performance falls within environmental limits) (McElroy, 2009b).

It is possible to measure the bottom-line economic, ecological, and social sustainability performance of organizations by using the quotient. The sustainability of an organization is primarily defined as maintaining and enhancing the carrying capacity of natural and anthropic capital. Effectiveness is seen as a sustainability quotient where the numerator is the actual net quantitative impact of an organization’s activities on capital, and the denominator is the net quantitative impact on capital that an organization expects to have (McElroy, 2008). A living system’s behavior is sustainable if its impact on the capitals on which it relies for well-being do not unduly degrade or diminish the related stocks of capital. We advocate the use of this quotient-based method since it explicitly takes “context” into account and looks for a “social contract” with organizational stakeholders regarding impact on vital capitals.

The quotients approach to non-financial sustainability metrics is consistent with GRI’s call for “sustainability context” in sustainability measurement and reporting. The sustainability

quotients of context-based sustainability management are Context-Based Metrics (CBMs). CBMs bring “context” into the business of designing and applying sustainability metrics, by factoring actual social, economic and/or environmental conditions in the world as they pertain to basic levels of human well-being (McElroy, 2009a). It’s a quantitative method for computing meaningful bottom lines for social, environmental and economic performance, being literal measures (absolute, not relative) of true sustainability performance. Thus, impacts on water and other natural resources are measured against empirical rates of regeneration and/or waste assimilation, and impacts on society and economy are measured against human, social and/or infrastructure conditions – all relative to levels required to ensure human well-being. The question that a sustainability metric must answer is not a monetary one; rather it is a normative one: *Were the organization’s impacts on vital capitals what they should have been in order to ensure stakeholder well-being?* (McElroy, 2009b). There’s a growing body of research which integrates and emphasizes the subject of “needs, well-being and quality of life” into the context of sustainability (Costanza et al., 2007; Rauschmayer et al., 2008). If organizational sustainability policies and strategies want to be successful, they have to influence our quality of life in positive ways.

(2) System Dynamics

The BSC approach is also still in its infancy in using *impact modeling* to both predict and measure the effects of Balanced Scorecard interventions, changes in strategy, and changes in policy, program and project interventions on organizational performance (Firestone, 2006). Efforts to remedy this problem have begun, and focus around the use of System Dynamics and statistical analysis. Since 1997, a considerable literature has developed proposing or illustrating the use of System Dynamics to investigate the impact of BSC interventions on performance. Cavaleri & Sterman (1997) advocate designing System Dynamics interventions in advance in order to perform impact forecasting and later evaluation. Wolstenholme (1998) specified three ways in which System Dynamics could be used to develop Scorecard systems.

First, it can be used to model relationships among components of a strategic vision in strategy maps. Second, it can be used to develop dynamic relationships in sub-models. Third, it can be used to model specific, but still high-level relationships dealing with trade-offs among performance measures.

System Dynamics used in conjunction with the AQLSC allows explicit specification of hypotheses about causal influences and single- and double-loop feedback effects. When System Dynamics is combined with experimental or field-based data collection and statistical analysis, it is possible to test ideas about the impact of interventions connected to the scorecard’s critical performance indicators (Thompson & Cavaleri, 2009).

7. Conclusions

We have explored two different dimensions of organizational sustainability with their corresponding metrics; thus creating a new strategic map for 21st century business that we call the AQLSC, a tool for connecting organizational learning and innovation with corporate social responsibility and sustainability. In our evolutionary view of Performance Scorecards, this also means the ‘creative destruction’ of the original BSC, while evolving to a next level of development.

We think the AQLSC successfully integrates the Adaptive Scorecard and TBL, making a distinction between “drivers” of performance and the actual stakeholder satisfactions,

outcomes and impacts. Organizational sustainability (and change) management is a broad field. It encompasses both the fields of KM and Corporate Sustainability Management. They should preferably not be confined to a specific function or department. They are everybody's business and an integral part of everyone's tasks. We need to rediscover the source of performance improvement in "inside knowledge" (Fearon & Cavaleri, 2006).

The AQBLSK provides executives with a more dynamic knowledge-based framework that accounts for more of the core competencies and sustainable sources of competitive advantage that organizations are currently seeking to leverage. While the BSC has gained popularity, in large part due to its simplicity and ease of use, the increasing competitive pressures on firms today are leading executives to pay greater attention to knowledge-based intangibles and subtler forms of intellectual capital. We believe the AQBLSK will serve to open the door to an important dialogue between theorists and practitioners on future directions of measuring organization performance.

This dialogue takes place in the context of an increasing number of similar discussions about well-being at a national (Stiglitz et al., 2009) and European level of analysis (Commission EC, 2009). Here the issue is measuring the progress in the world, beyond GDP. Economic indicators such as GDP were never designed to be comprehensive measures of well-being. The same evolutionary process is at work here: complementing GDP with environmental and social accounts, changing the emphasis from measuring economic production to measuring human well-being.

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