



Modeling & Analytics of Sustainable, Resilient and Robust Enterprises

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Submitted: March 1, 2014- Published: August---, 2014

*DOI: 10.7350/BSR.***** – URL: http://dx.medra.org/10.7350/BSR.V***.20*****

ABSTRACT

The Sustainable Enterprise Excellence (SEE) approach of Edgeman and Eskildsen (2014a) is amended to embed resilience and robustness. This delivers the SEER² Model and Assessment Regimen. Simultaneous and sustainable attainment of enterprise sustainability, resilience, and robustness at superior levels leverages general and social-ecological innovation (Edgeman & Eskildsen, 2012), enterprise intelligence & analytics, operational and supply chain excellence, and enterprise human ecology as enablers. SEER² deploys enterprise governance (Edgeman 2013a; Elkington 2006) and 3E Triple Top Line (TTL) strategy (McDonough & Braungart 2002a) focused on generation of economic benefit to firm stakeholders, development and equitable distribution of social benefits, and environmental stewardship to deliver Triple Bottom Line (TBL) 3P (people, planet, profit) performance and impact (Elkington 1997) while also rendering the enterprise robust and resilient (Edgeman, 2013b).

Continuously transforming TTL strategy into superior TBL performance and impact is central to global policy change (Anderies et al., 2013) and is a hallmark of continuously relevant and responsible organizations (Edgeman et al., 2013a). Such transformation is focal to SEER² and weds enterprise excellence modeling typified by those of the European Quality Award and America's Baldrige National Quality Award or the balanced scorecard with the sustainability movement symbolized by the Global Reporting Initiative, UN Millennium Development & Sustainability Goals, and the 10 principles of the United Nations Global Compact. This effort "makes soft measures harder" via maturity scales and a combined narrative and dashboard performance report, making SEER² the first model and assessment regimen to simultaneously address enterprise sustainability, excellence, resilience and robustness.

Keywords: dashboard technology, maturity assessment, resilience, robustness, social-ecological innovation, triple top line, triple bottom line.

1. INTRODUCTION

Sustainable enterprise excellence (SEE), *resilience* and *robustness* (R^2) are important, desirable and related enterprise traits, but are not wholly consonant, with objectives that differ in subtle yet important ways. A third R, *resplendence*, is addressed briefly herein. Together these may be represented as SEER² or SEER³ – with characterization depending on how resplendence is

generated – whether independently, as a consequence of SEE, resilience and robustness, or in some other manner. These are activated by appropriately implemented multiple common factors or enablers, among others being big data intelligence & analytics, operational & supply chain proficiency, and innovation. Complex interrelationships involving SEER² and its enablers are explored, with two enablers particularly emphasized: innovation, along with IT enhanced big data intelligence & analytics (Melville 2010).

While numerous forms of innovation are important to SEER², the emphasized form is social-ecological innovation (Edgeman & Eskildsen, 2014b) or SEI, a key factor in organizational transition toward sustainability (Smith & Raven, 2012) with enterprise manifestation at the interface of *sustainable innovation* and *innovation for sustainability* (Rennings 2000). Sustainable innovation (Nill & Kemp, 2009) pervades organizational culture when innovation is regular, rigorous, systematic, systemic and strategic. Innovation for sustainability explicitly targets social or environmental objectives with the intent of delivering improved financial performance or other tangible benefits to the organization (Orlitzky et al., 2011), that is, TTL benefits which are directly traceable to such innovation. Innovation for sustainability is more likely, though not of a certainty forsaken under more turbulent, less promising economic conditions (Harwood et al., 2011; Sekerka & Stimel, 2011) so that clarity concerning the costs and benefits of SEI is of critical import (Sprinkle & Maines, 2010). In purely environmental applications SEI may be referred to as eco-innovation (Carillo-Hermosilla et al., 2009).

We will subsequently elaborate resilience, robustness, sustainable enterprise excellence, social-ecological innovation, and big data intelligence & analytics separately and in relation to one another. Consideration of resplendence or other key enablers of SEER², the model and assessment schema for which unify these with other key factors will be limited. The aims of such models and assessment technologies are to deliver insight into recent organizational performance, including operational and strategic successes and failures as well as areas where performance differed significantly from projections in form or magnitude. Perhaps more importantly, they purpose to provide enterprise foresight that inform and shape future enterprise strategy and tactics, leading to *next* best practices and sources of competitive advantage.

2. SUSTAINABILITY, EXCELLENCE, RESILIENCE AND ROBUSTNESS

Sustainable enterprise excellence results from integration and harmonization of selected principles emphasized by the enterprise excellence and sustainability movements that have developed largely in parallel over the past quarter century, with each having much deeper historic roots (Edgeman & Eskildsen, 2013). The enterprise excellence movement is often associated with the balanced scorecard (Kaplan & Norton, 1992) and the models and criteria supportive of the European Quality Award and America's Baldrige National Quality Award (Balasubramanian et al., 2005; Jacob et al., 2012). These stress superiority of financial performance, quality and productivity, human ecology performance (Edgeman et al., 2013b), customer and marketplace performance, operational and supply chain performance, and other domains. Relative to enterprise *sustainability* we intend the ability of an enterprise to create and maintain economic, environmental and social value for itself, its stakeholders and society at large, in both the short and long terms (Boston Consulting Group & MIT Sloan Management Review, 2013). Key principles of the sustainability movement are in differing ways embedded in the ISO 14000 Environmental Management Standards (King et al., 2005), ISO 26000 Social Responsibility

Standard (Castka & Balzarova, 2007), Global Reporting Initiative (GRI) aspects, 10 Principles of the United Nations Global Compact or UNGC (Kell 2012), United Nations Millennium Development Goals (Sachs 2012) that are in transition toward UN sustainable development goals (Griggs et al., 2013), and the 1987 Brundtland Commission declaring sustainable development as development meeting the needs of the present generation without compromising the ability of future generations to meet their own needs (Shrivastava 1995; Wood 1991).

Sustainability is both an emerged megatrend (Lubin & Esty, 2010) and *the* key driver of innovation (Nidumolu et al., 2009), though of course the relationship is more circular: innovation enables sustainability while sustainability issues motivate innovation. This is a positivistic view since any given thrust is subject to perversion or sabotage leading to realization of negative consequences in what may be called the “bad robot” phenomenon.

Innovation enables enterprise *resilience* and *robustness* where in some constructs resilience and innovation are inextricably linked. To wit, Reinmoeller and Van Baardwijk (2005) characterize *resilience* as an enterprise’s capacity to self-renew over time through innovation. More extensively, *resilience* is an enterprise’s ability to continually change, reinvent itself, and adapt its responses (Contu 2002; Folke 2006) in order to rebound or recover from negative shocks or extreme challenges in a multi-faceted ecosystem that includes political, social, economic and other aspects in its competitive domain. In contrast, *robustness* is enterprise resistance or immunity to impacts from such shocks or challenges through formation and execution of an array of enterprise strategies, policies, partnerships, and practices (SP³) that transform extreme challenges into opportunities to maintain or advance enterprise competitive position.

Design for *robustness* is well-understood in engineering contexts as maintenance of the integrity of a system subjected to external, unpredictable perturbations or subject to uncertainty in its design parameters. *Robustness* implies that system outputs are insensitive to system input changes (Csete & Doyle, 2002). Analogous to robust product design, design for enterprise robustness involves tradeoffs between SP³ approaches producing optimal performance versus those delivering greater robustness. This dilemma arises since performance of a robust product, process, system or enterprise rarely matches the efficiency of a less robust “optimum” design but, in exchange, does not deteriorate as rapidly or precipitously as its non-robust counterpart (Anderies et al., 2004).

When extrapolated beyond products and services to the enterprise level, *design* is a battery of control processes that gather information from the enterprise, and subsequently transform it into actionable and implementable intelligence. In some instances these processes may be more mechanical and in other instances may manifest as policies that translate intelligence into action that feeds back into the enterprise. This characterization of robust enterprise design implies the following, all of which are fully transferable in relation to assessment of organizational progress toward any given objective, including SEER²:

- Assessment of robustness anticipates explicit use of performance measures reflecting relative maturity;
- The nature and magnitudes of enterprise uncertainty are defined, even if not necessarily well understood and only crudely quantifiable;
- Analysis of robustness addresses trade-offs between robustness and performance; and
- Analysis of robustness addresses change in performance in the face of various perturbations or shocks.

More complete and accurate elaboration of an enterprise's external environment together with better anticipation of any real or potential embedded shocks to the enterprise and their array of probable impacts provides opportunity and motivation to formulate contingency or safety strategies. This observation harkens to the value of enterprise intelligence and – in some cases – big data analytics, particularly when complex interactions exist that magnify the importance and preference of an optimal (single) integrated solution to a complex scenario in contrast to a simple combination of multiple “optimal” solutions to sub-scenarios that do not adequately account for such interactions (Chichilnisky & Wu, 2006).

Although there is a relationship between organizational resilience and organizational robustness, since they are neither identical, nor of necessity fully compatible, the implication is that an SP³ set maximizing resiliency may not be identical to the SP³ set maximizing robustness. As such, a critical organization design consideration is determination of an enterprise form that jointly optimizes resilience and robustness. Whenever there are differences in the SP³ sets maximizing resiliency and robustness, the organization should exercise care to elaborate and make informed choices among tradeoffs between *resiliency* and *robustness* so that any choice of organization design and SP³ leads ultimately – at best – to a constrained optimum.

As with many constructs, this in part implies that single measures of *resilience* and *robustness* are inadequate since each of these manifests within high-dimensionality spectra with non-orthogonal dimensions, and hence complex interdependencies. In an effort to better balance the various considerations of such tradeoffs Edgeman and Williams (2014) have formulated a calculus of resilience and robustness.

In addition to innovation, risk mitigation and vulnerability reduction (Scholz et al., 2012) are widely acknowledged *resilience* and *robustness* dimensions. The ability to breach barriers to change and intentional diversification of the portfolio of areas in which an enterprise possesses or is capable of developing competitive advantage provide two further means of enhancing *resilience* and *robustness* (Hamel & Välikangas, 2003), with yet another means provided by strategic selection of innovation strategy, practices, and targets. In particular, enhanced *resilience* and *robustness* may be advanced by deliberately embedding of SEI approaches such as cradle-to-cradle design (McDonough & Braungart, 2002b) and biomimicry (Benyus 2002) in an enterprise culture of sustainable innovation.

Integration of enterprise excellence and sustainability principles necessitates migration away from singular emphasis on profitability toward a more holistic and strategic view of firm performance that blends social, environmental, and financial perspectives. Together these are often referred to as 3P or “people, planet, profit” (Van Marrewijk & Werre, 2003). Active integration of these in innovation strategy that leverages biomimetic, cradle-to-cradle, and other higher-order design methodologies and principles is increasing, with such exemplar organizations as IBM leading the way (Bjelland & Wood, 2008). Such methodologies will ordinarily support the key sustainability principle of closed loop supply chains and material flow wherein end-of-life products supply energy or material for subsequent products or processes (Guide & Van Wassenhove, 2009; Souza 2013).

What we see in summary is that enterprise excellence, sustainability, resilience and robustness are consistent, though not wholly congruent. As such these are each advanced by various common enablers, yet strategies, policies, partnerships and processes optimizing one of these are not likely to optimize the others – implying that the overall “best” solution will be one that requires compromise in what is commonly referred to as a constrained optimum.

3. SELECTED ENABLERS OF SEER² AS RESILIENCE & ROBUSTNESS

SEER² includes both enablers and results. Many SEER² elements hold long-standing stature in established enterprise excellence models. Here we examine a few SEER² enablers whose roles relative to resilience, robustness or both are less well understood. In particular we briefly explore the roles of human capital; operational and supply chain strategy, processes, and actions; and enterprise governance and strategy in relation to resilience and robustness. Innovation and big data intelligence & analytics are reserved for deeper examination.

Strategic management of human capital resources to create competencies among core employees makes it possible for enterprises to respond to severe shocks in a resilient manner, particularly when competencies are aggregated at the organizational level (Lengnick-Hall & Beck, 2005). Critical human capital elements central to developing resilience capability include selected cognitive abilities, behavioral traits, and organizational / applications context, where these are subject to blending via human capital policies and practices (Lengnick-Hall et al., 2011). A human capital concern critical to resilience and robustness – not to mention enterprise excellence – is that of ambidextrous learning that enables enterprises to exploit existing knowledge domains while simultaneously exploring new ones. Selected human capital configurations are far more supportive of ambidextrous learning than others (Kang & Snell, 2009).

Excellence models have traditionally focused on organizational senior leadership rather than the larger hybrid of governance and leadership embraced by SEER² (Edgeman 2013a). That said, high profile corporate (ethical) failures leading to the Sarbanes-Oxley Act of 2002, New York Stock Exchange Corporate Governance Rules, and follow-on legislation and regulations acknowledge societal and political expectations of corporate governance. A Booz Allen Hamilton study of corporate governance concluded that governance is capable of delivering enterprise resilience, robustness, and continuously improved enterprise performance, but that a combination of soft factors related to the board of directors and hard factors that include performance criteria, processes, and measurements are essential if governance is to be transformed from a vague concept into an engine for enterprise resilience, robustness, and performance (Kocourek et al., 2003). The SEER² model and assessment technology specifically rely on performance criteria and measurement of these relative to defined maturity scales. Elkington (2006) notes the value of governance to enterprise sustainability, where a governance-leadership hybrid may be expanded to include the element of *capture*. Capture focuses on market expansion, whereas governance and leadership are related to enterprise capacity to assimilate, retain, defend and increase dominance with tactics of isolating and weakening adversaries, creating forward outposts, maintaining a strong base, and saving and consolidating power – all of which are strategies aimed at creating more enduring, resilient, and robust organizations (Carmeli & Markman, 2011).

Supply chains are comprised of a system of enterprises, people, activities, information and resources involved in producing and moving a product or service from supplier to customer. Superior supply chains are fast, cost-effective, agile, adaptable, and able to ensure that all of the enterprises' interests remain aligned so that they are robust and resilient (Lee 2004). The importance of supply chain resilience and robustness have become obvious in the wake of severe disruptions resulting from the terrorist strikes of September 11, 2001 (Christopher & Peck, 2004), natural disasters such as the 2004 Indian Ocean tsunami, the 2011 meltdown of three nuclear reactors in Japan, and Superstorm Sandy in 2012. At the enterprise level, more than 90% of

companies surveyed by PriceWaterhouseCoopers (2013) indicated that supply chain disruptions significantly affect business and financial performance. Strategies aimed at increasing operations and supply chain resilience and robustness typically focus on managing and minimizing operational and supply chain risk (known unknowns) and reducing uncertainty (unknown unknowns). Such risks and uncertainties include potential impact on assets and related services that might result from inadequate or failed internal processes, systems, technology, actions of people, or external events leading to corruption or disruption in enterprise operations or its supply chain (Gulati et al., 2010). Thorough management of operational and supply chain resilience uses protection strategy that seeks to prevent realization of operational risk and uncertainty in high-value services or disruption in supply of key resources; sustains high-value services or supply sources when risk is realized; effectively and efficiently deals with results and ramifications of realized risks and uncertainty to restore the organization to its prior steady state; and fulfills these goals at lowest cost, least negative social consequence, and least damaging environmental impact. It is thus that we seek to design, create and implement more resilient and robust operations and supply chains. Strategies and approaches for achieving this goal include risk segmentation; increasing operations and supply chain flexibility and agility; improving operational and supply chain maturity and risk management (PricewaterhouseCoopers, 2013); improving information sharing and security throughout the supply chain (Cachon & Fisher, 2000); increasing trust and collaborative relationships among supply chain partners (Faisal et al., 2006); enhancing corporate social responsibility (Sydow & Frenkel, 2013); and better aligning incentives and revenue sharing policies across the supply chain (Tsay 1999).

We see then, that operational and supply chain proficiency, enterprise strategy and governance, and strategic management of human capital each enable attainment of enterprise resilience and robustness. Moreover, it is clear that these interact and that appropriate interaction can multiply their impact so that enterprises must be aware of and manage these interactions.

4. BIG DATA INTELLIGENCE & ANALYTICS IN SEER²

Hallmarks of big data include richer and more numerous data sources; massive data volume and variety; dramatic growth in data storage capacity and processing speed; and quantum leaps in analytic capability and graphic intricacy. This combination has led to deeper exploration and analysis of less well-understood data types that include textual, web, network, mobile, and big data and analytics (Chen et al., 2012) that can be used in increasingly complex or novel environments that demand highly efficient, effective, rapid and customized translation of data into intelligence, intelligence into foresight, and foresight into value (LaValle et al., 2011). Included among more recent such developments are stratigraphy that contributes to graphic conceptualization and communication of enterprise strategy (Cummings & Angwin, 2011).

The enterprise excellence focus on big (and small) data analytics and intelligence reflects the inevitable progression resulting from extension of quality management practices and principles in relation to product, process or system performance to whole enterprise and supply chain dynamics and performance. Quality management has long esteemed data driven decision making, management and strategy (Apte et al., 2002), however the game changer has been the relentless advance of information technology that in keeping with Moore's Law (Jiang et al., 2011) has long delivered exponential growth in information storage capacity, processing speed and intelligence extraction that has ushered in the "big data era" (McAfee & Brynjolfsson, 2012). As

such enterprises are transitioning away from traditional data driven decision making toward a blend of this time honored approach with vastly more complex and computationally-intensive big data analytics that may yield mixed quantitative, qualitative and visual forms.

The importance of big data intelligence and analytics to enterprises is evolving so rapidly that noted organization design authority Jay Galbraith (2012) cites them as critical organization design components capable of supporting competitive strategy that enables organizations to operate both differently and more intelligently than their competitors and hence providing additional avenues to resilience and robustness (Voelpel et al., 2005). Consistent with Galbraith, application of big data intelligence & analytics to value and supply chain design and optimization carries with it the potential to transform “connected intelligence” into “integrated collective intelligence”. Connected intelligence is ordinarily – at best – additive in the sense that knowledge is summative across the chain. In contrast, integrated collective intelligence is multiplicative and better enables best-practice identification, sharing and integration, thus transforming best practice into common or usual practice or, in some cases, may be recombinant in that best practice fragments may be collected across the chain and combined (integrated) in ways that lead to *next* best practices and sources of competitive advantage deployed more pervasively across the chain – a topic that is intimately related to the ability of the organization to develop big data intelligence and analytics as a core competence that in turn contributes to TBL sustainability (Zhou et al., 2013).

The preceding discussion highlights just one of many examples of how organizational progress toward SEER² may be advanced through use of sophisticated, IT-enabled analytic transformation and translation of information into actionable enterprise intelligence and foresight. The importance of big data intelligence and analytics to sustainability (Gijzen 2013), operational and supply chain efficiency and effectiveness (LaValle et al., 2011), financial performance (Brown et al., 2011), knowledge management (Davenport et al., 2002), innovation (Conway & Klabjen, 2013), resilience (Pettit et al., 2013), and robustness (Preis et al., 2012) – all of which generate massive amounts and variety of information – are thus widely recognized, even if not always well understood. Increasingly then, organizations cannot afford to ignore big data intelligence and analytics – not because they provide failsafe identification and evaluation of all important organizational issues and decisions, or that they ensure subsequent derivation of uniformly better solutions than use of traditional data driven decision making – but rather because of the rapidly increasing volume of information generated from which intelligence and foresight that account for complex interactions of factors must be extracted.

While not assured, big data intelligence and analytics promise generally improved solutions to complicated organizational challenges that yield better supply chain navigation along with improved financial, societal and ecological performance. In this latter regard, organizations are increasingly incorporating social-ecological factors into their intelligence and analytical evaluations of enterprise competitive context as a means for improving performance through generation and implementation of strategic foresight (Petrini & Pozzebon, 2009) so that use of big data intelligence and analytics in combination with advanced design and innovation methodologies such as six sigma will for many organizations be critical to progress toward SEER² (Edgeman 2013b).

It is certain that the promise and potential of big data intelligence and analytics is intoxicating. On a precautionary note, however, it is often said “with great power comes great responsibility”. The power of big data intelligence and analytics further underscores the importance of data confidentiality as well as security in a more comprehensive sense in order to protect against

industrial espionage (Crane 2005) that can yield devastation analogous at enterprise levels to that wreaked by the 2008 cyber-attack on the United States Defense Department (Lynn 2010). This implies the sensibility of integrating security and privacy among SEER² measures.

5. INNOVATION AND SOCIAL-ECOLOGICAL INNOVATION IN SEER²

In essentially any context sustainability may be regarded as a capacity to endure, with the TBL formulation supporting a perspective well captured by the phrase: lean, green, ethical and real (Edgeman & Eskildsen, 2012a) as an extension and integration of lean approaches (Scherrer-Rathje et al., 2009) with green or environmental emphasis (Ginsberg & Bloom, 2004). We have:

- *Lean* refers predominantly to conservation of non-environmental resources;
- *Green* is associated with conservation of non-renewable natural resources, wise use of renewable resources, and limitation of environmental footprint;
- *Ethical* is related to commitment to and practice of social equity and justice, community involvement and contribution, and positive regard for treatment of the enterprise's human capital, and
- *Real* implies lean, green, and ethical practice with concomitant results that include financial, societal, and environmental results.

Sustainability thus composed has been identified as an emerging source of competitive advantage (Laszlo & Zhexembayeva, 2011) wherein effective environmental policy is a documented driver of firm value (Al-Najjar & Anfimiadou, 2012). Just as solid environmental policy is positively correlated to firm value, so too has effective implementation of enterprise excellence models so that various attempts have been made to integrate these approaches (Asif, et.al 2011; Avlonas & Swannick 2009; Salzman et al., 2005).

It is well-established that innovation in general and SEI in particular is a key thread integrating the gains realized by effective environmental policy implementation and effective use of enterprise excellence models (Hansen & Wernerfelt, 1989; Samson & Terziovski, 1999; Pujari, 2006). Innovation of the form pursued herein, then, is innovation that addresses societal, environmental and financial performance and thus integrates sustainability and enterprise excellence regularly, rigorously, comprehensively, systematically, and profitably, that is, social-ecological innovation. Innovation is a joint responsibility of an enterprise's governance, leadership and human capital that is advanced through activity at the co-creative interfaces of the enterprise with its customers (Hoffmann 2012) and society (Edgeman & Fraley, 2008).

Organizations pursuing SEER² are engaged in pursuit of continuously relevant and responsible strategy, action, performance and impact – a pursuit that organizational structure can enhance or accelerate (Atkinson et al., 2000). In this context *continuous* implies regularity in both practice and performance, while *relevant* and *responsible* refer especially to social equitable, fiscally sound, and ecologically sensitive practice, outcomes (e.g. impacts). Routine iterative generation and implementation of enterprise foresight is critical to this pursuit where the generative process will commonly involve application of big data intelligence and analytics capabilities that aid development and coalescence three innovation perspectives germane to SEER²:

- The *strategist* perspective elaborating new business fields in which SEER²-driven innovation may occur;
- An *initiator* perspective that increases the number of SEER²-driven innovation concepts; and
- The *oppositional* perspective that challenges SEER²-driven innovation projects in order to elevate their performance (Rohrbeck & Germünden, 2011).

While the creative spark is widely recognized and valued in innovation, the process of selecting innovation projects and targets when confronted by multiple opportunities may be aided by the use of innovation tournaments (Terwiesch & Ulrich, 2009) with tournament entries represented by the portfolio of enterprise innovation prospects. The tournament process then seeks to identify and subsequently pursue the most exceptional such prospects. Central to pursuit of SEER² inspired innovation is that criteria defining *exceptional* prospects will include and perhaps emphasize SEI so that social and environmental benefits and impacts will ultimately prove influential in selection of innovation opportunities that are pursued. It should be noted that a shift toward a new equilibrium in the balance of exploration-based and exploitation-based innovation opportunities sought and pursued is almost surely consequential to adoption of SEER² driven organizational culture and strategy (Raisch et al., 2009).

5.1 Embedding SEI in SEER² Driven Enterprise Culture

The importance of SEI to SEER² necessitates understanding its contribution to value creation:

- SEI efforts will in some instances be generally consistent with lean approaches that focus on reducing cost, risks, waste, and delivering proof-of-value (Scherrer-Rathje et al., 2009);
- SEI should in other instances direct attention to redesign of selected products, processes, or business functions to optimize their performance and hence advance from doing old things in new ways to doing new things in new ways – that is, to value-creation (Edgeman & Eskildsen, 2014b);
- Integrate SEI and other innovation approaches into core strategies to drive revenue growth (Skarzynski & Gibson, 2008).

In like manner to effective integration of enterprise excellence approaches and environmental policy that positively impact firm value, embedding a culture of sustainability produces multiple positive enterprise impacts (Eccles, et.al. 2012). Relative to SEER², a significant aspect of such culture is innovation in general and SEI specifically. At issue then, is creating, cultivating, and advancing enterprise culture that embraces sustainability, SEER² and SEI – an effort supported by adapting the “tipping point” philosophy of human capital (Gladwell 2008) suggesting enterprises should be peopled by a strategic blend of and collaboration among *connectors* who build key enterprise bridges, *mavens* that provide creative and innovative energy, and *sales agents* that herald innovation and sustainability-driven value delivered to the enterprise where it is likely that given individuals might at different times assume differing or multiple simultaneous roles. In complementary fashion, noted innovation authority Tim Brown, CEO of IDEO, the world’s leading innovation and design firm (Davenport et al., 2002) – is that interdisciplinary collaboration is crucial to such an enterprise culture and the pursuit of such culture. Table 1 provides recommendations consistent with Brown’s perspectives (Brown 2008), but directed toward embedding such culture in an enterprise in order to advance SEER².

Table 1. Embedding Socio-Ecological Innovation in Enterprise Strategy & Culture

Focus	SEI Strategy and Actions
Innovation from the outset	Engage in structured ideation and innovation (Goldenberg et al., 1999; Hauser et al., 2006) before any direction has been set in order to expand the potential solutions space, thus creating more concept fragments and better likely eventual result. Actively include the “eco-voice”.
People-centered innovation	Leverage people-centered design thinking to capture unexpected insights and produces innovation that more precisely reflects consumer and societal wants and needs. Conduct ethnographic research to directly observe the user environment (Deshpande & Webster, 1989).
Rapid development	Demand rapid experimentation and prototyping, with constant consideration of environmental and societal impacts and hence sustainable solutions. Assess progress with creativity metrics such as time to first prototype.
Co-creation focus	Expand the enterprise innovation ecosystem through engagement of users and society (Edgeman & Eskildsen, 2012b).
Innovation portfolio	Manage an innovation portfolio that spans and strategically blends short-term incremental ideas to long-term evolutionary ones. Build efficiency while also stimulating broad experimentation and strategic variety, requiring that a significant subset of the portfolio have an SEI emphasis to ensure relevant and responsible innovation. This strategy aims to secure profitability from SEI, while also building enterprise resilience and robustness (Lavie et al., 2011).
Pace of innovation budgeting	Although innovation is often rapid, commercialization is often a more turbulent prospect that is sensitive to intellectual property considerations. Since complex budgeting cycles constrain the pace of innovation enterprise leadership must possess sufficient agility to allocate and reallocate budgetary resources as opportunities arise (Govindarajan & Trimble, 2010).
Talent capitalization	Human capital is a key enabler of both SEI and SEER ² . Build enterprise human capital with interdisciplinary talent and orientation. Provide innovation, design, and sustainability training strategically throughout the enterprise.
Design for the cycle	Rapidly rotate human capital in order to provide experience across the inspiration-to-ideation-to-implementation cycle and increase organizational ambidexterity (Jansen et al., 2005), thus generating better judgment and creating long-term benefits for the enterprise that includes improved understanding innovation impact on all sustainability dimensions.

Source: Adapted from Brown (2008) and Edgeman and Eskildsen (2012b)

While Brown provides a concrete multi-faceted SEI strategy and Gladwell suggests human capital composition, numerous others (e.g., Olsson & Galaz, 2011; Gauthier & Wooldridge, 2012; Eccles & Serafeim, 2013) have suggested adaptable roadmaps for embedding SEI strategy within and throughout the enterprise across all functional areas, activities, and results in order to successfully, profitably, and simultaneously transform 3E triple top line strategy into 3P triple bottom line performance, becoming increasingly agile and innovative while doing so. Adapted to SEI integration, such roadmaps collectively suggest:

- Make SEI core to enterprise vision and strategy, actively and deeply embedding translation of 3E triple top line strategy into superior 3P triple bottom line performance;
- Contribute SEI-driven solutions to specific challenges without creating new challenges;
- Gain the support of key stakeholders;
- Saturate all parts of the enterprise with SEI;
- Stress SEI performance and communicate success;
- Architect a board level authority with the will to make a difference via SEI – including enrichment of human life and society without eroding of life-supporting ecosystems;
- Set measurable SEI goals and monitor progress toward their fulfilment;
- Build, enrich, harness, and leverage the power of individual and collective human capital;
- Actively participate in key networks and engage at the co-creative enterprise-culture, enterprise-user, and enterprise-environment interfaces, leveraging the creativity and ingenuity of users, workers, consumers, citizens, activists, and businesses, thus rebuilding enterprises as communities (Mintzberg 2009);
- Less saleable, ensure that SEI is applied to work more thoughtfully and directly toward social justice, poverty alleviation, environmental sustainability, and democracy, rather than applying it exclusively to derivation individual or corporate profit (Olsson & Galaz, 2011).

In addition to the aforementioned policies, strategies and actions supportive of SEI penetration and saturation, Edgeman and Eskildsen (2014) have identified and elaborated complementary generic and context specific ones they refer to as 10R (basic) and 10A (advanced) SEI strategies and actions. The basic SEI actions and strategies include the familiar “reduce, reuse, recycle” call for environmental responsibility, along with replace, rethink, redirect, renew, reconsider, redesign, and reinvest. The more complex and strategically advanced SEI approaches include business model innovation, support for innovation, innovation insight, innovation foresight, innovation competencies and technologies, innovation readiness, new product and service innovation and design, socio-ecological innovation strategy, and systematic change integration.

The primary objective of springboard models is to provide useful feedback and foresight through a simple, accessible technology. SEI and general innovation play prominent roles in sustainable enterprise excellence and are featured in the *Springboard to SEE* model (Edgeman & Eskildsen, 2014a) that is next revised and extended to form a *Springboard to SEER²*. Prominence of SEI in the *Springboard to SEER²* traces additionally to its ability to reduce enterprise fragility in general and its financial system in particular (Klemkosky 2013) and hence contribution to enterprise resilience and robustness.

6. A SPRINGBOARD TO SEER² MODEL

Models such as the balanced scorecard, international quality award models, and many others are used to conduct regular, rigorous, comprehensive and systematic review of all relevant strategy, activities, and results for enterprise self-assessment purposes. *Relevant* is understood to mean

“relevant to whatever the model seeks to assess and discover”, whereas *comprehensive* implies thorough examination and discovery of intelligence relevant to areas assessed by the model. Chief among self-assessment aims are that it should provide feedback and foresight to the enterprise that stimulates improvement, informs strategy, and contributes to the greater likelihood or reality of identification, strategic selection, and implementation of *best* and *next best* practices and sources of competitive advantage.

Understood is that such models *do not* assess *everything* in the enterprise, instead emphasizing assessment relative to key model elements. For example, governance is not assessed in the same way as strategy, but it is assumed that the enterprise otherwise carefully addresses governance. As SEER² emphasizes SEE, resilience and robustness, enterprise self-assessment demands analysis of the quality of enterprise strategy, activities, performance, and impact relative to SEER² as part of the larger effort of understanding enterprise health (feedback). This is combined with intelligence concerning competitive, market, societal, political, and environmental conditions and trends to inform future strategy and action (foresight).

At its conceptual core the *Springboard to SEER²* is similar to many enterprise excellence models in that enterprise governance, executive leadership and strategy formulate policies and priorities that are transformed into performance results through people, partnerships and processes. These three primary divisions form the blocks of the Springboard model of Figure 1. High-level review of the Springboard to SEER² reflects this concept with the model proceeding from left-to-right from strategy & governance to process implementation & execution to performance results. A typical and intentional product of the analysis process is enterprise navigation away from a red ocean competitive bloodbath toward a more advantageous voyage in a competitively more pristine blue ocean (Kim & Mauborgne, 2005).

Production of a SEER² model and assessment regimen can be approached through adaptation and extension of the *Springboard to SEE Model* and associated assessment strategies and tools that include maturity measurement, *SWOT Plot Narratives*, *SEE NEWS Compasses*, performance dashboard technology, and the *SEE NEWS Report* (Edgeman & Eskildsen, 2014a). Six primary areas of the *Springboard to SEER²* are subjected to assessment: Triple Top Line Strategy & Governance (1), Process Implementation, Translation & Execution (2), and the four performance areas of the Triple Bottom Line Performance & Refinement block – Financial & Marketplace Performance (3), Sustainability (4), Human Ecology & Capital (5), and SEI & General Innovation and Continuous Improvement (6). By human ecology (Lozano, 2011) we intend the relationships between the enterprise and its human capital with the social, natural, and built environments via whatever mediators are pertinent.

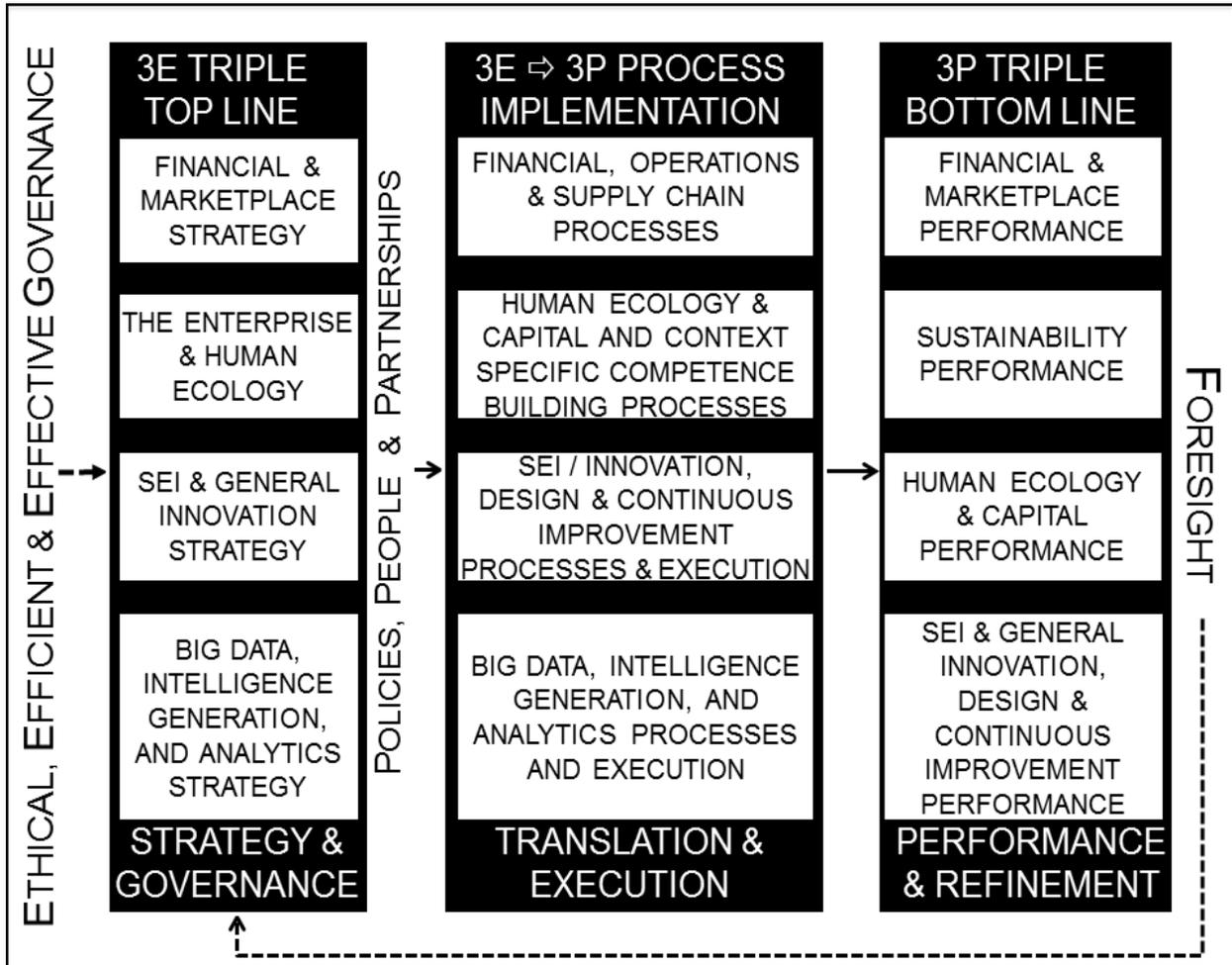
A “compass” is formed for each primary areas by assessing four perspectives or criteria (see Table 2) designated as navigational “compass” directions N (north), E (east), W (west), and S (south)– albeit rearranged to render the NEWS acronym.

NEWS conveniently serves three main self-assessment purposes in that it is *easily remembered*, carries with it the connotation of *direction* (compass) enterprise assessment is intended to supply, and provides an easily recalled companion to direction – *news* concerning enterprise health and the way forward with respect to *Sustainable Enterprise Excellence*, *Resilience* and *Robustness*.

It may be debated whether the ideal number of perspectives for each compass is four or should be more, less or variable. Equally, other modelers might select alternative perspectives or describe the provided ones differently. Similarly, the Springboard employs 0-to-10 maturity scale differentiation for each perspective assessed and other modelers may describe maturity differently or select a different scheme. Although such issues may never be fully resolved, these

and similar considerations are inherent to assessment so that awareness is important in order to minimize or altogether avoid the pitfalls of employing questionable methodologies (Porter & Kramer, 2006), whether those methodologies are employed to assess corporate social responsibility, sustainability, enterprise excellence, resilience, robustness, innovation capacity, or another area of interest.

Figure 1. Springboard to SEER² Model



Source: Adapted from Edgeman and Eskildsen (2013)

Table 2. Springboard to SEER² NEWS Compass Point Elements

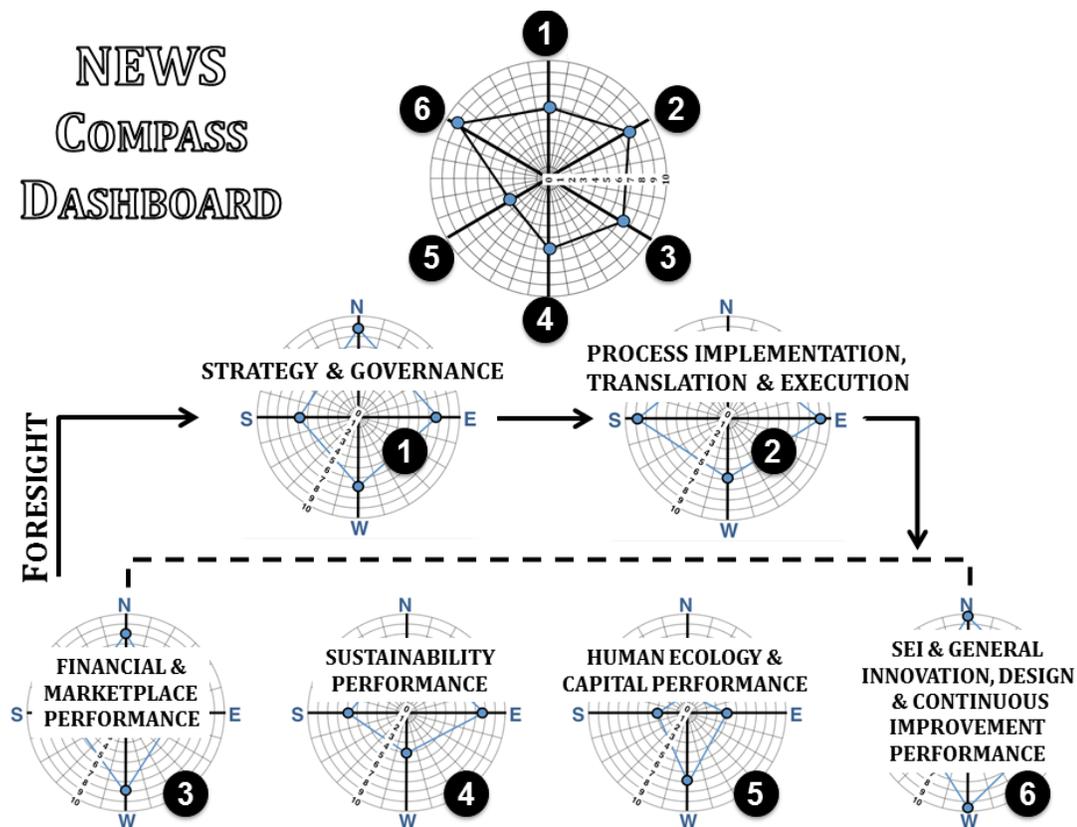
NEWS PERSPECTIVE	COMPASS DIMENSIONS
	TRIPLE TOP LINE STRATEGY & GOVERNANCE (1)
N	Financial & Marketplace Strategy for SEER ² & Supply Chain Strategy
E	The Enterprise & Human Ecology Strategy
W	Social-Ecological Innovation (SEI) and General Innovation Strategy
S	Big Data, Intelligence Generation, and Analytics Strategy
	PROCESS IMPLEMENTATION, TRANSLATION & EXECUTION (2)
N	Financial, Operations & Supply Chain Processes for SEER ²
E	Human Ecology, and Context Specific Competence-Building
W	SEI / Innovation, Design & Continuous Improvement Processes & Execution
S	Big Data, Intelligence Generation, and Analytics Processes & Execution
	FINANCIAL & MARKETPLACE PERFORMANCE (3)
N	Financial & Marketplace Results Traceable to Supply Chain Performance
E	Financial & Marketplace Results Traceable to Human Capital Investment
W	ROI & Reinvestment in Innovation, Design & Continuous Improvement: R&D
S	Financial & Marketplace Results Traceable to Big Data, Intelligence Generation, and Analytics
	SUSTAINABILITY (SEER²) PERFORMANCE W/ EMBEDDED ECONOMIC, INNOVATION, AND ANALYTIC IMPACT (4)
N	Sustainability Results Traceable to Supply Chain Performance & Analytics
E	Sustainability Results Traceable to Human Capital Engagement & Analytics
W	Environmental Sustainability Results & Refinement and Analytics
S	Societal Sustainability Results & Refinement and Analytics
	HUMAN ECOLOGY & CAPITAL PERFORMANCE (5)
N	Impact of Human Ecology & Capital on the Supply Chain
E	Impact of Human Ecology & Capital on Trajectory, Agility and Velocity
W	Impact of Human Ecology & Capital on Innovation Capacity
S	Impact of Human Ecology & Capital on Organization Design
	SEI & GENERAL INNOVATION, DESIGN, AND CONTINUOUS IMPROVEMENT PERFORMANCE (CI) (6)
N	Impact of Innovation, Design & CI Across and In the Supply Chain on SEER ²
E	Impact and Interaction of Innovation, Design & CI with Human Ecology & Capital on SEER ²
W	Impact of Innovation, Design & CI on Other Non-Financials & Intangibles
S	Impact and Interaction of Big Data, Intelligence Generation, and Analytics with and on Innovation, Design & CI Relative to SEER ²

7. SEER² MATURITY ASSESSMENT

N-E-W-S criteria are assessed relative to highly specific maturity criteria on a 0-to-10 scale for each of the six major assessment areas identified in Table 2. The scale is divided into five highly descriptive and progressive categories, with the possibility in each category of some discretion by an expert assessor. The categorical maturity ranges and labels are: (0-1) very low maturity, (2-3) low maturity, (4, 5, 6) moderate maturity, (7-8) high maturity, and (9-10) very high maturity. Maturity values for each N-E-W-S perspective are plotted on the appropriate dial of the Springboard to SEER² NEWS Compass Dashboard portrayed in Figure 2. The top dial in the dashboard has six axes rather than four (N-E-W-S) with each axis corresponding to one of the six primary assessment areas delineated in Table 2. The N-E-W-S perspectives associated with a given dial may be weighted, with preference for weightings that reflect the enterprise competitive context where, of course, non-negative weights must add to 1.00 (or 100%) within each primary assessment area as well as for the six axes of the summary “compass” positioned at the top dial of the dashboard.

A SWOT Plot Narrative similar to the generic one provided in Figure 3 is companion to each dial and these are in turn coalesced into a coordinated SWOT Plot Narrative Dashboard identical in construct to the Springboard to SEER² NEWS Compass Dashboard of Figure 2.

Figure 2. Springboard to SEER² NEWS Dashboard



Source: Adapted from Edgeman and Eskildsen (2013)

Figure 3. Generic SWOT Plot Narrative Format

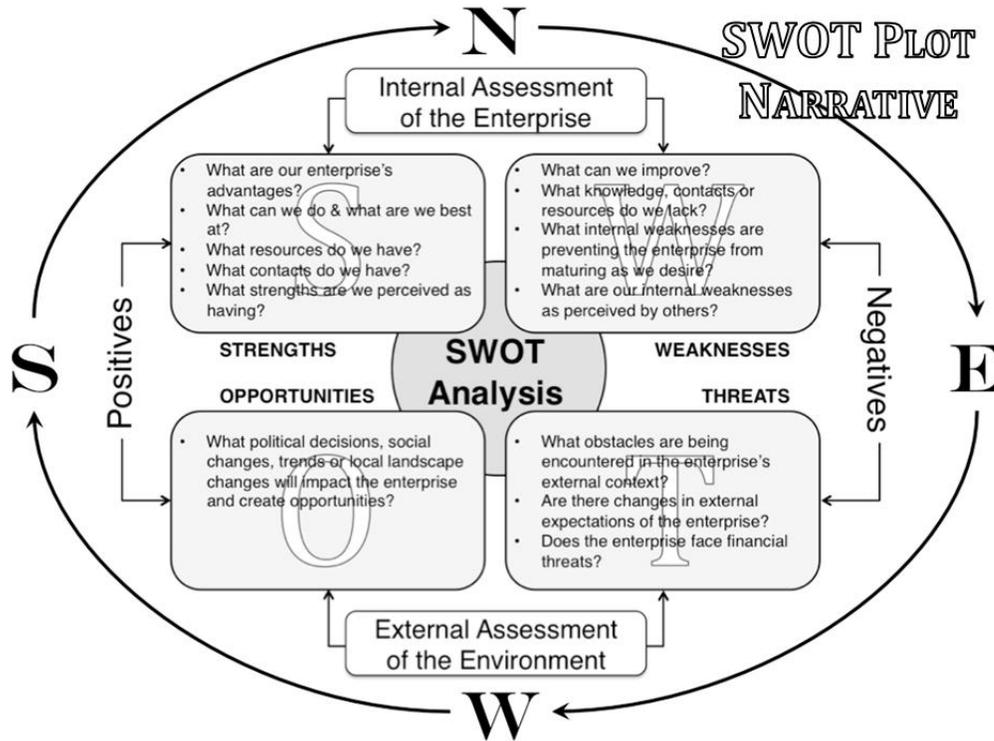


Figure 4. Springboard to SEER² NEWS Report

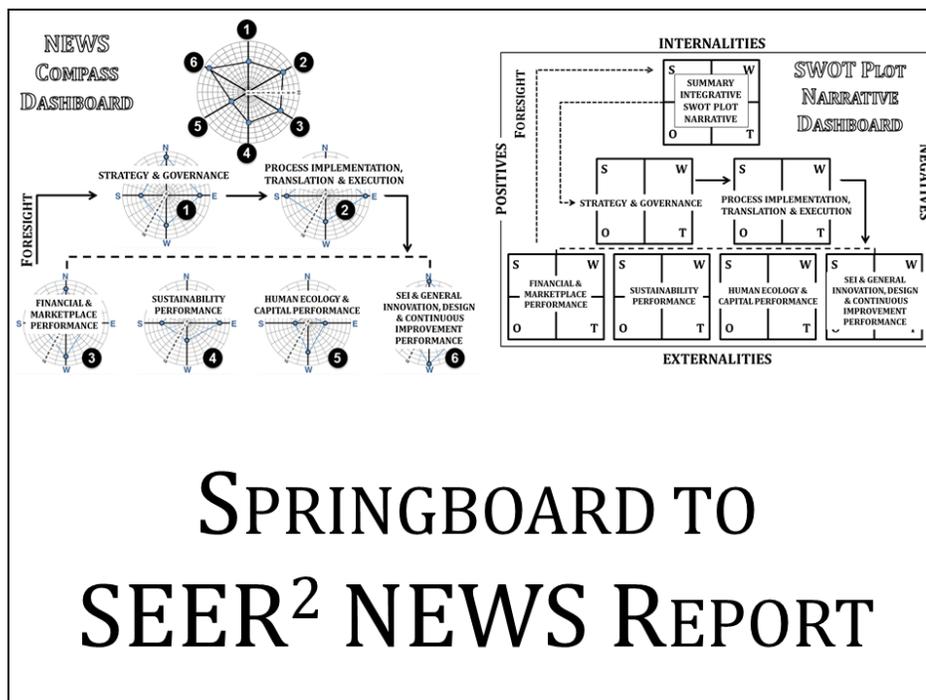


Table 3. SEI & General Innovation, Design and Continuous Improvement Maturity Assessment

S NEWS PERSPECTIVE	SEI & GENERAL INNOVATION, DESIGN, AND CONTINUOUS IMPROVEMENT PERFORMANCE ASSESSMENT AREA (6)
IMPACT AND INTERACTION OF BIG DATA, INTELLIGENCE GENERATION, AND ANALYTICS WITH AND ON INNOVATION, DESIGN, AND CONTINUOUS IMPROVEMENT RELATIVE TO SEER ²	VERY LOW MATURITY: Low Awareness and Capability (0-1)
	The enterprise generally has little or no awareness of big data, intelligence generation or analytic approaches and, similarly, little or no innovation, design or continuous improvement activity or capability.
	LOW MATURITY: Sporadic or Reactive Capability (2-3)
	Awareness of big data, intelligence generation or analytics approaches is limited. Similarly, innovation, design or continuous improvement activity is typically driven by short-or-near-term problems when seen as a necessity, rather than as a profit or other tangible gain opportunity.
	MODERATE MATURITY: Early Systematic Approaches (4, 5, 6)
	The enterprise is in the early-to-middle stages of embedding systematic and repeatable application of big data, intelligence generation and analytical approaches and connecting these to their innovation, design, or continuous improvement activities and is aware that application across the supply chain has the potential to generate additional benefits.
HIGH MATURITY: Aligned and Partially Integrated (7-8)	
Widespread application of big data, intelligence generation and analytic capabilities relative to innovation, design and continuous improvement opportunities is the norm and the connection of these to financial performance is well-understood. Some other supply chain members are engaged and benefit is being derived both for the enterprise and those supply chain members. Some processes are benchmark quality.	
VERY HIGH MATURITY: Deeply Integrated in Culture (9-10)	
Essentially all key and supporting areas of the enterprise actively make both strategic and tactical use of relevant big data, intelligence generation, and analytic approaches that enable improved innovation, design and continuous improvement solutions. This is generally embedded across the supply chain and especially so with its key members. These are critical to foresight generation and inform future enterprise strategy. Multiple of the relevant related processes are world class.	

SWOT, of course, refers to the familiar “strengths, weaknesses, opportunities, threats” analysis with strengths and weaknesses driven by controllable enterprise internalities, whereas opportunities and threats represent uncontrollable externalities (Blenko et al., 2010). As with the top dial of the NEWS Compass Dashboard, the uppermost narrative in the SWOT Plot Dashboard should represent a weighted or prioritized narrative that blends and harmonizes the narratives from the six primary assessment areas. The *NEWS Compass Dashboard* and *SWOT Plot*

Narrative Dashboard are ultimately combined to yield the final assessment of Figure 4, referred to as the *Springboard to SEER² NEWS Report*.

While assessment provides an enterprise health review, a more critical expectation of enterprise self-assessment is that it should provide ample and *actionable* foresight. Translation: assessment aims to improve enterprise performance with particularly astute enterprises able to attain significant improvement and implement best and next best practices, strengthening existing or identifying new sources of competitive advantage.

Central to this effort is the ability to meaningfully estimate enterprise maturity with respect to each N-E-W-S perspective for each primary assessment area cited in Table 2. Table 3 provides an abbreviated example narrative maturity scale for the S perspective of the SEI & General Innovation, Design and Continuous Improvement Performance assessment area. Twenty-four such scales are required, with the beginning narrative generally similar at like maturity levels across the six primary assessment areas and N-E-W-S perspectives.

8. CONCLUSION

Sustainable enterprise excellence, resilience, and robustness (SEER²) are hallmarks of high-performing organizations that thrive in good times and that successfully navigate more turbulent ones via pursuit of continuously relevant and responsible strategies, activities and results. Among key enablers of SEER² are superior triple top line enterprise strategy and governance and exemplary process identification, implementation, and execution that together generate superior triple bottom line performance.

The focus of the present work has been to provide a strategic and operational definition of SEER², develop an intentionally simple and easy to use Springboard to SEER² model, and to highlight key factors such as big data analytics, intelligence generation, and analytics; innovation in general and social-ecological innovation in particular; and enterprise human ecology. These efforts have been supported through development of maturity assessment along with graphic and narrative analytics that ultimately result in a Springboard to SEER² NEWS Report that produces both feedback on enterprise health and foresight that informs future strategy and activities, leading to best and next best practices and sources of competitive advantage.

Superior organization performance relative to SEER² is critical to long-term sustainable enterprise success and that is of course motivating to the stakeholders of most enterprises. Perhaps more important however, is the contribution of SEER² to positive societal and ecological performance.

REFERENCES

- Al-Najjar, B., Anfimiadou, A. (2012). Environmental Policies and Firm Value. *Business Strategy and the Environment*, 21(2): 49-59.
- Anderies, J., Folke, C., Walker, B., Ostrom, E., Walker, B. (2012). Aligning Key Concepts for Global Change Policy: Robustness, Resilience and Sustainability. *Ecology & Society*, 18(2): 8.
- Anderies, J., Janssen, M., Ostrom, E. (2004). A Framework to Analyze the Robustness of Socio-Ecological Systems from an Institutional Perspective. *Ecology and Society*, 9(1): 18.

- Apte, C., Liu, B., Pednault, E., Smyth, P. (2002). Business Applications of Data Mining. *Communications of the ACM*, 45(8): 49-53.
- Atkinson, S., Schaefer, A., Viney, H. (2000). Organizational Structure and Effective Environmental Management. *Business Strategy and the Environment*, 9(2): 108-121.
- Asif, M., Searcy, C., Garvare, R., Ahmad, N. (2011). Including Sustainability in Business Excellence Models. *Total Quality Management & Business Excellence*, 22(7): 773-786.
- Avlonas, N., Swannick, J. (2009). Developing business excellence while delivering responsible competitiveness. In Eskildsen, J., Jonker, J. (Eds.). *Management models for the future*, 171-184. Berlin, Germany: Springer.
- Balasubramanian, S., Mathur, I., Thakur, R. (2005). The Impact of High-Quality Firm Achievements on Shareholder Value: Focus on Malcolm Baldrige and J.D. Power and Associates Awards. *Journal of the Academy of Marketing Science*, 33(4): 413-422.
- Benyus, J. (2002). *Biomimicry: Innovation Inspired by Nature*. New York: HarperCollins.
- Bjelland, O., Wood, R. (2008). An Inside View of IBM's Innovation Jam. *MIT Sloan Management Review*, 50(1): 32-40.
- Blenko, M., Mankins, M., Rogers, P. (2010). The Decision-Driven Organization. *Harvard Business Review*, 88(6): 54-62.
- Boston Consulting Group and MIT Sloan Management Review (2013). Annual Sustainability Survey. Retrieved 5/31/2013 from <http://mitsloan.mit.edu/sustainability/>
- Brown, B., Chui, M., Manyika, J. (2011). *Are you ready for the era of 'big data'?* McKinsey Quarterly, October 2011. New York: McKinsey Global Institute.
- Brown, T. (2008). Design Thinking. *Harvard Business Review*, 86(6): 84-92.
- Cachon, G., Fisher, M. (2000). Supply Chain Inventory Management and the Value of Shared Information. *Management Science*, 46(8): 1032-1048.
- Carillo-Hermosilla, J., del Rio Gonzalez, P., Konnola, T. (2009). *Eco-Innovation: When Sustainability and Competitiveness Shake Hands*. New York (NY): Palgrave Macmillan.
- Carroll, A. (1991). The Pyramid of Corporate Social Responsibility: Toward the Moral Management of Organizational Stakeholders. *Business Horizons*, 34(4): 39-48.
- Castka, P., Balzarova, M. (2007). "A Critical Look on Quality through CSR Lenses: Key Challenges Stemming from the Development of ISO 26000. *International Journal of Quality and Reliability Management*, 24(7): 738-752.
- Chen, H., Chiang, R., Storey, V. (2012). Business Intelligence and Analytics: From Big Data to Big Impact. *MIS Quarterly*, 36(4): 1165-1188.
- Chichilnisky, G., Wu, H. (2006). General Equilibrium with Endogenous Uncertainty and Default. *Journal of Mathematical Economics*, 42(4-5): 499-524.
- Contu, D.L. (2002). How Resilience Works. *Harvard Business Review*, 80(3): 46-52.
- Crane, A. (2005). In the Company of Spies: When Competitive Intelligence Gathering Becomes Industrial Espionage. *Business Horizons*, 48(3): 233-240.

- Csete, M., Doyle, J. (2002). Reverse Engineering of Biological Complexity. *Science*, 295(5560): 1564.
- Cummings, S., Angwin, D. (2011). Stratography: The Art of Conceptualizing and Communicating Strategy. *Business Horizons*, 54(5): 435-446.
- Davenport, T., Thomas, R., Cantrell, S. (2002). The Mysterious Art and Science of Knowledge-Worker Performance. *MIT Sloan Management Review*, 44(1): 23-30.
- Deshpande, R., Webster, F. (1989). Organizational Culture and Marketing: Defining the Research Agenda. *Journal of Marketing*, 53(1): 3-15.
- Eccles, R., Ioannis, I., Serafeim, G. (2012). The impact of a corporate culture of sustainability on corporate behavior and performance. *Working Paper No. 17950*. Cambridge, MA (USA): National Bureau of Economic Research.
- Eccles, R., Serafeim, G. (2013). The performance frontier: Innovating for a sustainable strategy. *Harvard Business Review*, 90(5): 4-10.
- Edgeman, R. (2013a). Sustainable Enterprise Excellence: Towards a Framework for Holistic Data-Analytics. *Corporate Governance*, 13(5): 527-540.
- Edgeman, R. (2013b). Six Sigma Enablement of Sustainable Enterprise Excellence & Resilience. *Six Sigma Forum*, Vol. 12(4): 6-9.
- Edgeman, R. (2014). Six sigma innovation & design. In Wang, J. (Ed). *Encyclopedia of business analytics and optimization*, Vol. IV, 488-499. Hersey, PA (USA): IGI Global.
- Edgeman, R., Bøllingtoft, A., Eskildsen, J., Kallehave, P., Kjærgaard, T. (2013a). Sustainable Enterprise Excellence and the Continuously Relevant & Responsible Organization. *International Journal of Social Ecology & Sustainable Development*, 4(4): 65-76.
- Edgeman, R., Eskildsen, J. (2012a). Viral Innovation: Integration of Sustainability & Excellence via Innovation. *Journal of Innovation & Business Best Practice*. Volume 2012, DOI: 10.5171/2012.361451. Online: 24 April 2012.
- Edgeman, R., Eskildsen, J. (2012b). The C4 Model of People-Centered Innovation: Culture, Consciousness, and Customer-Centric Co-Creation. *Journal of Innovation & Business Best Practice*. Volume 2012, DOI: 10.5171/2012.932564. Online: 24 April 2012.
- Edgeman, R., Eskildsen, J. (2014a). Modeling and Assessing Sustainable Enterprise Excellence. *Business Strategy and the Environment*, 23(3): 173-187.
- Edgeman, R., Eskildsen, J. (2014b). Social-ecological innovation. In Wang, J. (Ed.). *Encyclopedia of business analytics and optimization*, Vol. IV, 532-543. Hershey, PA (USA): IGI Global.
- Edgeman, R., Fraley, L. (2008). A System of Profound Consciousness: Building Beyond Deming. *Total Quality Management & Business Excellence*, 19(7): 683-707.
- Edgeman, R., Kristensen, K., Eskildsen, J., Obel, B. (2013b). Enterprise-Wide Process & Performance Excellence: Architecting Human Capital for Continuously Relevant Organizations. *IAPQR Transactions*, 38(1): 39-48.

- Edgeman, R., Williams, J. (2014). Sustainable, Resilient & Robust Enterprise Self-Assessment Analytics. *The TQM Journal*, 26(4): pp. Pending.
- Elkington, J. (1997). *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Oxford (UK): Capstone Publishing.
- Elkington, J. (2006). Governance for Sustainability. *Corporate Governance*, 14(6): 522-529.
- Faisal, M., Banwet, D., Shankar, R. (2006). Supply Chain Risk Mitigation: Modeling the Enablers. *Business Process Management Journal*, 12(4): 535-552.
- Folke, C. (2006). Resilience: The Emergence of a Perspective for Social-Ecological Systems Analyses. *Global Environmental Change*, 16: 253-267.
- Galbraith, J.R. (2012). The Future of Organization Design. *Journal of Organization Design*, 1(1): 3-6.
- Gauthier, J., Wooldridge, B. (2012). Influences on Sustainable Innovation Adoption: Evidence from Leadership in Energy and Environmental Design. *Business Strategy and the Environment*, 21(2): 98-110.
- Gijzen, H. (2013). Big Data for a Sustainable Future. *Nature*, 502: 38.
- Ginsberg, J., Bloom, P. (2004). Choosing the Right Green Marketing Strategy. *MIT Sloan Management Review*, 45(3): 79-84.
- Gladwell, M. (2008). *The Tipping Point: How Little Things Can Make a Big Difference*. New York: Little Brown Publishers.
- Goldenberg, J., Mazursky, D., Solomon, S. (1999). Templates of Original Innovation: Projecting Original Incremental Innovations from Intrinsic Information. *Technological Forecasting and Social Change*, 61(1): 1-12.
- Govindarajan, V., Trimble, C. (2010). Stop the Innovation Wars. *Harvard Business Review*, 88(7): 76-83.
- Griggs, D., Stafford-Smith, M., Gaffney, O. Rockström, Öhman, M., Shyamsundar, P., Steffen, W., Glaser, G., Kanle, N., Noble, I. (2013). Policy: Sustainable Development Goals for People and Planet. *Nature*, 495: 305-307.
- Guide, V., Van Wassenhove, L. (2009). The Evolution of Closed-Loop Supply Chain Research. *Operations Research*, 57(1): 10-18.
- Gulati, R., Nohria, N., Wohlgezogen, F. (2010). Roaring Out of Recession. *Harvard Business Review*, 88(3): 62-69.
- Hamel, G., Välikangas, L. (2003). The Quest for Resilience. *Harvard Business Review*, 81(5): 52-65.
- Hansen, G., Wernerfelt, B. (1989). Determinants of Firm Performance: The Relative Importance of Economics and Organizational Factors. *Strategic Management Journal*, 10(5): 399-411.
- Harwood, I., Humby, S., Harwood, A. (2011). On the Resilience of Corporate Social Responsibility. *European Management Journal*, 29(4): 283-290.

- Hauser, J., Tellis, G., Griffin, A. (2006). Research on Innovation: A Review and Agenda for Marketing Science. *Marketing Science*, 25(6): 687-717.
- Hoffmann, E. (2012). *User Integration in Sustainable Product Development: Organisational Learning through Boundary-Spanning Processes*. Sheffield (UK): Greenleaf Publishing.
- Jacob, R., Madu, C., Tang, C. (2012). Financial Performance of Baldrige Award Winners: A Review and Synthesis. *International Journal of Quality Science*, 29(2): 233-240.
- Jansen, J., Van Den Bosch, F., Volberda, H. (2005). Managing potential and realized absorptive capacity: How do organizational antecedents matter? *Academy of Management Journal*, 48(6): 999-1015.
- Jiang, L., Tan, J., Thursby, M. (2011). Incumbent Firm Invention in Emerging Fields: Evidence from the Semiconductor Industry. *Strategic Management Journal*, 32(1): 55-75.
- Kang, SC., Snell, S. (2009). Intellectual Capital Architectures and Ambidextrous Learning: A Framework for Human Resource Management. *Journal of Management Studies*, 46(1): 65-92.
- Kaplan, R.S., Norton, D.P. (1992). The Balanced Scorecard: Measures that Drive Performance. *Harvard Business Review*, 70(1): 71-79.
- Kell, G. (2012). 12 years Later: Reflections on the Growth of the UN Global Compact. *Business & Society*, 51(1): 31-52.
- Kim, W.C., Mauborgne, R. (2005). *Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant*. Boston, MA (USA): Harvard Business School Press
- King, A., Lenox, M., Terlaak, A. (2005). The Strategic Use of Decentralized Institutions: Exploring Certification with the ISO 14001 Management Standard. *Academy of Management Journal*, 48(6): 1091-1106.
- Klemkosky, R. (2013). Financial System Fragility. *Business Horizons*, 56(6): 675-683.
- Kocourek, P., Burger, C., Birchard, B. (2003). *Corporate Governance: Hard Facts about Soft Behaviors*, Strategy + Business Issue 30, 12 pages, Booz Allen Hamilton (2003).
- LaValle, S., Lesser, E., Shockley, R., Hopkins, M., Kruschwitz, N. (2011). Big Data, Analytics and the Path from Insights to Value. *MIT Sloan Management Review*, 52(2): 21-31.
- Laszlo, C. and Zhexembayeva, N. (2011). *Embedded Sustainability: the Next Big Competitive Advantage*. Sheffield, UK: Greenleaf Publishing.
- Lavie, D., Kang, J., Rosenkopf, L. (2011). Balance Within and Across Domains: The Performance Implications of Exploration and Exploitation in Alliances. *Organization Science*, 22(6): 1517-1538.
- Lengnick-Hall, C., Beck, T. (2005). Adaptive Fit versus Robust Transformation: How Organizations Respond to Environmental Change. *Journal of Management*, 32(5): 738-757.
- Lengnick-Hall, C., Beck, T., Lengnick-Hall, M. (2011). Developing a Capacity for Organizational Resilience through Strategic Human Resources Management. *Human Resource Management Review*, 21(3): 243-255.

- Lozano, J. (2011). What Emerges when a Market Emerges? *Corporate Governance*, 11(4): 315-326.
- Lubin,, D., Esty, D. (2010). The Sustainability Imperative. *Harvard Business Review*, 88(5): 2-10.
- Lynn, W. (2010). Defending a New Domain: The Pentagon’s Cyberstrategy. *Foreign Affairs*, 89(5): 97-108.
- McAfee, A., Brynjolfsson, E. (2012). Big Data: The Management Revolution. *Harvard Business Review*, 90(10): 60-69.
- McDonough, W., Braungart, M. (2002a). Design for the Triple Top Line: New Tools for Sustainable Commerce. *Corporate Environmental Strategy*, 9(6): 251-258.
- McDonough, W., Braungart, M. (2002b). *Cradle to Cradle: Remaking the Way We Make Things*. New York: North Point Press.
- Melville, N. (2010). Information Systems Innovation for Environmental Sustainability. *MIS Quarterly*, 34(1): 1-21.
- Mintzberg, H. (2009). Rebuilding Companies as Communities. *Harvard Business Review*, 87(4): 140-143.
- Nidumolu, R., Prahalad, C. K., Rangaswami, M. R. (2009). Why Sustainability is Now the Key Driver of Innovation. *Harvard Business Review*, 87(9): 57-64.
- Nil, J., Kemp, R. (2009). Evolutionary Approaches for Sustainable Innovation Policies: From Niche to Paradigm? *Research Policy*, 38(4): 668-680.
- Olsson, P., Galaz, V. (2011). Social-ecological innovation and transformation. In A. Nicholls, A., Murdoch, A. (Eds.). *Social innovation: Blurring boundaries to reconfigure markets*, 223-247. London: Palgrave MacMillan.
- Orlitzky, M., Siegel, D., Waldman, D. (2011). Strategic Corporate Social Responsibility and Environmental Sustainability. *Business & Society*, 50(1): 6-27.
- Porter, M., Kramer, M. (2011). Creating Shared Value: How to Reinvent Capitalism and Unleash a Wave of Innovation and Growth. *Harvard Business Review*, 89(1): 62-77.
- PricewaterhouseCoopers (2013). *Making the Right Risk Decisions to Strengthen Operations Performance*. Boston, MA (USA): PwC/MIT Forum for Supply Chain Innovation Research Study.
- Pujari, D. (2006). Eco-Innovation and New Product Development: Understanding the Influences on Market Performance. *Technovation*, 26(1): 76-85.
- Raisch, S., Birkinshaw, J., Probst, G., Tushman, M. (2009). Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance. *Organization Science*, 20(4): 685-695.
- Reinmoeller, P., Van Baardwijk, N. (2005). The Link between Diversity and Resilience. *MIT Sloan Management Review*, 46(4): 61-65.

- Rennings, K. (2000). Redefining Innovation: Eco-Innovation Research and the Contribution from Ecological Economics. *Ecological Economics*, 32: 319-332.
- Rohrbeck, R., Gemünden, H.G. (2011). Corporate Foresight: Its Three Roles in Enhancing the Innovation Capacity of a Firm. *Technological Forecasting and Social Change*, 78(2): 231-243.
- Sachs, J. (2012). From Millennium Development Goals to Sustainable Development Goals. *Lancet*, 379: 2206-2211.
- Salzmann, O., Ionescu-Somers, A., Steger, U. (2005). The Business Case for Corporate Sustainability: Literature Review and Research Options. *European Management Journal*, 23(1): 27-36.
- Samson, D., Terziovski, M. (1999). The Relationship Between Total Quality Management Practices and Operational Performance. *Journal of Operations Management*, 17(4): 393-409.
- Scherrer-Rathje, M., Boyle, T., Deflorin, P. (2009). Lean, Take Two! Reflections from the Second Attempt at Lean Implementation. *Business Horizons*, 52(1): 79-88.
- Scholz, R., Blumer, Y., Brand, F. (2012). Risk, Vulnerability, Robustness, and Resilience from a Decision-Theoretic Perspective. *Journal of Risk Research*, 15(3): 313-330.
- Sekerka, L., Stimel, D. (2011). How Durable is Sustainable Enterprise? Ecological Sustainability Meets the Reality of Tough Economic Times. *Business Horizons*, 54(2): 115-124.
- Shrivastava, P. (1995). The Role of Corporations in Achieving Ecological Sustainability. *Academy of Management Review*, 20(4): 936-960.
- Skarzynski, P., Gibson, R. (2008). *Innovation to the Core: A Blueprint for Transforming the Way your Company Innovates*. Boston, MA (USA): Harvard Business Press.
- Smith, A., Raven, R. (2012). What is Protective Space? Reconsidering Niches in Transitions to Sustainability. *Research Policy*, 41(6): 1025-1035.
- Souza, G. (2013). Closed-Loop Supply Chains: A Critical Review, and Further Research. *Decision Sciences*, 44(1): 7-38.
- Sprinkle, G., Maines, L. (2010). The Benefits and Costs of Corporate Social Responsibility. *Business Horizons*, 53(5): 445-453.
- Sydow, J., Frenkel, S. (2013). Labor, Risk, and Uncertainty in Global Supply Networks: Exploratory Insights. *Journal of Business Logistics*, 34(3): 236-247.
- Terwiesch, C. and Ulrich, K. (2009). *Innovation Tournaments*. Boston, MA (USA): Harvard Business Press.
- Tsay, A. (1999). The Quantity Flexibility Contract and Supplier-Customer Incentives. *Management Science*, 45(10): 1339-1359.
- Van Marrewijk, M., Werre, M. (2003). Multiple Layers of Corporate Responsibility. *Journal of Business Ethics*, 44(2-3): 107-119.

- Voelpel, S., Leibold, M., Tekie, E., Von Krogh, G. (2005). Escaping the Red Queen Effect in Competitive Strategy: Sense-Testing Business Models. *European Management Journal*, 23(1): 37-49.
- Wood, D. (1991). Toward Improving Corporate Social Performance. *Business Horizons*, 34(4): 66-73.
- Zhou, N., Park, S., Ungson, G. (2013). Profitable Growth: Avoiding the ‘Growth Fetish’ in Emerging Markets. *Business Horizons*, 56(4): 473-481.