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Urgent evolution: excellence and wicked Anthropocene Age challenges

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We live in the Anthropocene Age or ‘age of humanity’. It is differentiated from past ages, which were defined geologically. The Anthropocene Age is referred to as such due to massive, negative impacts of human activity on both the social and ecological landscapes, on a planetary level. Well known among such impacts are increasing desertification and ocean acidity; soil, water, and air pollution and contamination that contribute to approximately 40% of all deaths worldwide annually; climate change and an increase in extreme weather events; rising sea levels threatening highly populated coastal regions; and water and food insecurity. While these challenges have been long in the making, their emergence in recent times is often traced to the so-called great acceleration that coincides with the first testing of the atomic bomb on 16 July 1945 in the desert sands of New Mexico, USA. While we as individuals have most certainly contributed to creation of these challenges, so to have we as enterprises. Enterprises have the responsibility to address these challenges. Discussed is how this may be aided by cultivating enterprise cultures that embrace the circular economy, mixed-currency approaches, social-ecological innovation, and a view of excellence that incorporates resilience, robustness, and sustainability.

Keywords: Anthropocene Age; biomimicry; circular economy; complexity; cultural principles; social-ecological innovation; sustainable enterprise excellence

We refer to the age we live in as the *Anthropocene Age* or ‘age of humanity’. It is an age fraught with extreme threats and dangers, many of which are caused by human activity. Many of these threats are ones that have been insidious rather than immediate in nature – slowly but surely advancing – generating little to no concern in most quarters until recently, yet with very loud, very public, often repeated denial from a few highly visible world leaders.

Many of the threats and dangers referred to are ones that negatively impact society, the natural environment, or both. These include climate change and extreme weather events, increasing desertification, ocean dead zones, food insecurity, water insecurity, terror activity including cyber-terrorism, air pollution, water pollution, soil contamination, drug-resistant disease, opioid and other drug addictions – and the list goes on and on, *ad infinitum*. Of these, many can be described as wicked challenges, characterised by the crossing of many domains (social, ecological, political, etc.) and hence competing interests so that any solutions generated are only partial ones that – often – metamorphise the challenge or create new ones.

Enterprises have in many cases helped to create these threats and dangers and must also contribute to their solutions. After all, organisations comprising fully one-half of the

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world's 100 largest economies, with nations comprising the remaining half – and are hence able to bring massive resources to bear on these challenges.

This article addresses select trends and approaches that individually and in consort possess the potential to eliminate the causes of these dangers and threats or to mitigate their impacts. Among these are adoption of mixed-currency frameworks that incorporate context-driven non-monetary currencies such as water, warmth, food, and time; migration toward a circular economy and associated cradle-to-cradle approaches to product design and production; consideration of a broader array of stakeholders in our decision processes; appropriate enterprise guiding principles; approaches to enterprise excellence that incorporate sustainability, resiliency, and robustness considerations; and directed innovation and invention.

The Anthropocene Age and wicked challenges of our time

The age in which we live is often referred to as the *Anthropocene Age*, or ‘age of humanity’, and represents the successor to the prior geologic age, the *Holocene*. While every age is populated by challenges, the *Anthropocene Age* is, unsurprisingly, an age replete with challenges that have either been created or significantly influenced by human activity, hence its name and differentiation from all prior ages. In his 1995 acceptance speech, Nobel Prize winning scientist Paul Crutzen, emphasised the gravity of the situation when he stated that it is ‘Utterly clear that human activities had grown so much that they could compete and interfere with natural processes’ (Crutzen, 1995).

When the *Anthropocene Age* began and the *Holocene Age* ended is a subject of some debate, with some researchers arguing for an *Early Anthropocene* that began about 1500 Common Era. Others argue for a date coincident with the first testing of the atomic bomb in the desert sands of New Mexico on 16 July 1945 and subsequent cascading of extreme activities and events referred to as the *Great Acceleration*. Researchers endorsing this latter date sometimes refer to this age as the *Hyper-Anthropocene* (Angus, 2015):

Human activities have become so pervasive and profound that they rival the great forces of Nature and are pushing the Earth into planetary *terra incognita*. The Earth is rapidly moving into a less biologically diverse, less forested, much warmer, and probably wetter and stormier state/. (Steffen, Crutzen, & McNeill, 2007)

Crutzen and his colleague, Will Steffen, drove home the serious and immediacy of the challenges by which the Anthropocene Age is fraught when they stated:

Earth is currently operating in a no-analogue state. In terms of key environmental parameters, the Earth System has recently moved well outside the range of natural variability exhibited over at least the last half million years. The nature of changes now occurring simultaneously in the Earth System, their magnitudes and rates of change are unprecedented and unsustainable. (Crutzen & Steffen, 2003)

It is of value to carefully analyse these few words from Crutzen and colleagues. Use of the term *unprecedented* indicates the magnitude, rapid pace and dire direction of changes we are experiencing. *Simultaneous* changes imply not only a multiplication of the effects of change, but also complex interactions that may be poorly understood. The movement into *terra incognita* or ‘unknown territory’ underscores the importance of sound strategy moving forward as we confront such challenges. Most provocative, however, is the term *unsustainable* – because it suggests that a distinctly undesirable end game is in progress.

Most Anthropocene Age challenges cited are social-ecological in nature, meaning that they have adverse social, environmental, or dual impacts. Among these are climate

change in relation to increased atmospheric presence of carbon dioxide and methane, increasing intensity and frequency of extreme weather events, drought and desertification, food sustainability and distribution, water pollution, air pollution, soil contamination, and the connection of these to disease, violence, and terrorism (Edgeman, 2015). These challenges are often described as *wicked challenges* possessing multiple of the following traits (Batie, 2008; Churchman, 1967; Waddock, 2012):

- They are intractable and difficult to define;
- Are multi-causal and possess complex interdependencies;
- Generate conflicting stakeholder perspectives that may be driven by strong moral, political, and social dimensions;
- Sit astride ecological, societal, enterprise, and other boundaries;
- Are associated with chronic policy failure;
- Demand complex judgment in the face of urgent, high-stakes resolution when solutions are available; and
- ‘Solutions’ yield unforeseen challenges that are neither right nor wrong, only worse or ‘good enough’, thus implemented solutions alter the challenge – sometimes in unforeseeable ways.

We see that humanity is faced by many, varied, extreme, and complex challenges. Of these, many are social-ecological in nature. While each of us bears individual responsibility to confront these challenges, so do our governments and, for the purposes of this work, our enterprises. It is thus that we now explore selected means by which enterprises may approach such challenges.

Currencies of the future and lean implications

It is imperative that we learn to see the cause-and-consequence relationships among our strategies, activities, and performance relative to selected impacts on the social and natural environments.

Currency can be regarded as any medium of exchange or trade. Though we are accustomed to thinking of currency as such national or international forms as dollars, pounds, euros or yen, our view need not be so limited. The view adopted here is that of a mixed-currency model that recognises other key currencies – including ones over which wars are fought – water, warmth, safety and security, transportation safety, energy, secure communication and transactions, food, human health, improving health of the natural environment, and (leisure) time. Given the directions, demands and imperatives of the *Anthropocene Age*, it seems likely that such currencies will increase in value – in brief – one can generally survive longer without money than without food, water, warmth and the like.

Movement to a mixed-currency model will of necessity motivate rethinking or refocusing of lean and enterprise excellence methods, objectives, and applications. In particular, a mixed-currency model incorporating currencies such as those listed above will lead to reallocation of resources and efforts. Although for-profit, governmental, NGO, and for-benefit organisations have differing missions and objectives, they will naturally gravitate toward delivery of maximum value.

Mixing currencies inevitably leads to a partial shifting of value away from money and toward alternative currencies that make differences in people’s lives – resulting in mixed-currency strategies, behaviours, and results. What the nature of those strategies, behaviours,

and results are is subject to speculation, but some relatively safe insights into change include transformation of cities into smart and secure ones, development and deployment of water-saving and water-purifying technology, greater emphasis on producing more and healthier food, more efficient energy production, clean energy production, reduced energy consumption technology, autonomous transportation, and time and effort-saving technologies.

It should be recalled, however, that many of the challenges that must confront are wicked challenges with every solution accompanied by complications. As but a single example, development and distribution of healthier (e.g. organic) food have contributed to the expansion of urban farmers' markets. Research indicates growth in the farmers' market movement contributes to a growing social imbalance in the form of so-called white gentrification in some areas where these markets are located (Joassart-Marcelli & Bosco, 2018). Although the larger socio-economic issue is gentrification of any ethnicity or combination of ethnicities, White gentrification results when wealthier consumers – typically Caucasian – living in the area where a market is located become the principal consumers, escalating property values and rents, and in turn pushing lower-income individuals out of the area.

This preceding illustration highlights the possibility that a solution to one socio-ecological challenge creates a mutated or substitute socio-ecological challenge. Implicit then, is the importance of carefully and fully elaborating not only the impacts of a given challenge, but the consequences of full or partial solutions to the challenge. This point is made by the title of the work in which the preceding example appears: *Just Green Enough* (Curran & Hamilton, 2018) – a title that implies that the underlying challenges are multi-faceted and not fully aligned in the needs and wants of each of those facets. In such cases, there is no single optimal solution and any solution generated will be one that either fully optimises the needs and wants of one facet to the exclusion of the partial neglect of the others, or will be a compromise solution.

Linear, reuse and circular economies

Historic human consumption has followed a pattern of waste known as the *linear economy* (Greyson, 2007) or, alternatively, a cradle-to-grave economy (Young & Tilley, 2006). This pattern is commonly described as 'take, make, use, waste'. *Take* refers to extraction of both renewable and non-renewable resources that are used to *make* products that are *used* and then disposed (*waste*) of. Among key considerations associated with the linear economy are durability and reparability, and longevity of manufactured goods.

In past eras, human population was both small enough and geographically distributed enough that this pattern was not a significant threat to our existence or to the natural environment. Returning to consideration of the *Anthropocene* Age and, more specifically, to the *Great Acceleration*, global human population has exploded since 1950 from approximately three billion to more than seven billion, with a project of nine billion by 2030. With this growth are numerous troubling concomitant ecological, social, and economic patterns (Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015). Simply stated, the linear economy is not and never has been sustainable. Furthermore, it is antithetical to the premise of lean enterprise and enterprise excellence approaches in its generation of waste. The mechanics of the linear economy are represented by the left one-third of Figure 1.

Movement to a *reuse economy* (Yokoo, 2010) represents an improvement, but not a complete solution to linear economy failings. Strategies promoting a reuse economy

Figure 1. Linear, reuse, and circular economy product lifecycles.

include direct reuse, recycling, and re-purposing of products and materials. Each of these strategies alleviates resource extraction demands and, to some degree, also manufacturing demands – but seen from a larger perspective, only slows and does not prevent resource depletion. Although waste reduction is fundamental to the reuse economy, a key consideration that should be inherent to each of these strategies is whether product safety is compromised. Although waste reduction is generally eco-positive, compromised product safety is socio-negative so that the potential of a wicked challenge and hence a compromise solution exists. A simplified expression of the reuse economy is presented in the middle-third of Figure 1.

A more ideal *economy* is the circular or *cradle-to-cradle* economy (McDonough & Braungart, 2002a; Webster, 2013). Circular economies regard all inputs as either technical or biological nutrients that – at the end of a given product's life – should be recycled or redeployed in ways that as nearly as possible enable their *ad infinitum* use. A simple graphical representation of the circular economy is portrayed in the right-third of Figure 1. New ship designs used by A.P. Moller-Maersk Group, the Danish shipping, and transportation conglomerate provide an exceptional example of a near cradle-to-cradle product, with 98% of its steel *efficiently* recyclable for other uses (Williams, 2013).

Vastly expanded stakeholders in the circular economy

Embracing a circular economic model multiplies the number and variety of stakeholders that must be considered and hence the balance of concerns that must be addressed. Figure 2 identifies many of these stakeholders together with some of their principal concerns. In addition to such commonly recognised stakeholders as shareholders, the human ecology of the enterprise, and suppliers circular economies recognise – from the heart of Figure 2 and radiating clockwise – extractors of raw materials, manufacturers, converters, brands, retailers, consumers, and a myriad of local or regional entities that include municipalities, haulers, composters, and reprocessors.

Included among the portfolio of pressures, regulations and other concerns these stakeholders are subject to is China's so-called green fence policy that radically reduced the materials that China will accept for recycling purposes – a policy that other nations seem destined to adopt or adapt (Earley, 2013). Other elements of this portfolio include shifting cost models, elevated customer expectations, zero waste goals, United Nations Sustainable Development Goals (Lu, Nakicenovic, Visbeck, & Stevance, 2015), reputation risks, land and marine litter considerations, and the rise of ethical investment and consumption.

Figure 2. Circular economy stakeholders.

Wholly considered, and in addition to prior observations, these suggest increased demand for more consistent policies, replacement of physical products with services, and development of products and services that better meet the social-ecological concerns of ethical consumers and investors.

If these and previously identified needs and concerns are to be better met, then fresh approaches to lean enterprise and enterprise excellence must be identified, promoted, and nurtured. It is toward such a formulation that our attention next turns. It is a formulation that incorporates sustainability, resilience, robustness, and social-ecological driven innovation – elements that, while generally consistent, are not fully congruent and hence among which compromises must be determined.

Sustainable enterprise excellence

Organisational strategy, activities, and results are typically driven by guiding principles. As such, the generic form of most excellence models is that they begin with guiding principles that inform strategy, which is then deployed via processes, policies, partners, and other means in order to produce results. Organisational self-assessment then routinely reviews all relevant strategy, processes, activities, and results with the goal of acquiring actionable insight and foresight. Insight and foresight are akin to what is expected from a visit to a physician, with insight representing a diagnosis of current conditions and foresight indicating how to ‘treat’ or improve conditions. The combination of insight and foresight is then used to hone organisational strategy with the purpose of improving future results. [Figure 3](#) provides a simple representation of a generic such excellence model, with three primary areas of strategic concern and consequent results.

The areas of strategic concern are consistent with Anthropocene Age needs, that is, strategy should intend social equity, ecological sensitivity, and should be economically

Figure 3. Generic enterprise excellence model.

sound – areas referred to as triple top line strategy (McDonough & Braungart, 2002b). The identified results areas are quite naturally ones that are consistent with strategy – that is – the so-called triple bottom line areas captured by the terms people, planet, profit (Elkington, 1997). But what of the guiding principles that inform strategy?

Although almost any organisation will have one or more unique or nearly unique guiding principles, some generic principles that are consistent with lean and enterprise excellence approaches can be identified. Ten such principles that support the Shingo Operational (enterprise) Excellence Model are provided in Figure 4 (Shingo Institute, 2017). The purpose of presenting these principles in the form of a target is to communicate the way they work collaboratively to zero in on desired results.

Whether these principles are consistent with successfully confronting *Anthropocene* Age challenges depends in large on the sorts of results enterprise leadership and governance pursue, as well as the means of pursuit.

Briefly explained, Figure 4 suggests that leaders cannot lead humbly without first respecting those whom they lead and – more broadly – those whom they serve, including

Figure 4. Guiding principles of the Shingo Operational Excellence Model.

members of the communities in which they operate and all parties affected by their activities and results. Humble and respectful leaders are better able to unite the organisations' human ecology to pursue a common vision or path toward excellence. This pursuit is aided by systems thinking and practice that considers and leverages interactions among relevant processes. Pursuit of enterprise excellence will invariably require changes that range from miniscule to monumental in magnitude and it is important to be able to identify which changes should be made, and to be able to establish any cause-and-consequence linkage between those changes and ensuing results – in other words – effective pursuit of enterprise excellence requires critical and scientific thinking. Remaining aware of the complexity inherent in interacting processes – that is – knowing that a change in one place produces a change in one or more other places – the enterprise can now better determine which processes to focus on and in what ways, with the purpose of improving overall enterprise performance. A fundamental tenet of process improvement is that of never intentionally passing on a mistake or defect, lest it be magnified – instead – focus is placed on correction of errors when and where they occur – a tenet referred to as ensuring quality at the source. In turn, this positions the enterprise to better flow and pull value – that is – to produce only in response to actual demand, rather than in response to wishful thinking. Together, these first nine principles enable the drive toward the 'holy grail' of creating value for all relevant enterprise stakeholders – represented by the term *results* at the heart of Figure 4.

Figure 5 positions these principles in the context of the organisation and typical responsibilities of senior and executive leadership, management, and individuals and implementation teams. Also displayed in Figure 5 are three insights of enterprise excellence, namely, that principles inform ideal behaviours; systems drive behaviours; and ideal results require ideal behaviours (Shingo Institute, 2017). Rather than *perfection*, use of the word *ideal* is here intended to convey best possibilities under present conditions so that what is *ideal* now is likely to be sub-optimal in the future. The purpose of the arrowheads on the perimeter of the outer circle in Figure 5 is two-fold: first, to indicate that these occur in the context of a cycle, with – second – the increasing size of arrowheads moving in a clockwise direction indicating organisational growth and development as the organisation matures and improves. The final element present in Figure 5 is the element of *sustainment* – a key objective of most organisations.

Figure 5. Principles of enterprise excellence in an organisational context.

Given the preceding – we are at a point where we need to rethink our definition and pursuit of enterprise excellence. At the least, we need to consider the generally consistent but not entirely aligned concepts of enterprise sustainability, excellence, resilience, and robustness. These can be combined into a more holistic concept, referred to as sustainable enterprise excellence (Edgeman & Eskildsen, 2014a; Edgeman & Williams, 2014), with an enterprise described as

- *Sustainable* to the extent that it is able to create and maintain economic, ecological, and social value for itself, its stakeholders, society at large, and policy makers.
- *Resilient* to the extent it possesses capacity to self-renew through innovation by adapting its responses to negative shocks and challenges over time.
- *Robust* to the degree that the enterprise is highly resistant or immune to a critical subset of such shocks and challenges.
- *Excellent* when its governance, leadership and strategy, as deployed through people, processes, partnerships and policies deliver superior performance and impact in specified areas that may include enterprise human ecology, innovation, financial performance, social-ecological performance, data analytics and intelligence, and supply chain management.

Innovation is central to sustainable enterprise excellence. It is evident that innovation is critical the sort of progress necessary to better address *Anthropocene Age* challenges. For these reasons, it is toward means of innovation aimed at refining or creating products and services that better meet various economic, social, and ecological *Anthropocene Age* challenges that we now turn.

Innovation and design in the Anthropocene age

Innovation is important to the health and vitality of many enterprises. Of special interest in the present case is equally anthro-centric and eco-centric emphasis on innovation that focuses on creation of new ideas, product, services, institutions and relationships that offer fresh approaches to overcoming critical societal and environmental challenges. Such innovation is commonly referred to as eco-innovation, green innovation, or *social-ecological innovation* (Edgeman & Eskildsen, 2014b). Examples of social-ecological innovation include global game-changing 3D-printing of such items as human organs and homes (Kirkpatrick, 2017); flashlights powered entirely by hand heat and produced at less than \$1 each (Makosinski and Makosinski, 2017); development of highly efficient and effective desalination equipment and drip technology (precision water delivery) in Israel (Tal, 2013); and development by Professor Manu Prakash of Stanford University of highly durable origami-like microscopes the size of an A4 sheet of paper able to project on any surface, and magnify up to 2000 times, and producible for less than one euro each (Ahuja, 2014).

Full commitment to social-ecological innovation requires more than anthro- and eco-centric innovation and improvement targets. It requires commitment to principles that involve the sorts of materials used in product designs, energy sources used in production processes and – if necessary – to power a product, fair-trade considerations (Brown, 2013), avoidance of conflict material as provided for in US legislation and executed by the Securities and Exchange Commission (Raj, 2011), workforce and consumer safety and security (Gildig, Hogarth, & Humphries, 2002) and more, including elements not cited here, but agreed to by the more than 9000 organisational signatories to the United Nations Global Compact (Voegtlin & Pless, 2014).

So important is the role of material selection, source traceability, extraction, initial and subsequent uses, that in addition to national and enterprise ecological or carbon footprints, discourse increasingly includes material footprints (Wiedmann et al., 2015). Material selection should be-driven by both technical and non-technical considerations, with representative non-technical considerations including labour conditions, safe extraction and processing, conflict or no-conflict sourcing, and more.

There are many social-ecological innovation approaches that adhere to these commitments while addressing *Anthropocene Age* challenges. Biomimicry is simply use / adaptation of principles and designs found in nature to yield products that – like nature itself – tend to be highly energy efficient and draw energy from naturally available sources, that fit form to function, that reward cooperation, that recycles materials in ways consistent with circular economy ideas, that curb internal excess, that leverage diversity, and demand local expertise, and that constantly probe frontiers while simultaneously living within boundaries (Benyus, 2002).

Various examples of biomimicry that can be cited. Among these are building ventilation systems that adapt the ‘technology’ termites use in building their hills; Velcro as an attachment or sealing mechanism with its design inspired by the barbs of cocklebur thorns/seeds in order to proliferate the plant (Kennedy, 2017); and the recent development by Boeing of an ultralight and ultra-strong metal developed by Boeing that is 99.99% air with a design based on lattice designs similar to those found in spider webs and bee/wasp honeycombs so that air freely flows through the design (Rashed, Ashraf, Mines, & Hazell, 2016).

Excellence in a complex environment

It is important to understand the complexity of an organisation’s environment. Figure 6 is an attempt at expressing this complexity. Explanation of Figure 6 will proceed from the outside in, where its perimeter represents the four major domains to which most organisations are subject – the BEST domains: biophysical (B) domain representing the natural environment; the economic (E) or financial domain; the social (S) domain; and the technological (T) domain that includes the built environment. Working from the outside of

Figure 6. A representative organisation environment.

Figure 6 toward its middle we next see that organisations must be sensitive to the concerns of many stakeholders, select ones of which appear in the figure, with some others cited in Figure 2. Continuing to drill into Figure 6, we see stakeholder mediating forces, among which are norms and values, concerns and interests, tangible resources, and intangible resources. Most of the elements cited thus far are to some degree are either fully or partially beyond the control of the organisation, so that the organisation can plan form strategy and take actions related to these to but not directly control them.

Elements within the span of an organisation's control are represented in the interior of Figure 6. Perhaps foremost among these is its culture – a simple definition for which is ‘the way we do things around here’. As important as the way we do things are the things we do and the motivations for doing them. In four broad categories, those are alignment of the enterprise; process design and management; risk management; and enterprise advancement.

To the degree that the culture, strategy, and processes are misaligned with mission, vision, priorities, stakeholder needs, and environmental and social concerns, the organisation will be subject to various forms of stress and strain. In no or low competition environments, these may not be apparent. Stress and strain assume many forms, including inefficient resource use and diminished profitability. Cultural elements cited in Figure 4 that are critical to alignment are those of leading with respect and humility, building unity of purpose and shared vision, and thinking and acting systemically.

In citing purpose, mission, vision, and strategy as critical to alignment, the differences between these should be noted. Mission aligns the organisation's human ecology with the same focus – it describes the business the organisation is in now and the business it expects and plans to be in the future. Purpose is a larger concept and represents the unifying principle driving everything the organisation does – something that Hewlett-Packard cofounder David Packard believed could never be fully realised and, for that reason, a constant stimulus for change and progress (Jones, 2016). Vision provides the motivations and means for mission and purpose.

Relative to *Anthropocene Age* challenges, it is the responsibility of the organisation to determine which challenges and aspects thereof it will embrace and then to marshal the resources and otherwise align the organisation to address the selected challenges. Aiding this effort will be various organisational processes, including analytics and sense-making ones that should provide routine feedback on the progress the organisation is making; needed process or system changes and course corrections; and potential changes on the organisation's political, societal, ecological, and competitive horizons.

Risk management is viewed as increasingly important to most organisations with key elements being identification of risks, assessment of their likelihood and possible consequences, and determination of risk-mitigation strategy and actions. Risk management is especially critical to enterprise resilience and robustness. The sorts of skills useful in enterprise risk management are ones also useful for addressing *Anthropocene Age* challenges, due to their commonly complex or wicked natures and inherent threats and dangers.

Finally, organisational advancement is commonly addressed via a combination of renewal, innovation, and optimisation. Organisation environment rarely remains static for extended periods of time and an organisation cannot achieve and maintain excellence without ongoing renewal or adaptation to its changing environment. Innovation, as regarded in this context, is generally focused at the enterprise level, with most organisations in need of innovation at that level in order to align to *Anthropocene Age* challenges, followed by trickle-down innovation at the process, system, product, and service levels. Similarly, although optimisation is usually with processes, systems, and services, in the present case optimisation holistically focused – that is – at the organisational level.

The nature of organisation-level optimisation is such that it requires an enterprise culture that is built to advance organisational vision, mission, purpose, and strategy. However, if these are not collectively attuned to *Anthropocene Age* challenges, an organisation will generate solutions to those challenges only coincidentally, rather than intentionally.

Summary and conclusions

Circular economy theory and approaches are well fitted to address *Anthropocene Age* challenges. But is the organisation able, well aligned to these, and ready to proceed? If now, how and when will it become so? A simple, partial diagnostic for these highly important issues is provided by honestly and accurately answer the following questions, each of which can be crudely assessed on a five-point scale, with higher additive scores indicating better preparation and positioning on the part of the organisation. Scales for each question are provided below.

- *Why does the organisation exist and how does this relate to Anthropocene Age challenges?* Effectively, this is the question of organisational identity and mission. 1 = very poor alignment, 2 = poor alignment, 3 = moderately aligned, 4 = well aligned, 5 = very well aligned.
- *What causes of these challenges is the organisation committed to addressing and what capability does it have to do so?* This is a highly complex question, if for no other reason than the complexity of wicked challenges of the *Anthropocene Age*. Apart from the commitment of the enterprise to attack these challenges, there are at least two highly useful capabilities the organisation must consider – in analytic and sense-making capability, and its socio-ecological innovation capability. 1 = very poor understanding and capability; 2 = poor understanding and capability; 3 = moderate understanding and capability; 4 = good understanding and capability; 5 = very clear understanding and strong capability.
- *How will the organisation meet these challenges?* The issue is how and why does the organisation do what it does. What are the requisite processes and systems? How will these be improved or innovated to better meet the challenges? 1 = very poor strategy, planning, and capabilities; 2 = poor strategy, planning, and capabilities; 3 = moderate strategy, planning and capabilities; 4 = good understanding and capability; 5 = very clear understanding and strong capability.
- *What does the organisation want to achieve relative to key Anthropocene Age challenges?* This question addresses the appropriateness and aggressiveness of goals, relative to its selected challenge or challenges. Relative to this question, the organisation should also address how well the enterprise is positioned to collaborate both internally and with potential partners? What are key leading and lagging indicators of success? 1 = very passive, very poor collaborative ability, very weak indicators that provide no direction; 2 = passive, poor collaborative ability, weak indicators that provide little insight; 3 = moderately aggressive, moderate collaborative ability, reasonable indicators that provide moderate insight; 4 = aggressive, good collaborative ability, insightful indicators; 5 = very aggressive, very good collaborative ability, very insightful and reliable indicators.
- *What should the organisation look like to achieve desired impacts?* Achieving the needed change in the world relative to the selected challenges requires building a high-performing organisation that strives toward desired performance and impacts – and these must be deeply embedded in strategy. 1 = very poor vision,

understanding, and planning; 2 = poor vision, understanding, and planning; 3 = moderate vision, understanding, and planning; 4 = clear vision, understanding, and planning; 5 = very clear vision, understanding, and planning.

Scientific evidence strongly suggests that we have reached both social and ecological tipping points. Organisations have contributed to the extreme challenges that we face and must contribute to their solutions. Acknowledging these challenges, embracing the circular economy, and establishing an appropriate enterprise culture provide a beginning to this journey. Identifying specific challenges to attack supplies purpose. Adopting and aggressively pursuing an approach to enterprise excellence that incorporates sustainability, resilience, robustness, and social-ecological innovation actively engages the organisation in the battle.

Wars are comprised of many battles and we – like it or not – are involved in a war that must be won. Is your organisation, and are you, willing and able to become warriors? If so, choose your weapons well.

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