

# Integrating Sustainable Development into Research Ethics Protocols

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**Abstract:** The challenges and crises that face organisations are frequently the result of unintended, unanticipated or unforeseen consequences of well-intended decisions. In this paper the role of research ethics is analysed in as far as it contributes to or militates against future decision-outcomes that compromise the development of sustainable societies. The concept of sustainable development (Brundtland, 1987) came into being because of the enormous environmental, social and economic challenges manifesting in contemporary life. Many of these challenges are unintended consequences of historical decisions which were not necessarily considered unethical at the time. However, ethical standards are aligned with the norms and values upheld by societies and therefore change over time. There are various historical examples of research that would not be contemplated or permitted today due to contemporary ethical standards. This raises a question as to the frontier ethical standards against which contemporary research will be judged in the future. Research and innovation frequently have unintended or unanticipated consequences, which may be either favourable or detrimental, and outside the scope of the research. Various recent examples of negative unintended consequences of research are cited. It is shown that contemporary research ethics protocols do not typically draw attention to the possibilities of negative consequences due to their almost exclusive focus on the human participants and the research process itself. Using the five capitals model of sustainable development (natural, human, social, manufactured, and financial) it is demonstrated that typically the unanticipated consequences of research occur in one or more of the capitals other than the capital in which the research is being carried out. The central tenet of the paper is that researchers ought to consider and be accountable for favourable and detrimental consequences of their research. To this end, a taxonomy of negative consequences is developed with recommendations as to the researchers' obligations in respect of the unanticipated consequences of their research, classified as unaddressed, unintended, unexpected, unforeseen and unforeseeable. A more comprehensive view needs to be taken of the ethics of business and management research to include procedural ethics, intrinsic ethics, and extrinsic ethics. Sustainable development is integrated into research ethics by considering the interdependencies of the five capitals of sustainable development and proposing a protocol based on the twelve features of sustainable societies. It is argued that evaluation of research using the proposed ethics protocol would militate against or mitigate the negative unanticipated consequences of research, thereby contributing to more sustainable societies. It may be argued that individuals cannot be held responsible or accountable for that which is unintended. However, by applying their minds using a more powerful ethical framework, researchers are more likely to anticipate and militate against these potentially latent and often long term impacts of their research. The approach in this paper is practical and applied rather than theoretical, philosophical or moral; business ethics and the ethics of medical research involving human or animals are excluded.

**Keywords:** extrinsic research ethics, five capitals; sustainable society; business decisions

## 1. Introduction

The concept of sustainable development (Brundtland, 1987) came into being because of the enormous environmental, social and economic challenges manifesting in contemporary life. Due to its very nature, sustainable development has pervaded all aspects of society – including business – in recent decades. Managers of organisations have been challenged to apply their minds, modify business practices and potentially amend their worldview based on this dynamic and maturing understanding of sustainable development. It therefore behoves all academics and professionals in business and management to consider their activities and the ethics of their research in the context of this paradigm.

There are many theoretical perspectives from which ethics can be viewed, including philosophical, legal, historical, moral, cultural, and human rights. However, research ethics will be addressed from a broad practical and applied perspective in this paper. It will be shown using historical examples that research ethics are dynamic and evolutionary. It can therefore be deduced that the ethical standards against which contemporary research is being judged are unlikely to be the same as those which will

be applied by future researchers, who will apply profoundly different social, professional and academic values. Further, the insufficiency of contemporary research ethics will be demonstrated by showing that unanticipated negative consequences of particular historical research would not have been mitigated by the application of contemporary research ethics.

The paper concludes by suggesting that an ethical protocol based on the twelve features of a sustainable society will narrow the gap between current research ethics protocols and the standards by which contemporary research will likely be judged by future generations.

## **2. Progression of research ethics**

A number of historical research projects have achieved notoriety on account of their methodologies or unanticipated consequences. Some of these have been well-publicised, and have been dubbed “Mad Science” by Schneider (2009).

The experiments involving “Little Albert” (Watson & Rayner, 1920) are controversial for a variety of reasons. In these experiments, the reactions of a nine month old boy to a variety of animate and inanimate objects were observed. Thereafter, the researchers conditioned the infant to fear a white rat by associating the rat with a loud clanging noise, resulting in the boy crying at the sight of the white rat (even when the noise was absent). The manner in which the experiments were carried out and the analysis reported have been the subject of criticism by subsequent authors (Harris, 1979; Paul & Blumenthal, 1989). Deliberately invoking fear in an infant in a laboratory setting, with or without parental consent, would not be contemplated by contemporary social scientists.

The Tuskegee Syphilis Study by the United States Public Health Service which began in the early 1930's involved withholding of medical treatment from a racially distinct group of syphilis infected individuals (Thomas & Quinn, 1991). Such was the affront to the dignity of not only the participants, but also an entire demographic group, that a presidential apology was offered by Bill Clinton on behalf of the United States government in 1997 (Harter, Stephens, & Japp, 2000). The study involved taking advantage of vulnerable individuals and is highly unethical in a number of respects (Experiment-Resources.com, 2008).

The so-called “Milgram experiment” (Milgram, 1963) purported to be an experiment to determine whether the administering of increasingly painful electric shocks by a volunteer research assistant (the “teacher”) would improve the memory of the volunteer research subject (the “learner”). In fact, it was the “teacher” that was the actual subject of the research, and the “learner” was receiving no electric shock whatsoever and was merely an actor in collusion with the researchers. The purpose of the research was to evaluate the subjects’ compliance with commands given to them by an authority figure. The findings were that, in response to authority, about two thirds of the “teachers” administered the maximum possible electric shock to the “learners” despite the extreme pain that the “learner” appeared to be in. The problem was that the experiment was extremely stressful and traumatising for the “teachers” and it is generally agreed that such an experiment would never receive ethical approval today (McArthur, 2009).

Having reviewed some examples of historical research in the social sciences, it is evident that, while these experiments may have been regarded as ethical at the time of the research, their methodologies would have been rejected when judged by contemporary ethical standards. Research ethics clearly evolve in order to remain consistent with societal values. Similarly, businesses have “contracts” with society that evolve from frontier expectations through semi-formal contracts, to formalised contracts such as legislation (Bonini, Mendonca, & Oppenheim, 2006). Therefore, contemporary professional and academic researchers in business and management studies should ask the question: *Against what frontier ethical expectations could current business and management research be judged by future generations?*

## **3. Insufficiency of contemporary research ethics**

The emergence of contemporary research ethics has not been a simple linear process (Isreal & Hay, 2006). Nevertheless, many of the generally accepted principles of research involving human participants can be traced back to The Nuremberg Code (1949). Although this code, together with the Helsinki Declaration (World Medical Association, 1964) are directed towards the ethics of medical research involving human participants and material, they are the seminal works of contemporary research ethics in the social sciences, including business and management.

The following principles are common to contemporary research ethics protocols and standards:

- Informed consent, which implies the avoidance of covert or secret participant observation (Bulmer, 1982).
- Privacy of participants (confidentiality and anonymity).
- Avoiding harm (including psychological effect) and doing good.
- Cognisance of vulnerable groups.
- Participants' right to withdraw or terminate.
- Restricted use of data.
- Due care in the storage of data.
- Avoidance of conflicts of interest.

Reviewing some of social science's most notorious research, it may be argued that the unanticipated consequences of the research could have been avoided if the research had met contemporary ethical standards. However, conforming to such a protocol would not necessarily have been a guarantee that unanticipated consequences would not manifest.

In various publications (P. Duesberg, 1992; P. Duesberg, Koehnlein, & Rasnick, 2003; P. Duesberg & Rasnick, 1998; P. H. Duesberg, 1991) Duesberg and his colleagues challenged the generally accepted understanding that HIV causes AIDS. Duesberg and Rasnick (1998) argued that AIDS is attributable to drug use, not HIV. They conclude that "the AIDS dilemma could be solved by banning anti-HIV drugs, and by pointing out that drugs cause AIDS." Butler isolates the two competing paradigms that dominated the HIV/AIDS policy debate in South Africa, which he labelled the "mobilization / biomedical" and the "nationalist / ameliorative" paradigms (Butler, 2005, p. 592). He goes on to highlight that each of these paradigms was premised upon different assumptions about the challenges that HIV/AIDS posed. What has become known as the Duesberg hypothesis had the support of a community of so-called AIDS-denialists, who were influential in the formulation of the South African government's post-apartheid HIV / AIDS policy. It is estimated that the loss of more than 300 000 lives could have been averted were it not for this policy (Chigwedere, Seage, Gruskin, Lee, & Essex, 2008; Natrass, 2008). Despite the weight of research that has subsequently criticised and refuted their hypothesis, Duesberg and his colleagues did not appear to have breached contemporary ethical standards in the course of their research.

This narrow ethical focus is not limited to the social sciences. Research by economists has illustrated the benefits and incentives of introducing financial intermediaries between borrowers and lenders (Diamond, 1984; Leland & Pyle, 1977). In terms of this "originate-to-distribute" model of banking, banks (the originators) lend money to borrowers, and then aggregate the debt and sell it on to third party lenders (Purnanandam, 2010). Prior to the global financial crisis that occurred late in 2007, banks in the United States had adopted this originate-to-distribute model of granting credit, specifically mortgage loans. There are benefits of this model of banking to the borrowers, the banks and the lenders such as enhancing the liquidity of the secondary syndicated loan market (Berndt & Gupta, 2009). However, Brunnermeier (2009) shows that the financial crisis was partially attributable to the originate-to-distribute banking model. Although there was nothing unethical from a research perspective, the liquidity crunch and financial crisis were an unintended consequence of this financial innovation (Brunnermeier, 2009). As another commentator observed "... what [the financial industry] did was to innovate itself, and the rest of us, into a big, nasty mess" (Krugman, 2007).

It is clear from the summary by Aksin, Armony, and Mehrotra (2007) that there has been extensive research into optimisation of capacity planning, queuing, and personnel scheduling for call centres. Optimisation strategies have undoubtedly been adopted that had negative impacts on the customer service representatives. At face value, the *Sacrificial Human Resources Strategy* (Wallace, Eagleson, & Waldersee, 2000) could be considered callous in its disregard for the impact on individuals and society. A parallel field of research exists that looks into the human resource issues in call centres (Aksin et al., 2007) in response to the impact that has not been studied in the traditional call centre research.

Researchers may also face the possibility of their findings being used or applied in ways which they had not intended. Mastrandrea and Schneider (2004) identified this possibility in the highly

controversial and politicised field of climate change when they observed that "... users of scientific results (including policy-makers) will undoubtedly make their own assumptions about the probability of different outcomes, possibly in ways that the original authors did not intend" (Mastrandrea & Schneider, 2004, p. 571). Contemporary research ethics protocols are silent on any obligation on researchers to consider the possibility of (mis)application, (mis)interpretation or (ab)use of their research by others. The ethical principles of informed consent, privacy of participants, avoiding harm and doing good, cognisance of vulnerable groups, participants' right to withdraw or terminate, restricted use and due care in the storage of data, and avoidance of conflicts of interest apply to researchers' own objectives and interactions, but do not address the intentions and purposes of third parties who may not uphold similar ethical standards.

It is clear that, no matter how rigorously and meticulously researchers adhere to contemporary research ethics protocols, these protocols do not necessarily militate against negative consequences. Therefore, it is argued that current research protocols are insufficient to adequately protect society at large from the totality of consequences of research, or to contribute with some degree of certainty towards sustainable societies. It is neither feasible nor logical to expect that all potential risks can be eliminated (i.e. reduced to a probability or consequence of zero); there remains nonetheless a gap between contemporary research ethics and the protocols needed to promote and support sustainable societies.

#### 4. Unanticipated consequences and unsustainability

The Five Capitals Framework of sustainable development (Porritt, 2007) has been developed as a basis of understanding the entirety of sustainability using the concept of wealth or capital as it is understood in economics, and is encapsulated in Table 1. This model is a constructive framework for analysing the diverse consequences of research activities that to date have not been explicitly addressed, mitigated or avoided by researchers.

**Table 1:** The five capitals framework (Porritt, 2007, p. 139)

Capital	Definition
Natural	Any stock or flow of energy and matter that yields valuable goods and services. It falls into several categories: resources, some of which are renewable (timber, grain, fish and water), while others are not (fossil fuels); sinks which absorb, neutralize or recycle waste; and services, such as climate regulation. Natural capital is the basis not only of production but of life itself.
Human	Health, knowledge, skills and motivation (all of which are required for productive work), as well as individual's emotional and spiritual capacities, Enhancing human capital (for instance through investment in education and training) is central to a flourishing economy.
Social	Structured, institutions, networks and relationships which enable individuals to maintain and develop their human capital in partnership with others, and to be more productive when working together than is isolation. It includes families, communities, businesses, trade unions, voluntary organisations, legal / political systems and educational and health bodies.
Manufactured	Material goods – tools, machines, buildings and other forms of infrastructure – which contribute to the production process but do not become embodied in output.
Financial	Plays an important role in our economy by reflecting the productive power of the other types of capital, and enabling them to be owned and traded. However, unlike the other types of capital, it has no <i>intrinsic</i> value; whether in shares, bonds or banknotes, its value is purely representative of natural, human, social or manufactured capital.

The unit of analysis in the AIDS research by Duesberg and Rasnick (1998) was the health and behaviour of the individual, which falls within the definition of human capital. However, a substantial consequence of the research was in the political and social spheres of social capital. The implementation of the originate-to-distribute banking model based on much earlier research (Diamond, 1984; Leland & Pyle, 1977) was an innovation within the domain of financial capital. The negative impact of the consequent financial crisis was a devaluation of not only financial capital but also human and social capital. The financial crisis potentially affected natural capital in as far as the resultant organisational budget cuts often affect the 'non-core' management issues first (as environmental issues are often perceived in business). Typically financial models have been developed for the management of personnel resourcing and scheduling at call centres, omitting the profoundly negative human and social consequences. If the most important research question to study is the longitudinal relationship between the aforementioned *sacrificial* call centre strategy and

market performance, as suggested by Wallace, et al. (2000), then human and social capital is discounted. It is well understood that technological developments, even as far back in history as the industrial revolution in the mid-1700's, resulted in extraordinary growth in manufactured and financial capital. Yet, the profound impact on the natural environment and the negative effects on society represent extensive destruction of natural, social and human capital at rates that exceed their ability to recover. The nuclear age ushered in similar developments in manufactured capital, but the military applications of the technology, the production of extremely high risk waste and worker exposure to radiation doses has come at a high price in natural, social and human capital – “nuclear power is a Faustian bargain” (Williams & Cantelon, 1984, p. xi). The social and human impact of contemporary manufacturing technology is clearly evident in the much publicised turmoil and tragedies experienced by individuals working in electronics manufacturing services companies (Branigan, 2010; Chan & Pun, 2010; Ngai & Chan, 2012). These examples demonstrate that the negative consequences of research activities can be the antithesis of sustainable development.

This analysis suggests that although typically the enhancement of capital as a result of research or innovation occurs as intended within one of the five capitals, this may sometimes be achieved at the cost of destruction of value in one or more of the remaining capitals. Schienke et al. (2009) proposed that responsible conduct of scientific research recognises three distinct components of research ethics: procedural ethics, intrinsic ethics and extrinsic ethics. As per their definition, extrinsic research ethics are:

*“Ethical issues extrinsic to the production of scientific research – that is, ethical issues in how the outcomes of science research impact society, such as: policy-making; lawsuits; changes in social norms; and education and entertainment.” (Schienke et al., 2009, p. 322)*

This triad of ethical domains has been designated the Ethical Dimensions of Scientific Research (Tuana, 2010). By introducing the concept of extrinsic ethics, Schienke et al. (2009) and Tuana (2010) are effectively proposing that researchers should integrate and apply their minds to the capitals other than that in which the research is being carried out, especially regarding the research outcomes. There are examples of contemporary research into supply chain network design, which can be classified as manufactured capital, that explicitly address issues pertaining to environmental capital (Wang, Lai, & Shi, 2011) and social capital (Pishvaei, Razmi, & Torabi, 2012). The collaborative research involving Indigenous communities in Canada (Ball & Janyst, 2008) is an example of the incorporation of social capital into the ethics of research. The principles of collaboration and consultation are now embodied in the document which prescribes ethical conduct for research involving humans in Canada (Brant Castellano & Reading, 2010; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, & Social Sciences and Humanities Research Council of Canada, 2010; Flicker & Worthington, 2012). Similarly, the necessity to engage with affected racial and ethnic groups in specific research contexts is acknowledged in the United States (Eckstein, 2012) and engagement with Indigenous Australians is embodied in the principles of carrying out health research among these populations (Commonwealth of Australia, 2003; Jamieson et al., 2012). In the information and communication technology field, Bilandzic and Venable (2011) propose a methodology of “participatory action design research” for urban informatics and suggest that this methodology will “...enable closer collaboration between academic researchers and the communities that they serve and benefit.”

## 5. A taxonomy and hierarchy of negative consequences of research

The central tenet of this paper is that researchers are responsible for considering all the outcomes and consequences of their research, whether or not those consequences are favourable and whether or not they are within the immediate objectives of the research. It can be argued that there are certain unforeseeable consequences of research for which researchers cannot reasonably be expected to accept responsibility. Conversely it is argued that researchers cannot merely abdicate responsibility by expedient definitions of scope. Therefore a taxonomy of negative consequences of research is helpful in articulating these consequences, allied to the ethical obligations of researchers.

Table 2 gives a proposed taxonomy of negative consequences of research which are considered to be out of the research scope; the categories of consequences are ordered in descending order of probability. The nondisclosure or omission from publication of negative, non-target effects or side effects that are within the research scope (Holdrege, 2008) would be regarded as unethical in terms of current standards; this situation is therefore not addressed in Table 2. It is proposed that

researchers' ethical obligations vary according to the risk associated with the outcome, which is a function of the consequence and probability of the event. In terms of this taxonomy, researchers have some obligations for even the most problematic negative consequences – those that cannot be foreseen.

**Table 2:** A proposed taxonomy and hierarchy of negative consequences of research

Categorisation	Definition	Probability	Researchers' obligations
Unaddressed	Consequences are known to the researchers but are not examined because of the predefined scope.	High	Public disclosure and engagement with stakeholders to achieve consensus on research scope and objectives.
Unintended	Consequences are known to the researchers, but with low enough probabilities that associated risks can be ignored.	Low	Include in the scope of the research measures to avoid negative consequences, despite the very low probability.
Unexpected	Consequences are known to the researchers, but with no anticipated risk because of zero probability of occurrence.	Zero	Disclosure and consultation within the professional and academic community to corroborate zero probability of occurrence.
Unforeseen	Consequences are unknown to the researchers, but could reasonably have been foreseen if researchers had applied their minds.	Unknown	Apply their minds to possible negative consequences, and their associated probabilities and impacts.
Unforeseeable	Consequences could not have been reasonably identified by researchers.	Undefined	Remain open-minded to possible negative consequences, and seek input on these, no matter which stakeholder(s) recognise(s) the risks.

Research is often mired in secrecy, and protected by copyright or patent laws, for reasons of economic competitiveness and gain. The systemic nature and scale of sustainable development challenges requires a worldview shift from protectionist to collaborative: hence the requirement for broader consultation. That this might require new research methodologies is acknowledged. Simultaneously, that “All people have the right to participate in and access information relating to the decision-making processes that affect their lives and well-being” is equally well entrenched in social and political doctrine through international law (United Nations Population Fund, 2012). This broader consultation could even result in unforeseeable consequences being serendipitously identified.

A similar taxonomy can be created for positive outcomes; ideally researchers would apply their minds to maximising positive outcomes towards sustainable futures. The obligations proposed in Table 2 are aligned with the typical hierarchy of risk treatment options as defined in ISO 31000:2009 (Purdy, 2010) which also apply equally to positive and negative outcomes. The preferential option is always to eliminate or avoid negative outcomes. By virtue of their activities, researchers are ideally positioned to identify and remove potential threats, and this should be their priority. It is worth noting here that the rigour of the research process necessitates proper observation and evaluation of activities. It has been argued (Hansson, 2011) that ethically problematic or risky activities should therefore only be carried out within a well-defined research context. However, a statement of responsibilities of researchers is worthless without a corresponding mechanism of accountability. The research ethics protocol is the appropriate means of holding researchers to account for applying their minds to all outcomes of their research.

## **6. A paradigm and protocol of research ethics for sustainable development**

Tuana noted that “My point here is that this domain of Ethical Dimensions of Scientific Research is ripe for research informed by philosophy of science perspectives” (2010, p. 481). It is being advocated in this paper that the ethics of business and management research is ripe for transformation into the context of sustainable development, due to the interdependent and constantly interacting nature of the capitals on which organisational productivity depend. Organisations are after all the mechanism through which people transform natural and human capital into social, manufactured and economic wellbeing. The twelve features of a sustainable society (Forum for the Future, 2011) is a useful framework within which consideration of potentially negative research outcomes can be applied by researchers. It is noted that these statements are comprehensive, internally consistent and culturally neutral. A protocol corresponding to this framework should govern and guide research and

professional innovation activities. Table 3 gives a proposed research ethics protocol using the five capital framework based on the twelve features of sustainable societies. The proposed protocol is consistent with sustainable development principles of fair access to resources across generations (intergenerational equity), acknowledgement of the finite limits of the capitals, and the tension between needs and wants.

**Table 3:** Proposed research ethics protocol based on the twelve features of sustainable societies

Construct	Protocol
Natural capital	<i>Natural capital must be shared fairly between current and future generations – intergenerational equity. Natural capital processes and resources have finite capacities, and protracted timeframes may be required to realise these capacities.</i>
Harmful Effects of Extraction of Substances from the Earth.	Consider and describe how the research and its outcomes may influence the environment's capacity to disperse, absorb, recycle or otherwise neutralise the harmful effects (to humans and / or the environment) of the extraction and use of substances taken from the earth.
Harmful Effects of Artificial Substances.	Consider and describe how the research and its outcomes may influence the environment's capacity to disperse, absorb, recycle or otherwise neutralise the harmful effects (to humans and / or the environment) of the manufacture and use of artificial substances.
Ecological System Integrity and Biological Diversity	Consider and describe how the research and its outcomes may influence the capacity of the environment to provide ecological system integrity, biological diversity and productivity.
Human capital	<i>The needs of the many must enjoy priority over the wants of the few, for both current and future generations. The limited capacity of specific disadvantaged groups to engage must be addressed.</i>
Standard of Health.	Consider and describe how the research and its outcomes may influence the standard of health among individuals of all ages.
Relationships, Social Participation, Development and Learning.	Consider and describe how the research and its outcomes may influence individuals' relationships and social participation, setting and achievement of personal standards of their development and learning throughout their life.
Work, Personal Creativity, and Recreation.	Consider and describe how the research and its outcomes may influence individuals' access to varied and satisfying opportunities for work, personal creativity, and recreation.
Social capital	<i>Sustainable social capital requires at a minimum, the same preconditions as sustainable natural and human capital.</i>
Governance and Justice.	Consider and describe how the research and its outcomes may influence trust in and access to systems of governance and justice.
Positive Values and Sense of Purpose.	Consider and describe how the research and its outcomes may influence shared positive values and sense of purpose among communities and society at large.
Stewardship of Natural Resources and Development of People.	Consider and describe how the research and its outcomes may influence the structures and institutions of society to promote stewardship of natural resources and development of people.
Safe, Supportive Living and Working Environments.	Consider and describe how the research and its outcomes may influence the capacity for homes, communities or society at large to provide safe, supportive living and working environments.
Manufactured capital	<i>Limits of current technology and human knowledge must be acknowledged. Consideration must be given to needs versus wants, and the natural, human and social capital expense of creating new technologies, products and services.</i>
Use of Natural Resources, and Human Innovation and Skills.	Consider and describe how the research and its outcomes may influence infrastructure, technologies and processes to minimise the use of natural resources and maximise the use of human innovation and skills.
Financial capital	<i>The financial cost of human, social, natural and manufactured impacts for current and future generations that are external to the organisation must be acknowledged and disclosed.</i>
Accurate Representation of the Value of Capital.	Consider and describe how the research and its outcomes may influence the accuracy of the valuation of natural, human, social and manufactured capital in terms of financial capital.

One can speculate as to how the outcomes of the previously cited research activities may have differed with the application of the proposed research ethics protocol based on the twelve features of sustainable societies. The impact of HIV/AIDS in South Africa could have been lessened if there had been greater consideration and engagement with civil society by Duesberg and his colleagues regarding how the publication of their research might ultimately influence the standard of health among individuals, the development of people, and the capacity for communities and society at large to provide safe, supportive living and working environments, not least through influencing government policy and approach. The financial crisis might have been mitigated or militated altogether if research into financial intermediaries had been premised on the accurate valuation of natural, human, social and manufactured capital. Operations researchers may have applied different algorithms and objective criteria if they had explicitly considered how call centre optimisation could influence the health of customer service representatives, their relationships and their social participation. The frontiers of technological innovation would surely have been redirected had there been greater consideration for:

- the harmful effects of the extractive industries, and of manufacturing artificial substances,
- for ecological system integrity and biological diversity,
- for individuals' relationships and social participation, and
- For shared positive values and sense of purpose among communities and society at large.

Mindful that the imposition of a bureaucracy of ethical procedures may be perceived to hamper academic research activity (Haggerty, 2004) the effect of the proposed protocol may rather be to increase the scope of such activities. Without the broader considerations embodied in the proposed protocol, the contribution of research to creating sustainable societies will be coincidental rather than by design.

## **7. Comments and conclusion**

As part of a postgraduate personal development programme, students were required to assess their own research against the protocol proposed in this paper. Students were prompted to think systemically about the inputs, throughputs and outputs of their research, including to what use the results of their work could be put by ethical and unethical individuals. Although anecdotal, the results are nonetheless pertinent. The most common impact reported by students was the realisation that in conceptualising their research problem, their focus had been on the positive contributions to knowledge their work might achieve; they had not considered the potential negative consequences. When considering individual components of their research problem, some students discovered that certain aspects of their research could have unintended negative consequences, even when the overall outcome was likely to be positive. The feedback generally indicated that students would amend their final reports, the most extreme case being a student who decided to dedicate an entirely new chapter to discussion of the results of applying this framework.

Sustainable development as a concept provides a lens for both upside opportunity and downside risk research: the focus of this paper is the downside, or negative risk, given the scale of global challenges in each of the capitals. It is not possible to foresee every possible outcome of research. However, the current research ethic paradigm and associated protocols tend to encourage a narrow focus based on the rights of human participants, bounded exclusively by the scope of the research problem and methodology. The interconnected nature of the five capitals that support life and the systems conditions established through these relationships requires that researchers apply their minds to the broader features of sustainable societies when considering, at an ethical level, the possible outcomes of research. At the same time, the boundary conditions of limits, needs versus wants, and intergenerational equity must inform the ethical considerations of the research. The proposed protocol is the step change that is required to shift the current narrow research ethic paradigm to one that addresses the conditions for sustainable development. In order to move towards research that contributes to sustainable development, business and management researchers and professionals must apply a thorough understanding of systems thinking to their research in order to anticipate the full suite of its possible outcomes. No single researcher can be expected to have a complete understanding of all aspects of sustainable development; the proposed consultation, dependent on the significance of the possible outcomes, addresses this limitation. Societal heterogeneity (in many forms) further dictates that researchers engage publically on potential outcomes to better gauge the current status of social expectations. The use of the proposed protocol

will not necessarily change the outcomes of the research; the broader considerations advocated in this paper should encourage decision-making that is more likely to contribute to sustainable societies.

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