

WILL THE REAL SUSTAINABLE DEVELOPMENT PLEASE STAND UP – AN INTRODUCTION

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Abstract: A practical application of sustainable development (SD) is unfeasible without being guided by a logical framework and suitable mechanism. Popular conceptions of SD are various, and non-rigorous, so that they do not offer a viable point of departure for any practical programme, that Engineers could follow. There is an urgent need to return to the basis provided by the form of words of the Our Common Future (OCF) definition of SD to rediscover the true meaning of the concept.

In OCF the context for the SD definition is set. The key ideas of environment and development are refocused giving these words a specific meaning framing the Brundtland definition which consequently should never be quoted out of context. SD is a non-negotiable unambiguous principle, a restatement of the ‘Hicksian’ principle of income that is the foundation of sound and wise household management.

This paper proposes a mechanism for practical SD that allows the ordering of the popular vocabulary of the subject and leads to useful insights into the nature of SD itself not just for Engineers but for sustainability practitioners in all walks of life.

Keywords: Real Sustainable Development Mechanism, return to basics, Brundtland.

1. Introduction

With time, the practical application of Sustainable Development (SD) within the context of Engineering has taken on added importance as environmental and social problems mount with no real solution in sight. Yet currently with the way the subject is being presented, it is difficult to discover a practical methodology that would allow systematic and effective implementation of sustainable development in business and industry.

The use of the triple bottom line (TBL) approach to produce ‘sustainability’ reports within for example the global reporting initiative (GRI) is woefully inadequate and ultimately ineffective as a way of fulfilling the sustainability agenda. (Milne, Gray, 2013) This has led to an examination of the issue from the fundamentals. Getting back to basics is perhaps a cliché,

but in this case vitally important if the real nature of sustainable development is to be truly fathomed.

It is puzzling how a depiction of SD in the form of the well known “Venn diagram” representation (Figure 7) can stand alongside the, often quoted definition of SD from Our Common Future (OCF). There appears to be no logical connection between them other than some kind of intuition (Henriques, 2001, p. 32) which hardly is a rigorous logical progression. Yet in many texts the two appear unabashedly side by side without comment. Only by re-examining the form of words of the Brundtland definition of sustainable development (Brundtland, 1987, chapter 2) does the true nature of the issue emerge.

This paper presents a general framework built up from basics that allows reconciliation between the forms of sustainable development commonly found in literature. Discarding some and suggesting an interrelationship between others. The rigorous mechanism of sustainable development resulting from this analysis allows an effective engineering approach to be made for the design of processes and activities that are truly sustainable. However, this approach is not just for engineers but is relevant to sustainability practitioners in all walks of life.

2. “Brundtland” Sustainable Development (BSD) from first principles

Almost every discussion of SD starts with a quotation of the definition found at the beginning of the second chapter of OCF

Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Yet, more often than not, this is where it stops, and the article goes on to discuss something similar but usually essentially different from the meaning conveyed by the form of words of the quoted definition. To distinguish this definition from any other, it is necessary at the outset to examine the context within which the BSD definition is proposed. OCF is very explicit about the essential concepts used in the report.

2.1. Our Common Future report (Brundtland SD in context)

The World Commission on environment and development (WCED) established in 1983 and responsible for the OCF report, quickly widened its remit from the investigation of the interrelationship between human development and the environment to include four main players, namely people, resources, environment and development. (Brundtland, 1987, chairman’s foreword p ix). The following quote shows that the commission wanted to widen the scope of the meaning of the fundamental concepts of environment and development to avoid being confined to narrow interpretations.

When the terms of reference of our Commission were originally being discussed in 1982, there were those who wanted its considerations to be limited to ‘environmental issue’ only. This would have been a grave mistake. The environment does not exist as a sphere separate from human actions, ambitions, and needs, and attempts to defend it in isolation from human concerns have given the very word ‘environment’ a connotation of naivety in some political circles. The word ‘development’ has also been narrowed by some into a very limited focus, along the lines of ‘what poor nations should do to become richer’, and thus again is automatically dismissed by many in the international arena as being a concern of specialists, of those involved in questions of ‘development assistance’.

But the ‘environment’ is where we all live; and ‘development’ is what we all do in attempting to improve our lot within that abode. The two are inseparable.

This general description of terms is meant to be all encompassing. In the case of development, OCF specifically casts it in terms of the processes and activities used for need satisfaction. Stating that *The satisfaction of human needs and aspirations is the major objective of development* (Brundtland, 1987, p. 43).

The dictionary refers to development as a *gradual unfolding or growth* (MacDonald, 1077, Chambers dictionary) but looking at the operational phase of a power plant, for example, the supply of electricity is not a *gradual growth* and yet the plant certainly contributes to the satisfaction of needs for cooking and lighting. This makes the Brundtland development more than this dictionary definition implies and includes anything that contributes to the process of need satisfaction, which means the design, construction, and operation of systems and procedures. The power plant in this instance becomes a development in its own right satisfying the need for electricity, like a housing scheme often referred to explicitly as a housing development satisfies the need for shelter.

Environment too in OCF is more than just trees, oceans and deserts but is closer described by the idea of surroundings as given in the environmental management system (ISO14001. 2004) All this of course has wider implications, for example, the principal output of the economy is, in this context, need satisfaction and not wealth creation, while goods and services, the output of business and industry, are only an intermediary to this “higher” aim. The context described here is inseparable from the actual “Brundtland” definition of sustainable development presented in the same report and discussed in the next section. This means that the said definition cannot be quoted or used out of context as many do with impunity.

2.2. The form of words

The phrase ‘sustainable development’ forms an organic grammatical whole. This would seem obvious, but what others have done with these words has got to be seen to be believed. (IUCN, 2006) Violating grammatical rules, the phrase is ruptured, and the properties of

development and sustainability treated as separate, leading to all sorts of bizarre conclusions including the labelling of sustainable development as an oxymoron (Brown, 2015).

The word sustainability is also used in all sorts of ways causing all manner of confusion. Dictionaries pre-dating OCF often don't even list sustainability directly but rather refer to it as the noun relating to the verb 'to sustain' as the root. In the dictionary definition given below, sustainability doesn't appear at all. The adjective 'sustainable' does and it describes something that can *keep going*.

sustain...v.t. *to hold up: to bear: to support: to provide for: to maintain: to sanction: to keep going: to keep up:adj. sustainable...(Macdonald, 1977, Ch. Dictionary).*

Sustainability appears as a separate entry, more often post Brundtland and the predominant meaning of sustainability here is still "the ability to continue or keep going" (Porritt, 2005). The meaning given in (2) below however is already drifting away from being just 'continuance'.

sustainability [suh-stey-nuh-bil-i-tee] noun (1) *the ability to be sustained, supported, upheld, or confirmed.* (2) *Environmental Science: the quality of not being harmful to the environment or depleting natural resources, and thereby supporting long-term ecological balance* (dictionary.com).

The meaning of the word undergoes much more of a metamorphosis in sociological and other "humanist" texts, where sustainability denotes something like wellbeing, and wholeness, implying a state of existence, a concept that according to Herman Daly is an abstract. (Daly, 2007). It is easy to extend this idea of sustainability to mean a wholeness or wellbeing of society or of the economy or indeed of the natural environment all endangered today and all in need of being made "sustainable" (Wouter Van Dieren, 1995, Chapter 7).

In OCF though, sustainability is never explicitly defined, and considering the report was written before all the various interpretations took hold, it is highly unlikely that sustainability means anything other than continuance.

SD then, is a need satisfaction process that can go on indefinitely. It is the sustainability or continuance of development that is in question here so that BSD is a form of development that is made up of activities that provide and continue to provide need satisfaction for all regardless of generation or social standing or economic condition, with equity requirements explicitly built into the form of words and into the OCF narrative.

Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

2.3. Needs?

One of the most appropriate and comprehensive definitions of human needs is given by the Maslow pyramid (Fig. 1) This extended version includes spiritual aspirations at the pinnacle. Although the whole of Maslow's approach has centred on the hierarchical nature of need satisfaction, nevertheless before his death Maslow had already alluded to the inclusion of the

added stage at the top of the pyramid and he also questioned the rigorous application of the pyramid hierarchy indicating that the order is not strict and that even the physically hungry can and do have a need to reach out to a dimension of life beyond themselves (Koltko-Rivera, 2006).

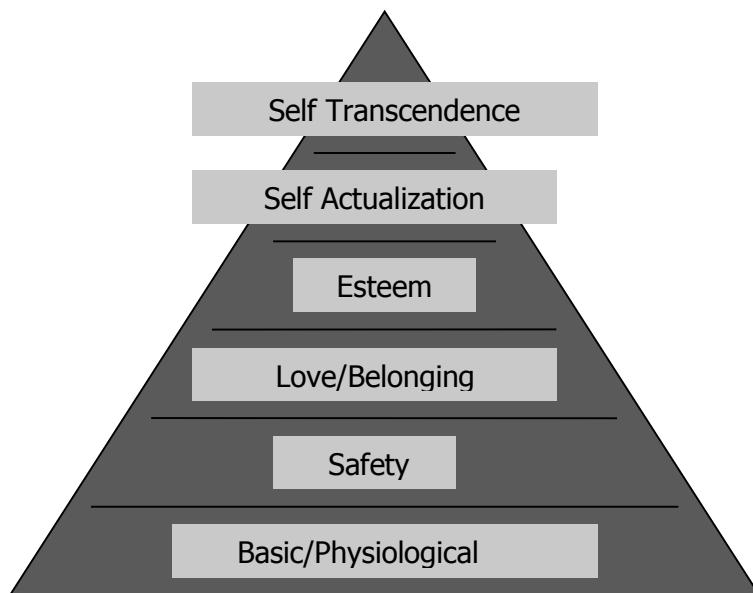


Figure 1. Maslow's extended pyramid of needs.

To meet the needs of society or of individuals in practice, a mechanism should be drawn up that identifies the role of Engineering in the procedures.

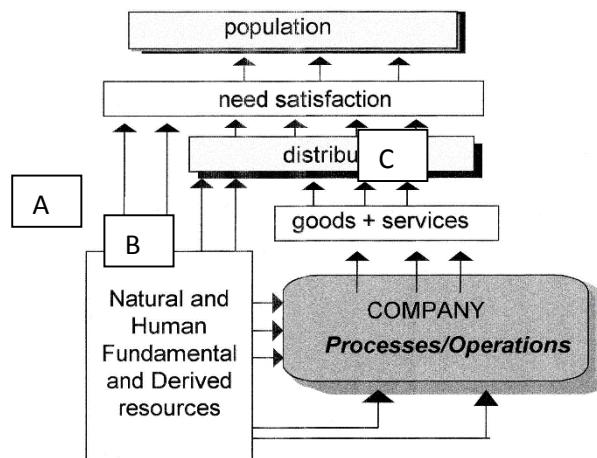


Figure 2. The practical mechanisms of development for needs satisfaction: A – directly, B – through distribution, C – through distributed goods and services.

Needs are met (Fig. 2) through development where in path A resources are accessed directly, like breathing air; path B resources are distributed like Water is, and path C resources are processed into goods and services that are then distributed for consumption. Engineering that contributes explicitly to path B and C has to be aware of this bigger picture.

In straight development, there is no mention of pollution or any other negative side effect associated with the development path. A more realistic model (Fig. 3) below showing the functioning of the economy, includes resource flows and the negative side effects of processing, both of which figure implicitly in the notion of sustainable development.

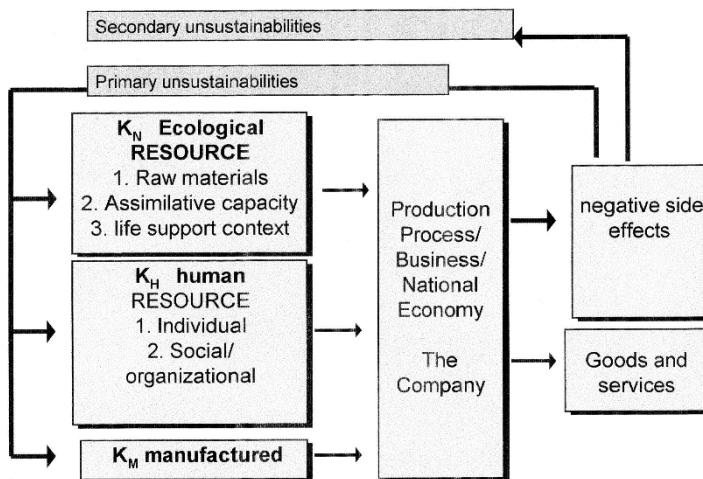


Figure 3. Un-sustainabilities of business and the economy. Adapted from (Wouter Van Dieren, 1995, Chapter 5).

The figure also shows that there is more to resources than just raw materials. Anything that is necessary for manufacture is a resource, including the life support context provided by the environment within which everything is imbedded.

2.4. The mechanics of Brundtland sustainable development

Various writers have drawn attention to the unsustainable nature of our present development paths.

Many present efforts to guard and maintain human progress, to meet human needs, and to realize human ambitions are simply unsustainable - in both the rich and poor nations. They draw too heavily, too quickly, on already overdrawn environmental resource accounts to be affordable far into the future without bankrupting those accounts. They may show profit on the balance sheet of our generation, but our children will inherit the losses (OCF, 1987, chapter 1).

Without resources there is no development and no need satisfaction, so the resource base must be maintained in tact if we want to keep on meeting our needs over and over again. The sustainability of development is defined therefore by its interrelationship with the underlying resource base that feeds it. Any development activity that undermines any resource is unsustainable (Fig. 4).

Resource availability therefore lies at the heart of sustainable development and has two main features:

1. The existence of resources as such.
2. The equitable access to these resources as indicated by the equity clause of BSD.

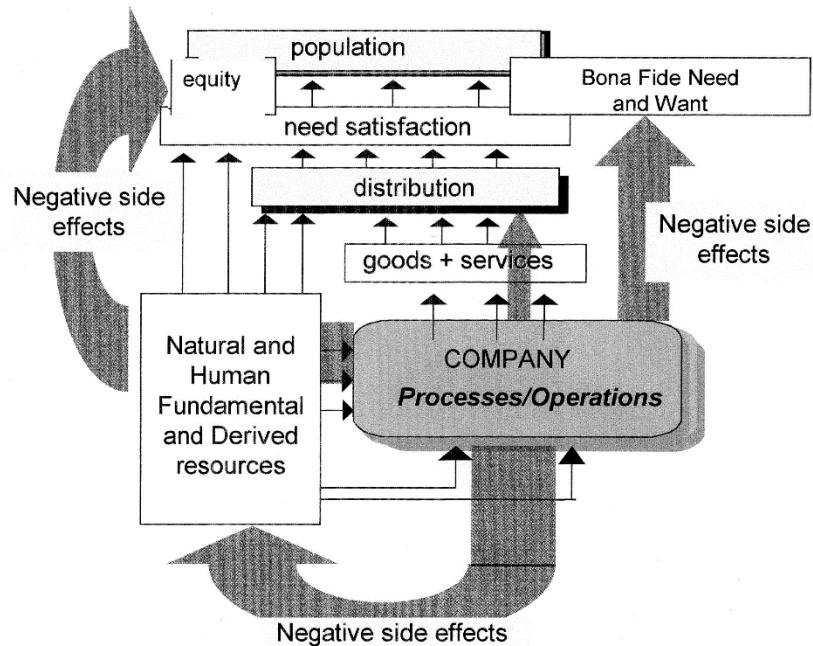


Figure 4. A description of the un-sustainability of development.

Activities that undermine or otherwise infringe resource availability are deemed unsustainable and this effect has to be neutralised or designed out of the system for BSD to take effect.

Resources are made **unavailable** through:

- Exhaustion or destruction and contamination. Applies to raw materials, to biomass, soil water and air.
- The dismantling of environmental regulation mechanisms like the regeneration of Renewable resource, the assimilative capacity for dealing with waste, or water regulation or soil regeneration and life support context in general.
- Denial of equitable access to resources for individuals or groups within a generation, by population dislocation for example including the denial of the opportunity for livelihood.

In summary, the phrase “sustainable development” is an indivisible grammatical whole while SD is a non-negotiable principle, that simply says:

1. *If you want to continue to satisfy your needs now and into the future then don't trash the resource base that supports you.*
2. *Don't prevent others from also meeting their own needs.*

This is nothing more than the principle of wise husbandry that emphasises the conservation of capital as you live off your income. Hicks translated this principle into economics (Salah El

Serafy, 2013). The concepts of development and environment contained in BSD definition are specific to OCF while the human needs in question are shared by all people by virtue of being human.

3. Brundtland SD applied

BSD derived from first principles has yielded a particular insight into its true fundamental meaning and application. It has three modes of application.

3.1. The direct implementation mode

The deliberate proactive design installation and operation of processes that are sustainable because they have no resource undermining side effects throughout these stages, is the **direct implementation** mode of sustainable development. This is a *Total* concept.

Current SD implementation as practiced in the ‘official’ economy is reactive in nature because problem fixing is the primary way of acting (see c. below). Direct implementation is most likely to happen through charities and NGO (Elliot, 1996) that aim to alleviate poverty. Even then these projects may have to rely on unsustainable transport and energy infrastructure to function at all. So un-sustainabilities are imported into an otherwise sustainable developmental activity.

3.2. The enabling mode

In OCF there is a curious statement which at first sight appears to be another definition of SD.

Sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations (OCF, p. 46).

It would appear that these words have been used as a possible alternative definition of sustainable development. (Wackernagel, Rees, 1996, p. 39) because the wording in OCF is confusing when the expression *sustainable development is....* is at the beginning of the paragraph. The narrative of OCF isn’t perfect and there are several other instances in the report where the phraseology is unclear.

Returning to the words cited above however, it seems that most of the factors mentioned in this ‘other definition’ relate rather to what can be called **the enabling mode** of Sustainable Development. This means that the *direction of investment, the orientation of technological development and institutional change* and the way in which resources are exploited, should all work together to make SD happen. They must **enable_sustainable development to be designed**

and operated in order to *enhance both current and future potential to meet human needs and aspirations*. It follows that education and properly defined profitability rules would naturally be included in this mode of application.

3.3. The remedial/remediation mode

Development that causes the visible problems of poverty, environmental degradation, climate change and social strife is un-sustainable (Fig. 5). The real relationship between development and its outcomes is largely unseen while the problems are obvious. It is only natural therefore that most management efforts are problem orientated. Agenda 21 that came out of Rio in 1992, the millennium goals and now the 17 Sustainable Development goals for 2030, (Sustainable Development goals, 2016) are largely to do with solving the visible problems.

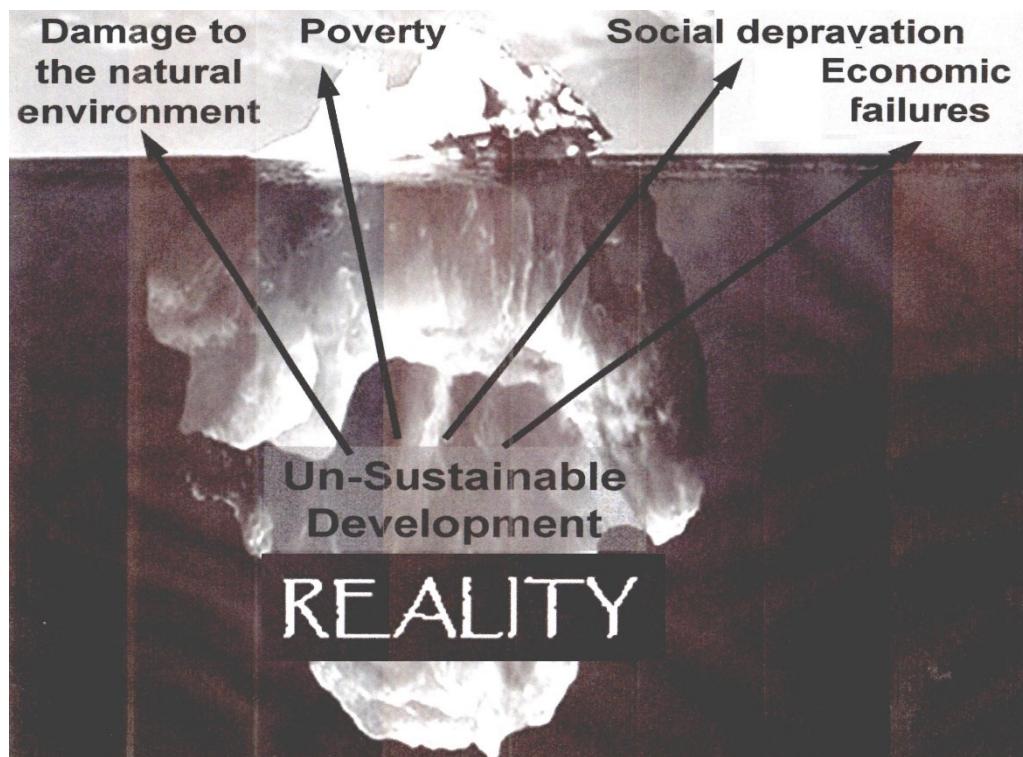


Figure 5. The ‘unseen’ un-sustainable development lies behind the seen problems it causes.

It is true that the effect of these solutions will finally trickle down to the processes that are the sources of un-sustainability, but this procedure is slow and cumbersome and ultimately ineffective because it cannot keep up with the pace of deterioration. How much better would it be to implement sustainable processes directly at the outset?

3.4. The inter-relationship of the three modes of SD

SD is primarily operationalised by direct implementation in a proactive way. This depends on an active enabling strategy marrying together financial incentive, legislation, research, education and so on, to enable not only the installation activities but the remediation activities

as well. Due to historical legacy the remedial mode of action dominates business and society, even education where TBL thinking abounds (QAA, 2014) The TBL approach to sustainability management is also inspired by the need to fix problems. Any business can demonstrate its contribution to this through such mechanisms as the Global Reporting Initiative (GRI). But the effectiveness of this with regard to core sustainable development is quite minimal because the ingrained core of production and consumption continues to be unsustainable (Brundtland, 1987). In the end, the proper ordering and application of the three modes of sustainable development is a political decision.

4. The real sustainable development – Stand up!

Sustainable development is development that meets the needs of the present without diminishing the ability of future generations to meet their own needs.

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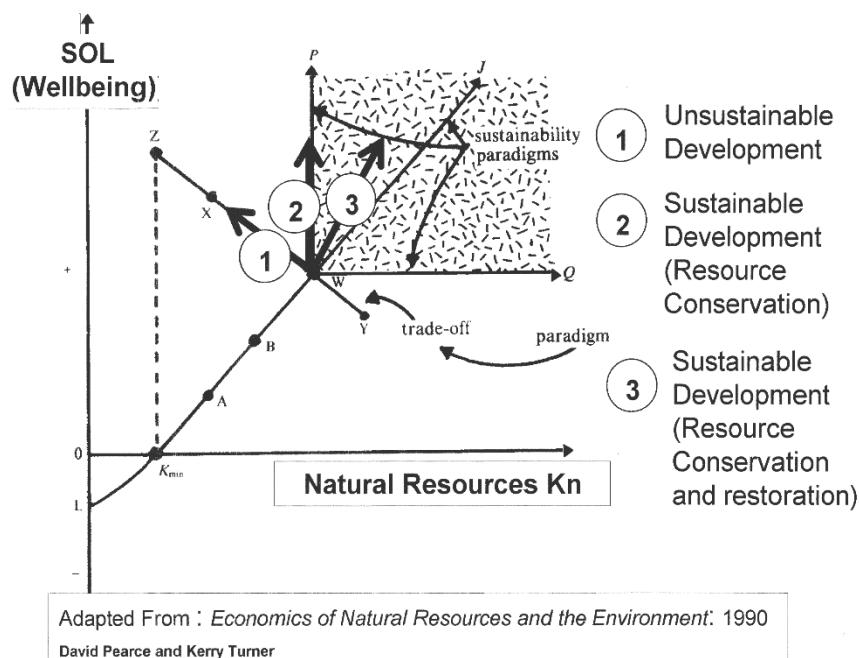


Figure 6. The real sustainable development. Adapted from (Pearce, Turne, 1990).

This real sustainable development is well illustrated in figure 6. The nature of the development path determines its sustainability and the key to its sustainability is its relationship to the resource base. Development path 1 is unsustainable because it reduces the availability of resources. Path 2 and 3 maintain or enhance resource availability and are therefore sustainable

The form of words of BSD is a rigorous statement of principle. It, plus all the properties that define an authentic sustainable development summarised above in section 2.4. is the

standard against which all other interpretations and shades of sustainable development have to be judged.

The examples that follow represent the most common ways sustainable development has been miss-interpreted.

1. **Sustainable Development is a process of moving towards sustainability.** *Here the “sociological” interpretation of sustainability is used, meaning a state of wellbeing integrity and health. It is indeed a path moving us closer to wellbeing, when needs are being progressively satisfied. It is however much more than this. BSD is about the sustainability of development which involves a type of process that has no detrimental effect on resources. It is a special process path that moves us closer and closer to a state well being (Fig. 6) (Pearce, Turner, 1990).*
2. **Sustainable Development is an oxymoron.** *This assertion requires the adoption of the economist’s interpretation of development as economic growth. Such growth on a finite planet cannot be sustained so that this form of Sustainable Development is indeed an oxymoron (Brown, 2015). Real sustainable development however, the Brundtland kind, is about meeting needs and not about economic growth and real sustainable development is NOT an oxymoron. OCF specifies economic growth of a “new kind” in which sustainability equity social justice and security are firmly embedded.*
3. **Sustainable Development is the same as Sustainability and sustainability means all things to all people** (Henriques, 2001). *This assertion has no substance at all and cannot be demonstrated. It is simply wrong. Sustainability is never defined in OCF and by implication means continuance. Sustainability in the sociological sense may be a valid goal of sustainable development but never a synonym. That the notion of sustainability (in the sociological sense) is subjective is a consequence of its abstract definition (Daly, 2007).*
4. **Sustainable Development is vague, ambiguous etc.** (Daly, 1990; IUCN The World Conservation Union, 2006; Wackernagel, Rees, 1996). *Again this is simply wrong. Sustainable Development has been shown in this paper to be a statement of principle unequivocal and precise, unambiguous and non-negotiable.*
5. **Sustainable Development is represented by the three pillars of social environmental and economic sustainability or by a three circle “Venn type” diagram (Fig. 7).** *There is no argument that can logically demonstrate that sustainable development as defined in OCF can be so represented. Rather, this interpretation has been a matter of ‘gut feeling’ or insight as the following quote demonstrates. The writer here, after earlier having quoted the OCF definition verbatim and then having equated sustainability with sustainable development goes on to say: ‘Another insight (into sustainability) is given by the very intuitive idea of the ‘triple bottom line’ which was suggested originally by John Elkington of Sustainability Ltd. This works by establishing the three dimensions – social environmental and financial – as of comparable status in*

their own right and crucially also as legitimate aspects of management attention for companies in working towards sustainability” (Henriques, 2001). The BSD and the “Venn” representation are talking about two different things. The first, through the form of words defines the real sustainable development that concentrates on making sustainable the processing activities used for need satisfaction. The second, the three-domain representation at best refers to the places where the outcomes of sustainable development are concentrated.

5. Discussions: Questioning your assumptions

Travelling home one evening a conversation on the car radio caught my attention. An interviewer had just asked “So what would you say was the main reason for your change of direction that led you into such success?”.

After a short pause, the answer came, “I questioned my assumptions, “The assumptions that had become the implicit driver in what I was doing”.

In research, assumptions continually have to be questioned so that corrections can be made, returning to the bedrock upon which assertion could be built. To be as objective as possible you have to do that. Are you building on the bedrock of fact or on the shifting sands of conjecture?

This of course applies to sustainability and sustainable development too. The assumptions and world view that give direction to the undertaken investigation are in this case subconsciously built on a historical legacy that has its roots in colonialism and exploitation. That is how much of the wealth in Europe came about. The economic systems were built to foster this, and not to consider sustainable development.

We have inherited an unsustainable linear production and consumption system that underpins all our economic activity. It was expedient and still is, to take, make, use and discard. All the recycling initiatives have made little difference to this economic juggernaut and asking this system to grow just increases throughput so that all the unsustainable ailments increase in proportion.

The EC, the common market, was conceived as a trade organisation in the 1950’s and in a matter of twenty years later smog, acid rain, and currently climate change are testimony to the fact that the linear system is hitting the buffers; legislation became mandatory. This kind of problem orientated management is symptoms management and is slow and cumbersome. In 1952 a pea-soup smog brought London to a halt and 4000 extra deaths, mostly premature were attributed to this episode. The clean air act of 1956 was designed to “sort” the problem with fuel switching and tall chimneys that would eject the pollution higher into the atmosphere. Out of sight out of mind was the order of the day; with implementation taking another 4 years

and 10 years later the problem was abated, swept under the carpet or no longer politically sensitive.

Some 40 years later, smog has returned to the UK today, smog with its roots in diesel. Diesel was one of the fuels that replaced coal as a remedy for the 1950's smog. Diesel was also recommended as preferable to petrol because it produced less CO₂ and less "global warming".

This kind of symptom management is ineffective because the rudimentary problem, namely an unsustainable power generation system and transport system persists, just as the predominantly linear production and consumption system behind all the ailments also persists.

SD is about the way we do things. It is a people problem, a behavioural problem a lifestyle issue not a technological one. The solution lies in lifestyle and processing changes not sorting problems, fixing the environment or alleviating poverty. It is tackling the source processes at their root. The proliferation of plastic waste is not fixable by fining consumers and making them pay 5p for a plastic bag. If there is to be any effective change, plastic and its use has to be designed out of the production and consumption system.

Economic growth is at odds with natural laws. Business as usual with a predominantly linear production-consumption system is not an option. Symptom management is not effective and will not work. You cannot fix a problem using the same approach that was used in creating it in the first place. (Einstein), so business as usual has outlived its usefulness.

The TBL is not sustainable development regardless of its popularity. There is no logical way that you can go from the Brundtland definition of SD to the Venn diagram representation or the three-pillar representation of sustainable development. Both of these fails to capture the process orientated reality of sustainable development with its equity requirement.

The BSI (Henriques, 2001) has commended Paul Elkington for his "intuition" depicting SD as three pillars, leading to the triple bottom line enshrined in the UN's 2005 declaration (United Nations, 2005) and also in business through the practice of Global Reporting Initiative. Can intuition really replace logic? Nevertheless, after more than 30 years since OCF logic it seems is in short supply!

To illustrate this, in the academic world, the 2014 higher education guidance document, quotes the Brundtland definition out of context, then somehow switches to the three-pillar model, claiming that the UN had made a "recalibration" (The Higher Education Academy, QAA, 2014). How scientific is that?

We need to return to the bedrock, to moor our arguments to the real sustainable development of Our Common Future and to end these meanderings that lead to such bizarre conclusions.

6. Conclusions

Sustainable Development has become misrepresented on a grand scale. There is a proliferation of incongruous ideas and interpretations of epidemic proportions, which have permeated business, governments and institutions such as the UN, BSI and even academia.

These prevailing paradigms, brought about by history, have resulted in a strengthening of the business as usual straitjacket and feel good marketing strategy.

BUT, SD demands proactive implementation and enabling which requires political will and a measure of courage.

Universities are well placed to right the wrong and to teach the fullness of the subject rather than just towing the TBL line. Re-examining assumptions is crucial so that any expose or any discussion is based on the bedrock of logical deduction, rather than on ‘intuition’ or ‘recalibration’.

Perhaps it just needs a light to be shone in the right direction? Certainly, there is no lack of enthusiasm for the subject and many in academia business and government who espouse the three-pillar approach without realising its true relationship to core sustainable development are doing so in good faith, but at the same time spreading a smokescreen that blots out the true face of the subject.

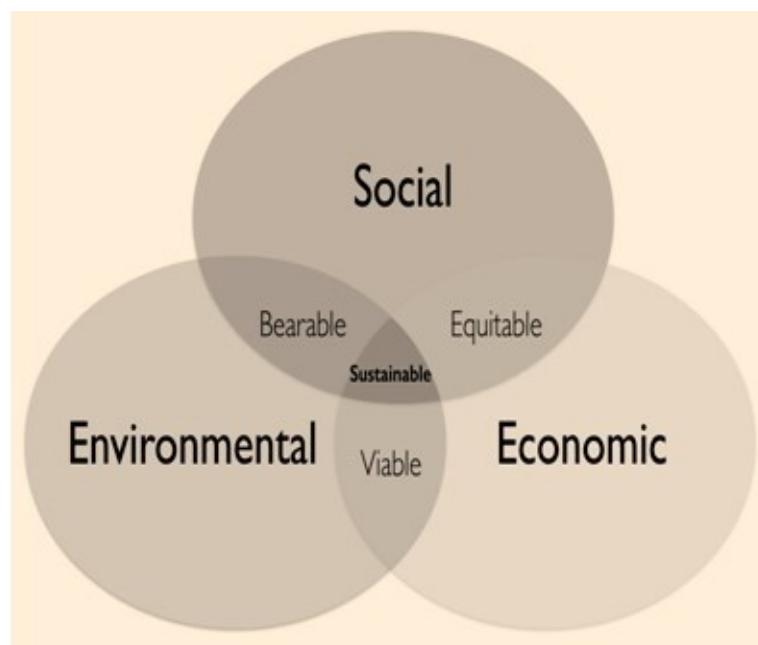


Figure 7. The often used “Venn” diagram representation of sustainable development. Usually it is assumed that sustainable development “resides” in the area where the three domains intersect.

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