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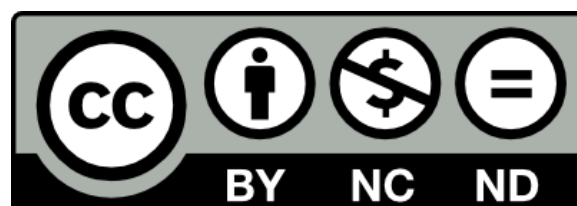
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<http://dx.doi.org/10.1016/j.eiar.2016.11.002>

**Pope, J., Bond, A., Hugé, J. and Morrison-Saunders, A. (2017)  
Reconceptualising sustainability assessment. Environmental  
Impact Assessment Review, 62 . pp. 205-215.**

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# Reconceptualising Sustainability Assessment

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## ABSTRACT

Sustainability assessment as an *ex ante* tool for directing decision-making towards sustainability has emerged in a diverse range of forms across the world over the past decade or so. This broad practice of sustainability assessment embraces a wide and continually evolving range of processes, making the field potentially conceptually confusing and difficult to navigate. In recognition of this, there have been numerous attempts to develop conceptual frameworks to make sense of the diversity of practice. Through a process of literature review and reflection upon practice, this paper builds on earlier work, including our own, to develop a new descriptive conceptual framework for sustainability assessment. The conceptual framework distinguishes two dimensions of sustainability assessment, each with several sub-dimensions: sustainability concept (with sub-dimensions of underpinning sustainability discourse and representation of sustainability) and decision-making context (with sub-dimensions of subject of assessment, decision-question and responsible party). Drawing upon further literature, several examples of different approaches are then identified for each sub-dimension, demonstrating the range of approaches evident within current and emerging global practice. Within the 'sustainability concept' dimension, the first sub-dimension calls for critical reflection upon what the normative goal of the sustainability assessment is, while the second refers to how the concept of sustainability is represented in the decision-making process through the use of indicators. Although these two sub-dimensions are closely related their distinction is a key feature of the conceptual framework. The second dimension describes the practical context of a sustainability assessment. The proposed new conceptual framework enables a particular body of practice to be located within the broader field, as we demonstrate by categorising five examples of sustainability assessment according to the framework. We believe this framework has value to both researchers and practitioners, as a structure to guide sustainability assessment research and analysis and as the basis for comparing bodies of sustainability assessment practice within the range of possibilities defined by the contours of the framework. The framework encourages reflective practice, particularly in relation to how the concept of sustainability is understood and embedded within the process, and what the practice might deliver. This new conceptual framework is presented as a relatively simple road map and guide as sustainability assessment theorising and practice enters its second decade.

**Keywords:** sustainability assessment, conceptual framework, pluralism, discourse, sustainability, decision-making context

Citation: Pope J, A Bond, J Hugé and A Morrison-Saunders (2016), Reconceptualising Sustainability Assessment, *Environmental Impact Assessment Review*, <http://dx.doi.org/10.1016/j.eiar.2016.11.002>

# Reconceptualising Sustainability Assessment

## 1. Introduction

Over the past decade, sustainability assessment has emerged in many different forms across the world (Bond et al., 2012), with the variety being evident in the recently published book *Sustainability appraisal: a sourcebook and reference guide to international experience* (Dalal-Clayton and Sadler, 2014). The term ‘sustainability assessment’ can be used to refer to processes that are *ex post* evaluative techniques as well as those that are forward-looking *ex ante* processes that aim to predict the potential effects of an activity prior to its implementation. There is also variety in terminology used to refer to *ex ante* sustainability assessment processes, including sustainability appraisal (particularly in England), integrated assessment, integrated sustainability assessment, and sustainability impact assessment (Pope et al., 2004). The point has not yet been reached at which there is universal consensus as to what any of these terms mean, much less a commonly understood process for conducting them.

One form of sustainability assessment is an emerging field within the impact assessment tradition, where impact assessment is defined as “the process of identifying the future consequences of a current or proposed action” (IAIA, 2009, p1) and the subject of the assessment is typically a proposed new policy, plan or project. This raises the question of how sustainability assessment can be meaningfully distinguished from other forms of impact assessment and other environmental governance processes, particularly environmental impact assessment (EIA) and strategic environmental assessment (SEA), especially as it has been pointed out that “the common cause shared by all environmental assessment and management tools [is] that of sustainability, even though many did not start out with that as the underlying purpose” (Sheate, 2009, p19). But on the other hand many applications of sustainability assessment do not arise from impact assessment tradition at all, but instead are posited as processes for “exploring sustainable solutions to persistent problems” (Videira et al., 2010, p448). In these cases, the sustainability assessment process can be the means by which a policy problem is structured and alternative strategies to address these problems are developed and evaluated.

A number of authors have sought to address this potentially confusing situation by proposing what they consider sustainability assessment *should be*, and defining points of difference from other related processes. In this vein, Sala et al. (2013) and again in Sala et al. (2015), distinguish between ‘integrated assessment’ and ‘sustainability assessment’, while Weaver and Rotmans (2006) propose an ideal process they call ‘integrated sustainability assessment’ (ISA), which they distinguish from ‘sustainability impact assessment’. In contrast with some of these and other authors, we take a descriptive rather than a prescriptive approach to sustainability assessment, embracing a range of sustainability assessment practice. We align ourselves with the definition of sustainability assessment as any process that aims to direct decision-making towards sustainability (Bond et al., 2011, derived from Hacking and Guthrie, 2008). This definition is sufficiently broad to encompass a vast range of decision-making from choices of individuals in everyday life through to projects, plans, programmes or policies more familiarly addressed in the field of impact assessment. For the purposes of this paper, however, we are specifically concerned with *ex ante* forms of sustainability assessment, and we consider that the defining feature of sustainability assessment compared with other forms of impact assessment is that some attempt is made to engage with the concept of sustainability in all its complexity (Pope, 2006).

This broad view of sustainability assessment brings with it some additional challenges for both researchers and practitioners, not the least of which is how to make sense of the range of applications, processes and practices that now proliferate. A failure to recognise the diversity of practice and to understand how a particular sustainability assessment process fits into the spectrum risks inappropriate assumptions being made or general conclusions about sustainability assessment being drawn that are actually only valid for very specific and restricted examples. For this reason a number of descriptive conceptual frameworks have been proposed over the last ten years or so that enable the various forms of sustainability assessment to be mapped or categorised in relation to one another. Having contributed some of these conceptual frameworks ourselves (Pope et al., 2004, Hugé et al., 2013), we are all too aware of the need to periodically review and if necessary update them in the face of the rapid growth and diversification of sustainability assessment since some of them were published.

The aim of this paper, therefore, is to review existing conceptualisations of sustainability assessment, and in doing so to propose a new descriptive conceptual framework for sustainability assessment based on a synthesis of current understanding. By 'conceptual framework', we mean "a network, or 'a plane' of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena" (Jabareen, 2009, p51), or more simply a map to help navigate complexity. Consequently we seek to describe, not to prescribe, in keeping with our view that *ex ante* sustainability assessment is a broad field that can encompass many processes and practices. Conceptual frameworks are of value to both researchers and practitioners, as they offer a structure to guide research and analysis and provide the basis for positioning, comparing and reflecting upon one body of practice within the range of possibilities defined by the contours of the framework.

## 2. Our approach

To achieve the aim of this paper we considered the following questions:

1. What dimensions should a comprehensive descriptive conceptual framework for sustainability assessment include?
2. In the context of these dimensions, how well do existing conceptual frameworks perform as a map to sustainability assessment practice?
3. What are some of the different approaches that can be discerned from current sustainability assessment practice within each sub-dimension?

Answering these questions leads to a conceptualisation structured around dimensions (and sub-dimensions) of sustainability assessment, illustrated with examples from practice within each dimension. By dimensions, we mean the major aspects (cf. Franks et al., 2013) that comprise any sustainability assessment process, whether explicitly or implicitly. Our methodological approach is based on review of literature drawn predominantly from books and peer-reviewed journals, using search terms reflecting the terminology discussed in the previous section. The review focuses on literature that helped us to answer these questions and as such does not represent an exhaustive coverage of the vast and exponentially growing body of sustainability assessment literature (Bond et al., 2012).

As the first step, a search was undertaken to identify literature that specifically has as its aim to contribute to the conceptual development of sustainability assessment as a form of *ex ante* impact assessment. Firstly, there is a body of literature that primarily seeks to describe and navigate the field of sustainability assessment, and in some cases to also define what might constitute best practice (Hacking and Guthrie, 2008, Hugé et al., 2013, Pope et al., 2004, Weaver and Rotmans, 2006). This work is therefore similar in

intent to this paper with its focus on description rather than prescription. Then there is literature briefly mentioned in the previous section that is more prescriptive, and seeks to define the features of certain forms of sustainability assessment that are posited to be superior to other forms (e.g. Sala et al., 2013, Videira et al., 2010, Sala et al., 2015).

There is a third (and partly overlapping) body of work, which has as its primary purpose to identify the various dimensions that need to be considered and presenting these as a multi-dimensional framework. While these contributions have both descriptive and prescriptive elements and do tend to have a strong normative component (e.g. Sala et al., 2013 offers a framework as well as a normative definition of sustainability assessment), their identification of the dimensions of sustainability assessment make them useful in addressing our first question above. We commence in Section 3 by reviewing these frameworks to identify the potential dimensions of a comprehensive conceptual framework for sustainability assessment (Question 1). In Section 4 we turn our attention to existing descriptive conceptual frameworks and review these against the identified dimensions and in light of recent thinking on sustainability assessment where applicable (Question 2). Through this process we refine the dimensions we consider relevant to our conceptual framework (Question 1). In Section 5 we draw upon other literature sources and case examples to identify some examples of different approaches from practice within each of the identified dimensions against which current sustainability assessment practice can be mapped (Question 3). In Section 6 we demonstrate the use of our proposed new conceptual framework to categorise five examples from global sustainability assessment practice, and consider how the framework might be usefully applied by researchers and practitioners.

### **3. The dimensions of sustainability assessment**

Our first aim (corresponding to Question 1) was to identify the dimensions of a sustainability assessment process. Our search identified four multi-dimensional frameworks for sustainability assessment that explicitly articulated such dimensions and the relationships between them: those by Lee (2006), Gibson (2006a), Wiek and Binder (2005) and Sala et al. (2013; 2015). Each of these works is largely focused on prescribing how each dimension of sustainability assessment should be addressed in practice. This is less relevant for our purposes, which at this stage are to firstly identify what these dimensions might be.

In 2006, Lee sought to bridge the gap between sustainability assessment theory and practice by proposing a 'common assessment framework' to outline "what constitutes a satisfactory integrated/sustainability impact assessment" (Lee, 2006, p57). Three dimensions comprise his framework: the planning context, the process, and the methods, with each dimension influencing the others. Thus, he argues, undertaking a sustainability assessment should commence with understanding the planning context, including the regulatory and institutional context and the constraints this might place on practice; the nature of the policy, plan or programme that is being assessed; and the resources available to undertake the assessment. In considering process, Lee discusses the principal steps that are common to impact assessment in general, namely screening, scoping, the assessment itself (both preliminary and detailed), and monitoring and *ex post* evaluation (otherwise known as follow-up).

Lee (2006) then discusses methods (or tools and techniques) that can be applied at different points and for different purposes throughout the process. He suggests that such methods can be both qualitative and quantitative, and that appropriate methods should be selected from the toolkit to meet the requirements of the planning context as part of the scoping stage (he calls this the 'task-methods analysis'). Lee poses a set of 'foundation tasks' that are essential for both preliminary and detailed assessments: "defining system

boundaries; problem identification, goal and target setting; options identification; specification of impact indicators” (Lee, 2006, p67).

In his discussion of impact indicators Lee (2006) makes the point that it is important to clarify the definition of sustainable development<sup>1</sup> that informs the development of indicators prior to the commencement of the assessment process. However, his discussion is limited to a brief consideration of the difference in the types of indicators that might be appropriate if the focus is to be more on intergenerational considerations compared with intra-generational equity concerns.

Gibson (2006a), on the other hand, places the nature of sustainability at the heart of his framework, which has four dimensions (p171):

- “the basic sustainability requirements that should inform a transition to sustainability assessment;
- the main implications of these requirements for sustainability assessment decision criteria and trade-off rules;
- how to incorporate proper attention to the specific circumstances of applications into particular cases and contexts; and, more generally,
- how to design practical sustainability assessment regimes”.

In contrast with Lee (2006) and his implicit understanding of sustainability, Gibson is explicit and unashamedly normative, specifying in his sustainability decision criteria the contribution he believes each decision should make towards a more sustainable future. He strongly advocates contributing positively and simultaneously to socio-ecological system integrity, livelihood sufficiency and opportunity, intra-generational equity, intergenerational equity, and resource maintenance and efficiency. Further he specifies how such decisions should be made – through embracing socio-ecological civility and democratic governance, precaution and adaptation, and immediate and long-term integration of all of the above elements (Gibson, 2006b, Gibson et al., 2005). It is important to note that in doing this Gibson does not attempt to define what sustainability looks like as a goal, but rather how decision-making should contribute to progress along the path to such a goal, whatever that may look like in practice. Like Lee (2006) he recognises the importance of context, but whereas Lee is interested in exploring the constraints represented by the planning context, Gibson advocates operationalising his decision criteria within whatever context applies in a given situation.

Gibson gives decidedly less focus to the process dimension of his framework, but his list of broad process steps does bear a passing resemblance to Lee’s (Gibson, 2006a, p172):

- “identifying appropriate purposes and options for new or continuing undertakings;
- assessing purposes, options, impacts, mitigation and enhancement possibilities, and so on;
- choosing (or advising decision-makers on) what should or should not be approved and done, and under what conditions; and
- monitoring, learning from the results and making suitable adjustments through implementation to decommissioning or renewal”.

The normative component of sustainability found in the work of Gibson is also explicit in the framework of Wiek and Binder (2005), who suggest that sustainability assessment has three dimensions: normative, systemic and procedural. The normative dimension here reflects the underlying concept guiding the process, or the implicit goal of the sustainability assessment; the systemic dimension refers to the way in

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<sup>1</sup> For the purposes of this paper we consider the terms ‘sustainability’ and ‘sustainable development’ to be interchangeable, in line with DRESNER, S. 2008. *The principles of sustainability 2nd edition*, London, UK, Earthscan.

which sustainability is represented for the purpose of the assessment process; while the procedural dimension refers to how the assessment process is undertaken, in terms of processes and tools applied. This framework offers a unique feature in the separation of the normative and systemic dimensions. In the words of Binder et al. (2010), p73 in their application of this framework to sustainability assessment practices in the agricultural sector, “we explicitly separate the question of whether a system is properly described by means of the set of indicators used (systemic) from the question of how to assess whether the studied system is sustainable (normative)”. Wiek and Binder (2005) do not, however, attempt to describe the range of normative and systemic understandings of sustainability that are possible.

The most recent of the four frameworks reviewed here is that by Sala et al. (2013; 2015), whose framework has three dimensions: approach to sustainability, decision-making context and methodological choices. Using this framework, they distinguish between ‘integrated assessment’ and ‘sustainability assessment’ ontologically, methodologically and epistemologically, but this aspect of their work is less relevant for our purposes. Sala et al.’s framework also draws upon the recently revised Bellagio STAMP principles for sustainability assessment and measurement (Pintér et al., 2012). The Bellagio STAMP principles themselves are not reviewed here in detail because they are indeed a set of eight separate principles and not a conceptual framework consisting of various dimensions. It could perhaps be argued that the first four principles relate to the sustainability concept (guiding vision, essential considerations, adequate scope, framework and indicators) and the latter four relate to the conduct of the assessment (transparency, effective communications, broad participation and continuity and capacity), and thus the principles form an implicit two-dimensional framework, but the principles are also very general and their potential application to *ex ante* sustainability assessment is only one possible application discussed by the authors (Pintér et al., 2012).

As mentioned previously, Sala et al.’s (2013; 2015) approach to the sustainability dimension involves bringing together sustainability principles and values that in turn inform the development of sustainability targets that are both science- and policy-based. Their list of decision-making context considerations is once again similar to those of Gibson (2006a) and Lee (2006), namely: policies/measures, institutions, production and consumption, actors, scale, complexity, uncertainty, timing, impacts, strategy, scenario-oriented versus target oriented practice. Within the dimension of methodological choices they consider methods, models/tools, indicators and uncertainty management.

Therefore there are notable similarities between the four frameworks reviewed as well as some subtle and not-so-subtle differences. A summary of our review is presented in Table 1.

**Table 1 Cross comparison of dimensions covered in four frameworks for sustainability assessment**

Reference	Sustainability concept	Decision-making context	Methodology
Lee (2006)	Not included (implicit)	Included (‘Planning context’)	Divided into process and methods
Gibson (2006)	Contribution that each decision makes to sustainability defined in the Gibson’s sustainability assessment principles.	Included from the perspective of developing context-specific decision criteria.	Included (‘practical sustainability assessment regimes’)
Wiek and Binder (2005)	Acknowledgement of normative and systemic components	Not included	Included (‘Procedural’)

Sala et al (2013; 2015)	Included	Included	Included
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It is notable that of the three dimensions considered in Table 1, the sustainability concept is the one most difficult to identify consensus for, suggesting that the conceptualisation surrounding sustainability itself is itself nuanced. As highlighted by Wiek and Binder (2005) the normative and systemic components in particular are potentially significantly different; we will go on to explore this further in the next section (Section 4).

#### 4. Reviewing existing descriptive conceptual frameworks

In 2004, when sustainability assessment within the impact assessment tradition was in its infancy, a literature-based conceptual framework was proposed through which the emerging theory and practice of sustainability assessment could be understood (Pope et al., 2004). Three models comprised the framework:

- Baseline-driven integrated assessment, which aimed to minimise negative impacts across the three pillars of sustainability;
- Objective-led integrated assessment, which aimed to maximise positive outcomes across the three pillars; and
- Assessment for sustainability, which aimed to assess whether or not a proposed activity was sustainable.

This framework reflected the fact that at the time most practice in what could be called sustainability assessment was based upon the extension of EIA and SEA to ensure that social and economic issues were covered to an equivalent extent as biophysical environmental issues, to give a balanced scorecard against the three pillars (of social, economic and environmental) representing the ‘triple bottom line’ (TBL) of sustainability (Elkington, 1997). The difference between the first two models is whether the basis for the assessment is the existing baseline or a series of aspirational objectives and targets. The baseline-driven approach is reflected in the EU SEA Directive while the objectives-led approach is exemplified by the English sustainability appraisal system (currently outlined in Department for Communities and Local Government (UK), 2014). The third model was an early attempt to recognise that typical practice reflecting the first two models are reductionist, in that they develop an understanding of sustainability based on social, economic and environmental indicators, which do not necessarily reflect conditions of sustainability (Therivel, 2013). The ‘assessment for sustainability’ model therefore proposed an approach founded on holistic sustainability principles and which sought, based upon a context-specific interpretation of these principles, to determine whether or not a proposal was in fact ‘sustainable’.

In light of the three dimensions identified in the previous section, each of the three models of Pope (et al. 2004) reflects a different understanding of the sustainability concept, and hence different normative orientations about how sustainability should be represented and what sustainability assessment should seek to achieve. That approach is silent on the dimensions of decision-making context and methodology, except to the extent that the conceptualisations of sustainability may influence the approach taken to the assessment.

Beyond its uni-dimensional scope, it is also useful to critically reflect upon Pope et al.’s framework with the wisdom of a decade of sustainability assessment theory and practice. Doing so identifies a number of issues. Firstly, while we believe there is considerable practice reflecting the baseline driven integrated assessment model, and in fact would argue that much current sustainability assessment practice reflects



this model, we find little evidence of objective-led integrated assessment in current global practice, beyond the English sustainability appraisal process which now has a decade of practice behind it. This imbalance alone calls into question the value of the framework.

Perhaps the most problematic element of the conceptual framework, however, is the 'assessment for sustainability' model. This requires an explicit articulation of what is and what is not sustainable measured against a clearly defined societal vision, and the authors drew upon the earlier work of Gibson (2001) to propose what this vision might be. As previously discussed, even if such a task is possible to deliver in practice, some authors have argued that such pre-emptive clarity is not even desirable, and that as a unifying discourse with which it is hard to disagree at a conceptual level (Owens and Cowell, 2002, Denniss, 2005, Dryzek, 1997, Rein and Schön, 1993), the concept of sustainability has the potential to not only keep everyone 'at the table', but to provide the catalyst for reflexivity and a deliberative space, or 'axis around which discussion can occur'. Owens and Cowell (2002, p8), writing about sustainability in the English planning system, go on to say:

Planning is not so much a mechanism for implementing sustainable development as an important forum in which different interpretations come to be contested and defined. There is no prior *conception* of sustainability (as opposed to the broader, consensual concept) independent of this process.

This concept of negotiated understandings of sustainability is also an important theme in the work of Sala et al. (2013) discussed previously, and it contrasts strongly with the notion of a pre-determined definition of sustainability as advocated by Hopwood (2005). This concept of negotiated understandings of sustainability is in line with Habermas's ideas on deliberative democracy, in which the best arguments ideally determine the conceptualization of sustainability in 'power-free' forums of peers (Habermas, 2006). By taking the opposite approach of prescribing a pre-defined concept of sustainability, the assessment for sustainability approach could also be criticised for reflecting an instrumental rationality which ignores the power relationships inherent in any policy process including impact assessment (Flyvbjerg, 2002, Cashmore, 2004).

Acknowledging the limitations of the assessment for sustainability model, we have more recently replaced it in the conceptual framework with the 'contribution to sustainability' model that has emerged in Canadian practice (Gibson, 2011, Gibson et al., 2005), where sustainability is a holistic concept and not merely defined by a series of environmental, social and economic indicators. We now consider the contribution to sustainability approach as being more representative of an ideal for sustainability assessment (Morrison-Saunders et al., 2014). Others have suggested alternative reformulations of the framework proposed by Pope et al. (2004); for example Videira et al. (2010) position their 'integrated sustainability assessment' as the third model.

Taking a different approach from Pope et al. (2004), Hacking and Guthrie (2008) developed a framework for determining the extent to which impact assessment processes are directed towards sustainable development by focusing on the scope of the assessment. Their framework consisted of analysis against three criteria:

- comprehensiveness – meaning the extent to which sustainable development themes are covered;
- integratedness – meaning the extent to which the "assessment techniques that are used and/or the themes that are covered are aligned/connected/compared/combined" (Hacking and Guthrie, 2008, p.75); and

- strategicness – meaning the extent to which the focus of the assessment is broad and forward looking.

According to these measures, a traditional EIA process would be characterised as being biophysical-focused, rather than comprehensive; separate rather than combined; and project-specific rather than strategic. While Hacking and Guthrie (2008) would argue that biophysical-oriented, project-level EIA is still on the spectrum of sustainability assessment, this framing allowed an ideal form of sustainability assessment to be visualised which would be positioned where it would be comprehensive, spanning all pillars of sustainability, fully connected in terms of the techniques used and themes covered, and very forward-looking.

Reflecting on the three dimensions from the previous section (sustainability concept, decision-making context and methodology), it is clear that this framework too focuses mostly on the sustainability concept and how this is reflected in the scope of the assessment. It does not, however, invite a debate on what sustainability outcomes might be desirable, only that there is comprehensive and strategic consideration of sustainability issues. The framework does have something to say about methodology, specifically that techniques are required for integration. However it is silent on decision-making context, although arguably context would inform the strategic dimension.

More recently, Hugé et al. (2013) offered a framework for categorising sustainability assessment based upon the sustainability-related discourse underpinning the process. Discourse is defined as “a specific ensemble of ideas, concepts, and categorisations that are produced, reproduced, and transformed in a particular set of practices and through which meaning is given to physical and social realities” (Hajer, 1995, p44). Unlike the previous two frameworks this one explicitly recognises that impact assessment in general is inherently normative (see for example Wood, 2003, Rozema et al., 2012); that there are numerous and continually evolving discourses of sustainability; and that the normative aims of the assessment process are inextricably linked to the discourse within which the process is constructed (see also Rozema et al., 2012). Categorising sustainability assessment according to underpinning discourse is therefore a useful contribution to categorising the spectrum of sustainability assessment practice, as it draws into focus the distinction made by Wiek and Binder (2005) (discussed in Section 3) between the normative and systemic components of the sustainability concept. Wiek and Binder’s normative dimension, or ‘implicit goal’, is analogous to Hugé et al.’s sustainability discourses since, as Rozema et al. (2012), p82 argue, the implicit goal or purpose of an assessment process is:

“shrouded in considerations that move beyond the immediate assessment procedure. These considerations are based on certain framings of sustainable development - environmental and sustainability discourses - that actors in a problem area may privilege”.

Similarly, Runhaar (2009), p203 argues that, “An analysis of the dominant discourses that underlie a particular decision or policy can articulate its rationale”. It is also true that discourses often become embedded within institutions (Hajer and Versteeg, 2005) and thus shape fields of practice. As Dryzek (1997, p19) says, “discourses can constitute institutional software while formal rules constitute institutional hardware”. Thus it is possible for a particular discourse to prevail within sustainability assessment in a particular context and shape practice accordingly, regardless of the legal frameworks or ‘rules’ that apply.

The systemic dimension of Wiek and Binder’s framework refers to the way sustainability is represented within an assessment. Their distinction between the normative and systemic dimensions emphasises that while in some cases a representation of sustainability may emerge directly from the underpinning discourse, a particular representation (for example the common three pillars of environmental, social and

economic concerns) could in fact be applied within processes with quite different underpinning discourses. Conversely too, different representations of sustainability could be envisaged within the same discourse.

In light of Wiek and Binder's work, the three models in the conceptual framework of Pope et al. (2004) can be seen to embed a combination of different normative discourses and different systemic representations of sustainability. Furthermore, the first two models (i.e. baseline-driven integrated assessment and objectives-led integrated assessment) conflate the normative and systemic dimensions of sustainability. Similar reflection upon Hacking and Guthrie's (2008) model shows that it focuses at the systemic rather than the normative level.

We therefore find Wiek and Binder's framework to be useful in untangling the normative and systemic dimensions of the sustainability concept. Hence we include both 'underpinning sustainability discourse' and 'representation of sustainability' as distinct sub-dimensions under the dimension of 'sustainability concept' within our proposed new conceptual framework.

Turning our attention to the second dimension identified in Section 3, that of decision-making context, we find that none of the identified existing conceptual frameworks explicitly address this dimension. Elements within this dimension that have been identified as important in the reviewed frameworks include how the regulatory and policy environment may influence practice (Lee, 2006, Sala et al., 2013); and how context is important in establishing sustainability targets (Gibson, 2006a).

For the purposes of developing a descriptive conceptual framework, we take a slightly different approach to the dimension of decision-making context. We have previously identified that many aspects of sustainability practice are dictated by factors such as subject of the sustainability assessment (corresponding to what Zijp et al. (2015) call 'system boundaries/inventory'), i.e. whether policy, plan, programme, project or other (Pope, 2006) or indeed whether it is an unstructured policy problem and not a proposal at all (Videira et al., 2010); the decision question that is being asked (Pope and Grace, 2006, Morrison-Saunders and Thérivel, 2006); and the party responsible for the assessment (for example government in external, regulatory sustainability assessment, or proponents in internal forms of sustainability assessment) (Pope, 2006). Although the literature we have cited in this discussion has some normative elements, for example open decision questions are argued to be preferable to closed ones (Pope and Grace, 2006, Morrison-Saunders and Thérivel, 2006), and more strategic levels of decision-making are considered to have the greatest potential to deliver sustainability (Hacking and Guthrie, 2008), these three components of subject of assessment, decision question and responsible party are largely descriptive and reflective of practical considerations, and hence we consider them appropriate sub-dimensions within the dimension of decision-making context.

The third dimension identified in Section 3 is methodology, which Lee (2006) separates into processes and methods. Process and methods (or tools) are essentially different, in that processes are the broad steps taken to undertake an assessment, while tools are the analytical techniques employed within the process. Tools for sustainability assessment have received considerable attention in the literature, and several descriptive conceptual frameworks are focused solely on this dimension of sustainability assessment, for example work by Ness et al. (2007), Gasparatos et al. (2008), Gasparatos and Scolobig (2012) and (Zijp et al., 2015). While useful work, we find these tool-focused frameworks less relevant for our purposes. A sustainability assessment process may employ different tools at different stages of the process. For example in a single sustainability assessment process, risk assessment might be used to identify potentially significant impacts during scoping; system dynamics might serve to develop a model of a socio-ecological system as the baseline of an assessment; and multi-criteria decision analysis might be used to assess alternatives, to name just a few (see also Lee, 2006 on this point). We also discuss in Section 5.1.2 how the

choice of tool can be closely related to the representation of sustainability. Similarly, neither do we consider that the process steps applied in a particular sustainability assessment is in itself a useful way to categorise or describe a body of sustainability assessment practice, because the process steps that are deemed appropriate in a particular application will depend upon, and give clues to, the other dimensions (and sub-dimensions) of the framework, for example the decision-question being asked (see Section 5.2.2) and also the sustainability concept being applied. For this reason, although the methodological dimension is clearly critical to sustainability assessment practice, we don't find it useful to include processes or tools in a descriptive conceptual framework for categorising different forms of sustainability assessment.

Hence, based upon this review of existing conceptual frameworks for categorising sustainability assessment, in the context of the dimensions of the four frameworks reviewed in Section 3, we propose a reconceptualised framework for sustainability assessment with two dimensions of sustainability concept and decision-making context, with associated sub-dimensions for each as follows:

- Sustainability concept:
  - Underpinning sustainability discourse;
  - Representation of sustainability;
- Decision-making context:
  - Subject of assessment;
  - Decision question;
  - Responsible party.

In the following section we will explore each of these dimensions in more depth, and propose useful categories within each one against which current sustainability assessment practice can be mapped.

## **5. Exploring the range of practice within each dimension**

The two dimensions and five sub-dimensions of our proposed new conceptual framework for sustainability assessment are discussed in turn, drawing upon further literature review to identify and examine examples from practice within each sub-dimension, demonstrating the range of approaches evident within current and emerging global practice.

### **5.1 Sustainability concept**

In our proposed new conceptual framework, the sustainability concept dimension has two inter-related sub-dimensions: underpinning discourse and representation of sustainability. The line between these two is somewhat blurry in practice. To clarify, we consider discourses to be the normative dimension of sustainability, describing what constitutes sustainability and therefore what the goal of sustainability-oriented decision-making should be, while representation of sustainability refers to how sustainability is operationalised for the purpose of decision-making or assessment. While some discourses imply a particular representation of sustainability (discussed further on), we will also show that the relationship between discourse and representation is not strictly one-to-one. In other words, different representations or models can be used within the same discourse, and the same representation can be used within different discourses.

#### **5.1.1 Underpinning sustainability discourse**

In their recent work, Hugé et al. (2013) reviewed a range of sustainability discourses identified in the literature and proposed three as being particularly relevant to and reflective of sustainability assessment practice:

- The pragmatic integration of development and environmental goals;
- The idea of limitations on human activities; or
- A process of directed change/transition.

The first discourse, the pragmatic integration of development and environmental goals, reflects aspects of both the ‘Panglossian’ sustainability discourse of Owens and Cowell (2002), whereby development and environmental goals are considered alongside each other with the goal of delivering positive outcomes in both, and Dryzek’s democratic pragmatism approach to problem solving with its emphasis on negotiating a balance (Dryzek, 2013). This discourse has a local rather than a global focus, and implicitly represents weak sustainability, which holds that substitution of capital is acceptable as long as the total stocks of capital remain constant or grow (Pearce et al., 1989). This is the discourse underpinning EIA-driven and objectives-led integrated assessment proposed by Pope et al. (2004). As argued by Hugé et al. (2013) it is often the underpinning discourse of government-led sustainability policies and processes as well as much sustainability assessment practice. The local focus ensures that this discourse would fall into the reform category of Hopwood et al. (2005) at best: meaning that it cannot be truly transformational. As Gibson et al. (2005, p90) note, “For practical decision making in a world facing sustainability problems at multiple intersecting scales, reliance on locally situated discourse alone is not workable”.

Hugé *et al.*’s second discourse, the idea of limitations on human activities, emphasises the limits or boundaries that apply at the global scale. This is akin to Dryzek’s (2013) ‘Limits, boundaries and survival’ discourse. This discourse harks back to the Limits to Growth study originally conducted in 1972 (Meadows et al., 1972) and subsequently reviewed and updated several times (Meadows et al., 1992, Meadows et al., 2004). It reflects a strong sustainability perspective (Pearce et al., 1989) in that natural capital must be preserved so as not to exceed the limits. It has been represented as the three concentric circles (representing each of the economy, society and the environment), or ‘nested egg’ model, with the economy located within society within the environment. This discourse has recently been revived through the concept of planetary boundaries (Rockstrom et al., 2009), whereby a ‘safe and just operating space for humanity’ is defined by specifying upper limits of environmental degradation and minimum acceptable social limits (developed by Oxfam<sup>2</sup>).

Although it can be argued that for humanity to operate within these limits, they should apply at all scales (for example a region that might be the focus of a sustainability assessment) this is clearly not how things work in practice. Firstly, some countries use far more than their share of global resources, as demonstrated by comparative ecological footprint analyses, and secondly trade and globalization mean that a region can exceed its carrying capacity but not collapse (Dryzek, 2013). The relationship between global limits and local sustainability represents a challenge for the practice of sustainability assessment, as explored in detail using systems analysis by Grace and Pope (2015).

In selecting their three discourses Hugé et al. (2013) sought to move away from the dichotomy of weak and strong sustainability, represented by the first two discourses respectively, (cf. the framework of Zijp et al. (2015)) to also include the third discourse of sustainability as a process of directed change or transition. This takes as its starting point that the current global conditions and trajectories are undesirable or will not lead to a desirable future, and hence the goal is not to sustain *per se* but rather to change. It is the discourse to which Gibson et al. (2005), p14 subscribe when they argue, “If the extraordinary popularity of the sustainability language reveals only one thing, it is widespread recognition that what prevails today is not sustainable and that changes of some sort are needed”. It is also reflected to some extent in the

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<sup>2</sup> see: <https://www.oxfam.org/en/research/safe-and-just-space-humanity> [accessed 27 October 2015]

Canadian practice in which the 'contribution to sustainability' test is applied (Gibson, 2011, Gibson et al., 2005), and deliberative approaches that bring about learning and transformation as discussed in the previous section. Transition is explicitly discussed in the context of sustainability assessment by Gaudreau and Gibson (2015).

We suggest that there is room within the framework for a fourth sustainability discourse, in which the goal of sustainability is reflected by the twin concepts of **resilience and justice**, a case originally put forward by Hermans and Knippenberg (2006). Resilience is defined as the ability of the system to maintain functionality, or maintain the elements needed to renew and reorganise in response to a large perturbation (Walker, 2002). Whilst originally developed for ecological systems, the concept of resilience is now applied to socio-ecological systems, and so overlaps with the domain of sustainability assessment. The relationship between sustainability and resilience has received considerable attention in the recent literature (see for example Ahern, 2011, Garmestani and Benson, 2013, Davidson, 2010) as has the potential contribution of resilience thinking to sustainability-oriented impact assessment (Slootweg and Jones, 2011, Gaudreau and Gibson, 2010, Bond et al., 2015). The point has been made many times that resilience is not necessarily a desirable characteristic in itself (e.g. Grace and Pope, 2015), as many unsustainable and undesirable traits such as poverty, crime and corruption are highly resilient, but resilience combined with justice makes an attractive goal. The concept of justice has received less attention in the sustainability assessment literature, notable exceptions being the work of Lamorgese and Geneletti (2015) and Hermans and Knippenberg (2006).

In summary, therefore, we build upon the work of Hugé et al. (2013) to propose four sustainability discourses that we believe can be distinguished in current and emerging sustainability assessment theory and practice:

- The pragmatic integration of development and environmental goals;
- The idea of limitations on human activities;
- A process of directed change/transition; and
- Promotion of resilience and justice.

### 5.1.2 Representation of sustainability

In practice, sustainability is represented in assessment processes through the use of sustainability indicators of some kind, where indicators should provide a simplified, but still sufficient, representation of sustainability. The development of sustainability indicators has emerged as a field of study in its own right, albeit one that has been described as "rather confusing and non-consensual" (Ramos and Pires, 2013, p82). Ramos et al. (2004) provide a long list of different environmental indicator sets (noting that many of them extend to include broader sustainability considerations), for application in both *ex ante* and *ex post* assessment processes and ranging from local to global spatial scales. Sustainability indicators are also at the heart of corporate sustainability reporting in accordance with the Global Reporting Initiative. Numerous authors have focused on how sustainability indicators are developed for the purposes of various assessment processes (e.g. Coelho et al., 2010, Donnelly et al., 2006, Donnelly et al., 2007) while Waas et al. (2014) offer a useful discussion of the essential role of sustainability indicators and indicator frameworks in sustainability assessment. Some indicator frameworks such as the Driver-Pressure-State-Impact-Response (DPSIR) framework can be a methodological tool for sustainability assessment (Kristensen, 2004).

Against this substantial body of work on sustainability indicators, our focus for the purposes of this paper is quite specific: we are concerned with how indicators are used to represent or operationalise sustainability for the purposes of sustainability assessment, and how indicators reflect the various sustainability

discourses discussed in the previous section. In the ensuing discussion we follow Waas et al. (2014) to distinguish between sustainability *variables* (also known as attributes or factors) and sustainability *indicators*, where indicators reflect the value of the variables in relation to a defined reference point. As Waas et al. argue, without this comparison against a reference point, a variable on its own has nothing to say about sustainability. We argue here that these reference points will reflect the sustainability discourse underpinning an assessment.

In sustainability assessment a distinction is often made between aggregated and disaggregated variables or indicators (Ness et al., 2007, Zijp et al., 2015). Perhaps the most common example of the latter is triple bottom line (TBL) list in which variables or indicators are separated into environmental, social and economic categories. The triple bottom line (TBL) has become an almost ubiquitous representation of sustainability that appears in everything from corporate sustainability reporting to land use planning. The point has been made that even if the starting point is a principle-based concept of sustainability as advocated by Pope et al. (2004), in practice these principles tend to quickly be converted to **disaggregated TBL variables** (Hacking and Guthrie, 2006). As already discussed, the TBL is the basis for much current sustainability assessment practice reflecting the pragmatic integration discourse of sustainability. In such cases the development and environmental goals are considered alongside each other with the goal of optimising both but at least finding a reasonable balance between them. Hence it can be argued that the (explicit or implicit) reference point against which this evaluation is made is the reasonable balance as determined by those undertaking the assessment, which could be the decision-makers alone, or could also involve stakeholders through the use of deliberative techniques (Rozema et al., 2012, Frame and O'Connor, 2011, Kasemir, 2003).

TBL variable lists can, however, also be the basis for sustainability assessment reflecting the transitional discourse. Within objectives-led integrated assessment (Pope et al., 2004) the goal is to make a positive contribution to sustainability, as it is in some Canadian practice (Gibson et al., 2005), and in this case the value of the indicator represents progress towards a reference value in the form of a defined goal. Oxfam's 'safe and just operating space for humanity' discussed in the previous section is also in effect a series of environment plus socio-economic reference values at a global scale, reflecting either a maximum (environmental) or minimum (socio-economic) threshold. Hence it can be argued that the TBL can also be applied within an operating within limits discourse too.

In some cases TBL indicators may be considered separately, as in the practice of sustainability appraisal in England, where little or no consideration is given to interactions between competing objectives or indicators (Hayes and Fischer, 2015). It is common, however, for attempts to be made to integrate these indicators in some way, since integration is viewed as a fundamental tenet of sustainability assessment (Scrase and Sheate, 2002, Eales et al., 2005, Eggenberger and Partidário, 2000, Lee, 2002) as well as of the pragmatic integration discourse itself. Integration can take various forms and be supported by a wide range of tools and techniques. One such tool, particularly useful in strategic-level assessments where alternatives are compared, is multi-criteria decision analysis (MCDA). MCDA broadly involves assessing each the performance of each alternative across all of the identified variables (scoring), then determining the relative importance of each variable to the decision at hand (weighting) and then mathematically combining the score and weight to give an overall performance score for each alternative, which in the case of sustainability assessment is effectively a relative sustainability score (Geneletti and Ferretti, 2015). This score is a form of **composite sustainability variable**, of a similar type to those often used in assessing the sustainability of buildings or infrastructure, or even regions or nations in state of sustainability reporting. Developing composite sustainability variables and indicators could also involve conversion to a common unit, for example monetary units in environmental economics processes (Hardisty, 2010) or hectares in the

ecological footprint methodology (Wackernagel and Rees, 1998). The use of composite sustainability indicators is reviewed by Singh et al. (2012) and not covered further here.

An alternative to either disaggregated or aggregated variables is to represent the receiving environment as a socio-ecological system, highlighting the inter-dependence of social, socio-economic and biophysical variables that represent the receiving environment (Slootweg and Jones, 2011, Grace and Pope, 2015, Audouin et al., 2015). A key characteristic of socio-ecological systems is that they are dynamic, and evolve over time and in response to forces that might include unexpected shocks, interventions to achieve a vision, policy changes or indeed a major project that might be the subject of a sustainability assessment (Walker, 2002) and hence dynamic system modelling tools may be required (Grace and Pope, 2015).

**Systems representations** and systems analysis can be applied to support sustainability assessment in any of the discourses identified in Section 5.1.1, where the respective discourse will dictate the purpose of the assessment, and also the goal of the system, is. A system may simply seek to optimise environmental, social and economic conditions within a particular system (first discourse: pragmatic integration), with or without considering how this system relates to the planetary or local boundaries (second discourse: operating within limits). Similarly, the system may be modelled with the goal of transitioning to a more sustainable state (third discourse: transition) or achieving or maintaining resilience (fourth discourse: resilience and justice) (see Grace and Pope, 2015)

In summary, therefore, we discern the following three ways that variables representing sustainability can be presented within sustainability assessment practice:

- Disaggregated (TBL) variables;
- Composite sustainability variables;
- Systems representations.

Sustainability indicators are developed in the sustainability assessment process by ascribing values to these variables and comparing these with relative values (reflecting a particular discourse) in order to assess the sustainability of the proposal at hand.

## 5.2 Decision-making context

Each of the three sub-dimensions of decision-making context identified in Section 4 is briefly discussed below.

### 5.2.1 Subject of assessment

Perhaps the most obvious way to categorise sustainability assessment is by the subject of the assessment. As previously noted, since we have defined sustainability assessment broadly, it can apply at any level of decision-making, from **projects** that are typically assessed through EIA to more strategic **policies, plans and programmes** that are traditionally the domain of SEA (Pope, 2006), as well as to **persistent problems** as a way of structuring the problem and identifying and evaluating alternative strategies to address it (Videira et al., 2010). The Limits to Growth studies also demonstrate how *ex ante* sustainability assessment can be applied at a global level (Meadows et al., 1972) – to **Earth**.

In summary, therefore, we discern the following possible subjects of assessment within the field of *ex ante* sustainability assessment practice with which we are concerned:

- Policies, plans and programmes;
- Projects;
- Earth;



- Persistent problems.

### 5.2.2 Decision question

A second and related way to categorise sustainability assessment is in terms of the question the assessment process is seeking to answer (Pope and Grace, 2006). A typical decision question could be ‘is this proposal sustainable enough?’ (a **threshold** question often associated with project level assessment) or ‘which is the most sustainable alternative?’ (a **choice** question often associated with more strategic forms of assessment). Morrison-Saunders and Thérivel (2006) explored the link between the decision question being asked and the level of decision-making to which sustainability assessment is applied, arguing that more strategic decision-making contexts and more open questions have the greatest potential to promote integrated decision-making for sustainability. The decision question often also helps to frame the process through which the question is to be answered. Some decision questions may directly reflect a particular sustainability discourse, for example the question ‘does this proposal make a positive **contribution to sustainability**?’ can be argued to be a reflection of our discourse of sustainability as a transition, consistent with Runhaar’s point that “discourses affect the ways in which problems are defined and solutions are sought” (Runhaar, 2009, p203).

In summary, therefore, we discern the following broad examples of decision questions:

- Threshold;
- Choice;
- Contribution to sustainability.

### 5.2.3 Responsible party

A third way to categorise sustainability assessment is according to who undertakes the assessment. This could be a **regulator** in an external assessment; an external **third party** (see for example Winfield et al., 2010); or a **proponent** in an internal assessment designed to inform planning (Pope, 2006), an application that is becoming common in some jurisdictions (Morrison-Saunders and Pope, 2013). There is a relationship between the responsible party and the decision question, since regulators are generally interested in threshold questions of acceptability, while proponents undertaking internal sustainability assessment are often interested in selecting between alternatives prior to a final proposal being submitted to regulators.

In summary, therefore, we discern the following examples of responsible parties:

- Regulators;
- Proponents;
- Third parties.

## 6. Concluding remarks: Proposing a new conceptual framework for sustainability assessment

The aim of this paper was to develop a new descriptive conceptual framework for sustainability assessment. This work was driven by our view as researchers and practitioners of sustainability assessment that the rapid expansion of sustainability assessment in many diverse forms around the world has resulted in a confusion of language and process that makes the field difficult to navigate without an appropriate map. Previous attempts to provide such a map in the form of descriptive conceptual frameworks, including our own, were found to not fully reflect all the dimensions that comprise sustainability assessment, where a dimension was defined as being the major aspects of a sustainability assessment process. A review of the

literature resulted in the identification of two dimensions appropriate to our aim, each with several sub-dimensions: sustainability concept (with sub-dimensions of underpinning sustainability discourse and representation of sustainability) and decision-making context (with sub-dimensions of subject of assessment, decision question and responsible party). We then reviewed current practice as described in the literature to discern examples from practice within each of these sub-dimensions, which we believe reflect the diversity of current sustainability assessment practice. These examples certainly do not comprise an exhaustive list but we believe they offer a useful starting point to support the application of our conceptual framework.

To summarise, our framework is reproduced below along with our identified examples from practice.

- Sustainability concept:
  - Underpinning sustainability discourse, e.g.
    - The pragmatic integration of development and environmental goals;
    - The idea of limitations on human activities;
    - A process of directed change/transition;
    - Promotion of resilience and justice.
  - Representation of sustainability, e.g.:
    - Disaggregated (TBL) variables;
    - Composite sustainability variables;
    - Systems representations.
- Decision-making context:
  - Subject of assessment, e.g.:
    - Policies, plans and programmes;
    - Projects;
    - Earth;
    - Persistent problems.
  - Decision question, e.g.:
    - Threshold;
    - Choice;
    - Contribution to sustainability
  - Responsible party, e.g.:
    - Regulators;
    - Proponents;
    - Third parties.

In order to demonstrate the use of the framework in contextualising a particular application of sustainability assessment, we provide some examples in Table 2.

**Table 2: Populating the conceptual framework with examples from practice**

	<b>Sustainability appraisal in England</b> (Thérivel et al., 2009, Hayes and Fischer, 2015)	<b>The Limits to Growth Studies</b> (Meadows et al., 1972, Meadows et al., 1992, Meadows et al., 2004)	<b>Sustainability assessment of Benin Poverty Reduction Strategy</b> (Hugé and Hens, 2007)	<b>South West Yarragadee Water Supply Development</b> (Pope and Grace, 2006, Morrison-Saunders and Pope, 2013)	<b>Radioactive waste management in Belgium</b> (Hugé et al., 2011)
<b>Sustainability concept</b>					
- <b>Underpinning discourse</b>	Pragmatic integration	Limits and boundaries	Transition plus pragmatic integration	Pragmatic integration plus limits (acceptability limits defined)	Pragmatic integration plus limits (reversibility of waste storage included)
- <b>Representation of sustainability</b>	Triple bottom line	System representation	Triple bottom line	Triple bottom line	Triple bottom line
<b>Decision-making context</b>					
- <b>Subject of assessment</b>	Plan	Earth	Policy	Project	Policy/plan
- <b>Decision question</b>	Choice	Threshold	Threshold	Threshold	Choice and threshold (what is acceptable under which conditions?)
- <b>Responsible party</b>	Proponent (planning agency)	Third party	Proponent (national government), supported by civil society	Proponent (water authority) in close collaboration with Government	Third party

While we do not claim that our examples offer an exhaustive list of possibilities, nor that our conceptual framework is the only way of 'cutting the cake' to represent the spectrum of sustainability assessment practice, we offer it as a road map and guide to the diverse field of *ex ante* sustainability assessment. As we have made clear, it is a descriptive framework not a prescriptive one, and hence it makes no claims about what best practice sustainability currently is or should be in the future. Indeed, since its development has been based on an understanding of the range of practice that currently operates, it is therefore restricted to what happens, and not what theoretically should happen to best deliver sustainability. We recognise that other conceptualisations are possible which build on theoretical innovation, although these lie outside the scope of this paper.

We offer this framework to both researchers and practitioners, as a structure to guide sustainability assessment research and analysis and as the basis for positioning, comparing and reflecting upon one body of sustainability assessment practice within the range of possibilities defined by the contours of the framework. Taken as a whole, the conceptual framework should enable both researchers and practitioners to understand what actually might be theoretically and practically possible to deliver from sustainability assessment. Recognising there are many examples of different approaches within different dimensions of sustainability assessment should facilitate greater awareness of the plural interpretations of the processes being applied, and can help to facilitate debate on appropriate discourses and representations of sustainability within a given decision-making context. This recognition presents some potential for ensuring the legitimacy of the process in the eyes of the stakeholders – a known issue with assessment processes (e.g. Owens et al., 2004, Bond et al., 2016).

We believe the framework is particularly valuable as a tool for reflective practice as expressed by (Schön, 1983). The dimension of sustainability concept, with its sub-dimensions of underpinning discourse and representation of sustainability, serves to draw attention to the importance of critical reflection upon what is meant by sustainability in a given sustainability assessment and what the assessment is aiming to achieve. It also helps bring to the surface any implicit assumptions that might be inherent within an individual's practice. Thus it invites some thinking about the fundamentals which might otherwise be glossed over or taken for granted. We believe the dimension of decision-making context provides a pragmatic starting point for practitioners to locate their own practice within the contours of the sustainability assessment field, and enables the identification of other similar processes across global practice from which sustainability assessment practitioners may be able to learn.

We hope that our proposed new descriptive conceptual framework for sustainability assessment provides a useful basis for the next generation of researchers and practitioners to build upon and modify as the theory and practice of sustainability assessment continues to evolve.

## Acknowledgements

We acknowledge the insightful and valuable comments of the reviewers of this article, who provided clear instruction that helped us to clarify and enhance the text.

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