



Think Pies, Not Doughnuts

Introducing Pie Slice Accounting

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Introduction

Sometimes it can take years for cognitive dissonance to run its course. Such was the case for me in my own experience with Kate Raworth’s Doughnut Economics model – the graphical image of it, that is, not the concept. Like many, I first encountered Raworth’s Doughnut in 2012 in a publication she published that year,¹ but it wasn’t until this year that a problem I had been struggling with finally became clear.

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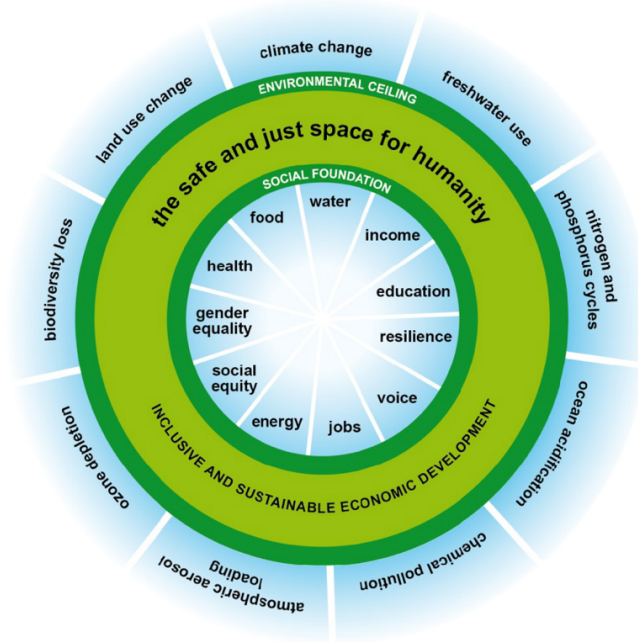


Figure 1 – Kate Raworth’s Doughnut Economics Model

As anyone familiar with the Doughnut Economics (DE) model will know, there are two rings in it: an outer ring representing ecological ceilings and an inner ring representing social foundations. In between the two (i.e., in the ‘meat’ of the Doughnut) is what Raworth calls the “the safe and just space for humanity”, the ideal space for human well-being (see Figure 1). The central message of the model, then, is that humanity should aim to inhabit that space – the space below the ecological ceilings and above the social foundations.

As Raworth freely admits, the DE model was built upon a similar representation put forward by Johan Rockstrom and others in 2009, in which they depicted nine ecological thresholds (or ceilings) that should not be transgressed (see Figure 2).²

¹ Raworth, K. 2012. *A Safe and Just Space for Humanity: Can We Live Within the Doughnut?* Oxfam discussion paper. Oxford: Oxfam International.

² Rockstrom, J. et al. 2009. “A Safe Operating Space for Humanity.” *Nature*. 461: 472-5.

Raworth simply added social foundations to the model and voilà, out came a doughnut!

Of course, Raworth has been quite forthcoming about all this by acknowledging not only the work of Rockstrom et al that came before her, but also that of Barbara Ward and her colleagues at the UN, who in 1974 had published their own ideas on so-called “inner” and “outer” limits.³ And then, of course, there was the 1972 *Limits to Growth* book by Meadows et al, the title of which pretty much speaks for itself.⁴ And then also the *Ecological Footprint* and *Social Footprint* methods, put forward by Wackernagel in 1994⁵ and myself in 2008,⁶ respectively. These latter two works, in particular, called for assessing performance relative to upper (ecological) and lower (social and economic) thresholds, just as Raworth does in her DE model, although not in the same visually distinctive way, of course.

Indeed, what Ward, Raworth, Meadows, Wackernagel, I, and many others have all been saying for years now is that in order to live sustainably, humans must live within their ecological means (by not exceeding ecological limits) and ensure the socioeconomic means to live (by maintaining the sufficiency of social and economic foundations). In other words, our relationship with resources in

all cases should be such that our impacts and demands for them always fall within their capacities and not beyond them.

Up is Down and Down is Up?

And that, of course, is exactly what the visual metaphor of Kate’s Doughnut model is supposed be telling us – that in order to be sustainable and live within the *safe and just space for humanity*, our impacts and demands for resources should neither exceed the upper limits of ecological ceilings, nor

fall below the lower limits of social and economic foundations. Right?

Well, no! There’s a problem here. And if anyone should have noticed it years ago it was me. After all, it was I who several years prior to Kate’s unveiling of the DE concept had been using the same ideas in my development of the *Social Footprint Method* and the broader methodology now

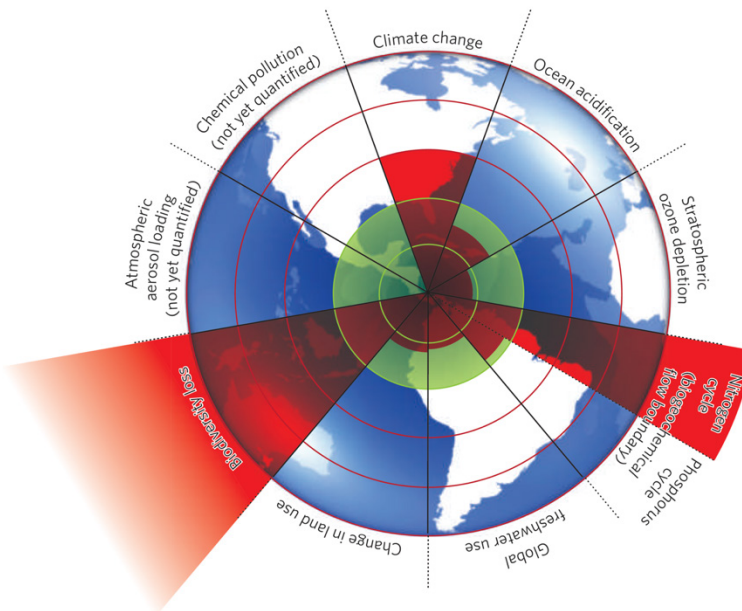


Figure 2 – Rockstrom et al’s Planetary Boundaries Model

known as *context-based sustainability*.⁷

The problem I have lies in the way the DE model positions social foundations vis a vis the safe and just space for humanity. What it suggests is that human impacts and demands for social and economic resources should fall *above* social and economic foundations, not *below* them. But why *above* social foundations? Wouldn’t that mean that the founda-

³ Ward, B. et al (1974) *The Cocoyoc Declaration*. Cocoyoc: UNEP/United Nations Conference on Trade and Development (UNCTAD) Symposium on Patterns of Resource Use, Environment and Development Strategies.

⁴ Meadows, D.H. et al. 1972. *The Limits to Growth*. New York: Universe Books.

⁵ Wackernagel, M. 1994. *Ecological Footprint and Appropriated Carry Capacity: A Tool for Planning Toward Sustainability*. PhD diss., University of British Columbia. Accessible online at: <https://open.library.ubc.ca/soa/ciRcle/collections/ubctheses/831/items/1.0088048>.

⁶ McElroy, M. 2008. *Social Footprints*. PhD. diss., University of Groningen. Accessible online at: <https://research.rug.nl/en/publications/social-footprints-measuring-the-social-sustainability-performance>.

⁷ Again, see McElroy, 2008 and also: https://en.wikipedia.org/wiki/Context-Based_Sustainability

tions are too low and that our needs exceed them? Indeed, shouldn't we be living below (i.e., within) the limits of *all* resources – social, economic and ecological alike (see Figure 3)?

In order to be conceptually (and visually) consistent, all sustainable impacts and demands should be depicted in the center of Raworth's model (i.e., in the doughnut hole) and not in the 'meat' at all, except for ecological impacts which are perfectly safe there. But the only place in the model – both conceptually and visually – where *all* impacts of *all* kinds would be safe and just is in the hole of the Doughnut. Why? Because it is only in the hole that impacts can be below all of the thresholds or limits of interest.

Despite this, the DE model portrays all impacts in that part of the Doughnut (the hole) as problematic, referring to them as "shortfalls". To my way of thinking, this not only violates the visual convention already established for ecological thresholds, but the conceptual principle behind social foundations, too, which is that impacts and demands for the resources involved should fall below their limits and not above them, just as we say for ecological impacts

Indeed, for a visual convention to work in a model, we have to be consistent in our use of it. And since it is clearly the case that the outer ring in the DE model represents upper limits in the carrying capacities of ecological resources that should not

be exceeded, so should the inner ring also be interpreted in that way. If so, then why should human requirements that exceed them (i.e., that are above or beyond them in the DE model) be portrayed as somehow falling into the *safe and just* space? What it tells me, instead, is that in the case of social and economic impacts, demands are exceeding supplies, and that's never a good thing.

Regarding the manner in which I assume we are expected to interpret the DE model, again I start with the preexisting visual and conceptual conventions put forward in the Rockstrom et al model. In

that model, and Raworth's too, there are human impacts and demands for ecological resources taking place, although not explicitly shown (i.e., human consumers and their acts of consumption are implicit in the model). Human activities, that is, literally result in the consumption of natural resources, either intentionally as such or as destructive by-products of what

they do (e.g., greenhouse gas emissions as a result of human commerce). If those rates of consumption fall below available ecological supplies, they (the human activities and their rates of consumption) fall into the *safe and just* space. If they exceed the thresholds, they fall outside of that space, as we see is the case in Figure 3 for four of the nine ecological dimensions (red wedges).⁸

Turning to the social (and economic) dimensions, the same sort of logic applies. Yes, it is true that the limits

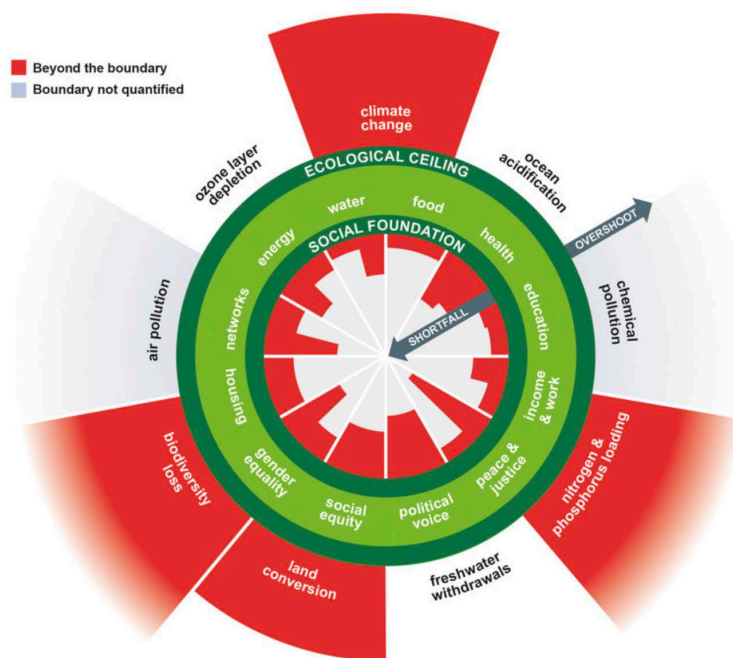


Image: Kate Raworth and Christian Guthrie/The Lancet Planetary Health

Figure 3 – “Overshoots” and “Shortfalls” in the Doughnut Economics Model

⁸ Source: [https://www.thelancet.com/journals/lanph/art_cle/PIIS2542-5196\(17\)30028-1/fulltext](https://www.thelancet.com/journals/lanph/art_cle/PIIS2542-5196(17)30028-1/fulltext)

referred to by the social foundation in Raworth’s model are largely anthropogenic and within human control. But they are no less limits that should fall *at or above* levels of human need, not below them. In other words, humans should continually produce and maintain them at required levels. Here it should be understood that social and economic resources (i.e., what Raworth shows as the social foundation) are just that, resources that humans rely on and partake of, just as they do with ecological resources. The *safe and just* place to be relative to social and economic limits, then, is below them, not above them.

Thus, although we might agree to refer to social foundations and the social and economic resources they entail as resources with lower limits, not upper ones, that should be maintained (i.e., because we do not want them to fall below minimally sufficient levels), they still do have their upper limits in the

sense that they exist in finite supplies just as natural or ecological resources do. And humans, in turn, consume them, the effects of which can either fall within or beyond their capacities. Here again, then, the same visual reporting conventions ought to apply. If impacts and demands for social and economic resources exceed their supplies, they should show up in red accordingly, just as they do for ecological impacts that cross over the boundaries of natural capitals.

Instead, the DE model indicates that impacts that exceed the upper limits of social and economic resources fall within the *safe and just space*. Or is it just that when they do, the DE model portrays such

impacts below the threshold instead of above (again, see Figure 3)? In other words, are we to understand that while for ecological impacts up is up and down is down, for social and economic impacts, up is down and down is up? And if the latter, shouldn’t the descriptor used in the center model be “overshoot”, not “shortfall”, just as it is for outsized ecological impacts (i.e., as impacts that exceed resource limits)? Or are shortfalls in the DE model really just upside-down overshoots by another name?

Phew! The need to keep all of this straight when referring to a DE report such as the one shown in Figure 3 is exhausting, what with all the twists and turns involved in navigating its rules, like *up is up here, but not there*, etc. – all for the sake of clinging

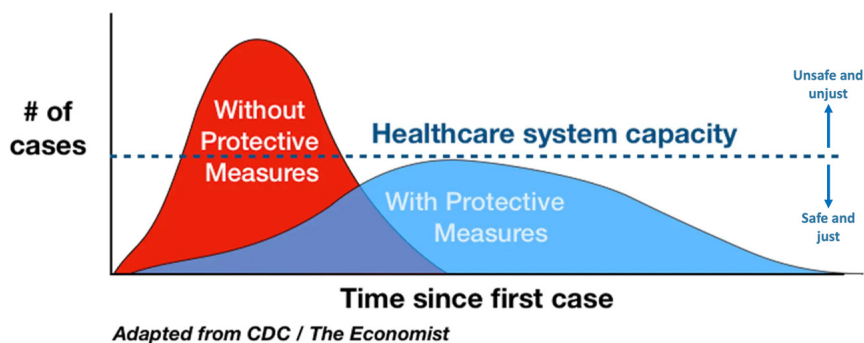


Figure 4 – Flattening the Curve in Healthcare Systems

(with right-side annotations added by author)

Adapted from CDC / The Economist

to a doughnut metaphor that maybe wasn’t such a good idea in the first place. Is it really worth it? The price to be paid in visual complexity alone is steep. Even my graphics design friends have trouble com-

prehending the image shown in Figure 3.

Flattening the Curves

To further support the argument that impacts on social and economic resources, when sustainable (or *safe and just*), should be shown below thresholds and not above them, recent events in the Covid pandemic provide a well-known case that I suspect we’ve all heard of before.

Most of us will recall the familiar credo so often repeated in the media about how important it is (or was) to “flatten the curve” (see Figure 4).⁹ The whole point of that phrase was to recognize that to be safe from the virus, our demands on healthcare

⁹ As Tweeted by Drew Harris on February 28, 2020: <https://twitter.com/drewaharris/status/1233267475036372992>; see also Baue, B. and Thurm, R. 2020. “What’s at Stake: Flatten the Curve to Respect Carrying Capacity”: <https://r3dot0.medium.com/whats-at-stake-flatten-the-curve-to-respect-carrying-capacity-c22cb9ce17c1>

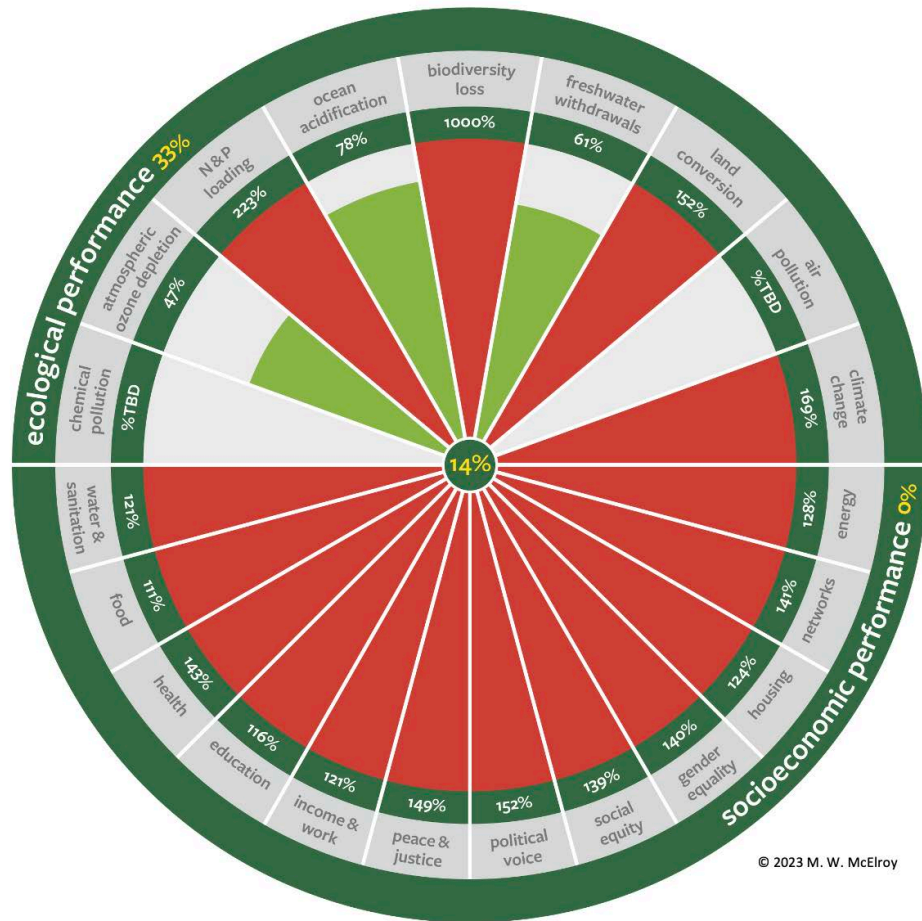


Figure 5 – Pie Slice Accounting View of Same Data Depicted in Figure 3 'Doughnut'

(white % scores represent performance for each area of impact [AOI], expressed as demand for capitals/resources over supply [D/S]; yellow scores represent performance for each grouping of AOIs, expressed as % of total AOIs that scored sustainably)

systems (hospitals, medical staff, PCE supplies, vaccines, etc.), should fall within (i.e., below) the scope of such resources and not above them. In other words, when the curve of demand for healthcare services exceeds or falls above the threshold of supply (i.e., the social foundation), bad things can happen. Thus, we need to either flatten the curve of demand *or raise the level of supply* in order to close the gap. No matter what we do, though, the *safe and just space* is always below the threshold, not above it. Remember, it's *flatten* the curve, not *fatten* the curve!

Pies Are Better than Doughnuts

This all leads to the alternative model I propose which I call the Pie Slice Accounting or PSA model. The PSA model takes just one approach, not two, to depicting performance in all areas of impact (social, economic and ecological), while enforcing the view that in order to be sustainable, all impacts and demands

on vital resources must fall within or below their limits. At the same time, it is just as flexible as the DE model in terms of its scope, and is much simpler, visually, to use and comprehend.

Thus, in the Pie Slice Accounting model (see Figure 5), I resolve the inconsistency found in the Doughnut model by defining all thresholds (social, economic, and ecological alike) as *upper* limits (or levels) of resources/supplies that must be maintained, by both (a) constraining the consumption of natural capitals within their limits, and (b) sustaining the production of all others at required levels. This naturally follows from the fact that while natural resources are available to us only in fixed amounts, social and economic resources, by contrast, are largely anthropogenic – humans make them. Fruit may grow on trees, but hospitals, schools, and democratic political systems don't!

Calculating, plotting and interpreting performance in a PSA model, then, can be explained as follows (again, see Figure 5):

- The upper half of the example shown in Figure 5 is devoted to ecological impacts and demands, the lower one to social and economic ones;
- Performance in all cases for each area of impact (pie slice) is determined by comparing human demands for the resources involved (i.e., vital capitals) to their supplies, be they, the demands, a consequence of resource consumption, resource destruction (i.e., destruction = consumption), or both; or simply the overall need for them:¹⁰
 - Impacts in all areas (pie slices) with demands (D) that call for 100% or less of the available supplies (S) of the resources involved are interpreted as sustainable (green slices), since supplies meet or exceed demands: **computed as D/S, or demands for resources as a percentage of their available supplies**¹¹
 - Impacts in all areas (pie slices) with demands (D) that call for greater than 100% of the available supplies (S) of the resources involved are interpreted as unsustainable (red slices), since demands exceed supplies: **computed as D/S, or demands for resources as a percentage of their available supplies**¹²
- The precise degree to which human demands are falling at, above, or below thresholds in the carrying capacities or supplies of capital resources is indicated by the percentages shown in the inner green ring. Thus, there is no need to go graphically off the page, so to speak, in the PSA model when portraying impacts that transgress thresholds. The colors and percentages tell the whole story;
- All scores for individual areas of impact (pie slices) are determined using context-based metrics, which always express performance in terms of demands relative to thresholds in resource supplies.¹³ The resulting scores of less than, equal to, or greater than 1.0 then easily map to the PSA model, since the inner green ring also corresponds to a score of 1.0 or 100% for any and all context-based metrics.
- For analytical purposes, it is important to bear in mind that while unsustainable performance in the case of ecological impacts usually boils down to exceedances in demands or consumption, unsustainability in the case of social and economic impacts more often results from a failure to create and maintain sufficient supplies. Whereas social and economic resources, that is, are anthropogenic, natural resources are not.

Some important differences between the PSA and DE models include the following:

- Unlike the DE model, the use of which by organizations is essentially forbidden by its makers,¹⁴ the PSA model can easily be used to report the sustainability performance businesses, government agencies, etc., and not just municipalities, communities or other political domains. This can include the use of the PSA model as a graphical reporting tool for analyses performed using the MultiCapital Scorecard and other context-based sustainability accounting methods.¹⁵ No such enterprise-level, context-based companion methods exist for the DE model;
- The PSA can also be tailored to report performance in terms of customized thematic groupings of impact areas, instead of only the two broader ones (ecological and socio-economic) shown in Figure 5. This includes triple bottom line reporting. Indeed, it should also be clear that the PSA model does not in any way prescribe areas of impact, indicators or specific metrics, and instead relies on the results of entity-specific (and context-based) materiality analyses.¹⁶

¹⁰ Again, see McElroy, 2008; and also McElroy, M. and van Engelen, J. (2012) *Corporate Sustainability Management – The Art and Science of Managing Non-Financial Performance*. London: Earthscan/Routledge/Taylor & Francis; and McElroy, 2022: “Thresholds, Allocations and the Carrying Capacities of Capitals”, accessible online at <https://www.sustainableorganizations.org/Thresholds-Allocations-CarryingCapacities.pdf>

¹¹ Ibid.; Note that resources consist of stocks and flows of vital capitals, including values, policies, and the practice of both.

¹² Ibid.

¹³ For more on context-based metrics, see here: <https://www.sustainableorganizations.org/context-based-metrics-public-domain/> and here: https://en.wikipedia.org/wiki/Context-Based_Sustainability#Context-Based_Metrics

¹⁴ <https://doughnuteconomics.org/faq/businesses-and-the-doughnut> (click on ‘updated Business and Enterprise Policy’ or ‘How can businesses engage?’ FAQ)

¹⁵ <https://www.multicapitalscorecard.com>

¹⁶ See, for example, McElroy, M. 2019. “Making Materiality Determinations: A Context-Based Approach.” United Nations Research Institute for Social Development (UNRISD). Accessible online at: <https://www.unrisd.org/mcelroy>

Summing Up

Despite the differences between the Pie Slice Accounting and Doughnut Economics models, it should be clear that they are no different from one another insofar as their conceptual commitment to context-based sustainability is concerned, a school of thought that interprets performance relative to social, economic and environmental thresholds in the world. Pies and Doughnuts, that is, all inhabit the same thermodynamic, finite, and values-laden corner of the kitchen!

Still, a case can be made, I think, that while the Doughnut Economics model is unnecessarily complex and arguably violates its own visual rules, the Pie Slice Accounting model is much simpler and sticks to its knitting. Indeed, in the PSA, all thresholds are upper ones that must be respected, be they ecological levels that should never be crossed, or social and economic ones that should always be upheld. The idea of social foundations, then, is best understood as a regulative ideal for how high upper limits need to be in order to be *high enough* – a not-less-than norm, but an upper-level threshold nevertheless. Thus, a single upper band for all thresholds in a framework like the Doughnut or Pie Slice model is quite sufficient.

And finally, while it is also the case that the keepers of the DE model openly discourage its use by businesses and other organizations, the PSA model imposes no such constraints. In a world in which most of the grave environmental problems we face – and many of the social and economic ones, too – are quite literally caused by commerce, the last thing we need is a powerful context-based accounting and reporting tool that is somehow withheld from that sector. Not only is the PSA model encouraged for use by business, it is tightly integrated with business-centric performance accounting tools that make it possible to measure and report performance in thresholds-based terms – all of which are open-source, including the PSA model itself.¹⁷

¹⁷ The MultiCapital Scorecard and Pie Slice Accounting model are both freely and publicly available under Creative Commons licenses and can be used in accordance with their terms (CC-BY-NC-SA 4.0); more general information about context-based sustainability, in turn, can be found here: https://en.wikipedia.org/wiki/Context-Based_Sustainability

About the Author

Mark W. McElroy, PhD is the founding director of the Center for Sustainable Organizations, a former partner at KPMG, and board chair emeritus of the [Donella Meadows Institute](#). He is particularly well known for his development of tools, methods, principles and metrics for measuring, managing and reporting the sustainability performance of organizations, including [Context-Based Sustainability](#) and [Generally Accepted Integrated Accounting \(GAIA\) Principles](#). He is co-creator of the economic doctrine known as [multicapitalism](#) and co-author of the books, [Corporate Sustainability Management](#) (2012) and [The MultiCapital Scorecard: Rethinking Organizational Performance](#) (2016). Dr. McElroy lives with his wife in Woodstock, Vermont and can be reached at mmcelroy@vermontel.net.

About the Center for Sustainable Organizations

[The Center for Sustainable Organizations \(CSO\)](#) is a U.S.-based 501(c)(3) non-profit organization created in 2004 by its founder and Executive Director, Mark W. McElroy, PhD. Its purpose is to conduct research, development, training and consulting for, and with, organizations around the world dedicated to sustainability in its most authentic, [con-text-based](#) form. What differentiates CSO from others in the field is its strong commitment to an approach to corporate sustainability accounting that interprets performance in terms of impacts on all vital capitals relative to organization-specific norms, standards or thresholds, and for the benefit of all stakeholders, not just some of them.