Cultures and Local Practices of Sustainability

ROUTES Towards Sustainability Network

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Universidad Pontificia Bolivariana
EDICIONES UC

338.9
C968

Cultures and Local Practices of Sustainability. ROUTES Towards Sustainability Network / Ana Elena Builes V., Andrea Casals H. y Gonzalo Valdivieso, Coordinadores editoriales -- 1 edición – Medellín : UPB, 2021.
239 páginas, 14x23 cm. (Serie Iconofacto)
ISBN: 978-958-764-999-4

1. Desarrollo sostenible – 2. Medio ambiente – I. Builes V., Ana Elena, editor – II. Casals H., Andrea, editor – III. Valdivieso, Gonzalo, editor – (Serie)

UPB-CO / spa / RDA
SCDD 21 / Cutter-Sanborn

Cultures and Local Practices of Sustainability. ROUTES Towards Sustainability Network
ISBN: 978-958-764-999-4
DOI: http://doi.org/10.18566/978-958-764-999-4
Primera edición, 2021
Escuela de Arquitectura y diseño
Facultad de Arquitectura
CIDI. Grupo de Investigación en Arquitectura, Urbanismo y Paisaje. Proyecto: Propuesta para una Vivienda de Interés Prioritario con criterios sostenibles para la población del Corregimiento de la Danta en el posconflicto. Moda, ciudad y Economía. Circulación y espacios de circulación de productos vestimentarios y demás procesos comerciales en el sector de la comuna 14 entre el Parque Lleras y el Barrio Provenza. Los distritos de innovación y su impacto en el desarrollo urbano: estudios de caso Bogotá, Medellín y Barranquilla - Fase I. Radicados: 122C-05/18-35, 602B-05/16-69, 606C-08/20-28.

Gran Canciller UPB y Arzobispo de Medellín: Mons. Ricardo Tobón Restrepo
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Imagen portada: Shutterstock ID 1066368659

Dirección Editorial:
Editorial Universidad Pontificia Bolivariana, 2021
Correo electrónico: editorial@upb.edu.co
www.upb.edu.co
Telefax: (57)(4) 354 4565
A.A. 56006 - Medellín - Colombia

Radicado: 2137-19-08-21

Ediciones Universidad Católica de Chile
Vicerrectoría de Comunicaciones y Extensión Cultural
Av. Libertador Bernardo O'Higgins 390, Santiago, Chile

Sustainable development as redirected evolution. Insights from innovation studies and ecological humanities

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Abstract

In this chapter, we describe and discuss similarities and differences between human evolutions with natural evolution. This is done after a bibliometric study of the use of eight concepts from ecology in the literature on innovation: evolution, eco-system, variation, retention and selection, niche, bio-mimicry, co-evolution, and the helix metaphor for collaborative arrangements between business, government, academia and civil society organisations. We argue that sustainable development should be understood as redirected evolution: getting closer to sustainable development requires a multitude of changes, each of which is subject to quasi-evolutionary processes of variation, selection, retention. The way forward is to recognise evolutionary potential and make good use of this. For this, concepts from ecology are useful. From the arts and ecological humanities, two key contributions are the recognition of immaterial needs and an ontology of connectivity.

Key words: Evolution, Innovation, Ecological Humanities, Sustainability

1. Introduction

The literature of innovation for sustainable development (SD) is replete with notions from ecology. Some examples are evolution, eco-system, variation, retention and selection, niche, biomimicry, co-evolution, and the use of the helix metaphor for collaborative arrangements between business, government, academia, and civil society organisations (CSOs). Sometimes, there are slightly different terms being used; for example, innovation scholars speak of complementary technologies and assets, instead of mutualism. There are other differences as well: people are evaluative beings whose relationship with the world is one of concern (Sayer, 2011); another difference is that social worlds have human-made institutions, such as regulation, as the outcome of collective deliberation and choice. Because of this, social evolution possesses teleological qualities, in contrast to biological evolution in which mutations are blind.

In this paper, we describe and discuss the use of 8 notions from ecology in the literature on innovation for sustainable development (section 2). The notions are the most prominent ones (in terms of their frequency of use and/or being foundational in the ontological understanding of innovation for SD). In section 3, we discuss crucial differences between natural and human evolution, such as social structures, power, and politics, and people having goals and well-developed capacities for evaluation and deliberation, all of which are important for innovation and for sustainable development as goal-oriented evolution (based on the Sustainable Development Goals or SDG). In section 4, we investigate the insights from ecological humanities for sustainable development, especially the role of the arts and humanities for thinking about sustainable development and achieving it.

To us, an important contribution form the arts and humanities is that they show that people have immaterial needs, and that well-being can be found in less-material ways, which lends support to a welfare view of a good life (where well-being is not reached at the expense of the natural environment and other people's well-being). For everyone to have a good life, we need a higher moral economy and capabilities and contexts for flourishing, something which requires social innovation and structural change in terms of types of workplaces that cater to autonomy, relatedness, and to the competences people have. Access to education and services, fair pay, and purpose are additional elements. Section 5 states the conclusions.

2. The use of ecological concepts in innovation studies

A word count of ecological concepts in journal articles, with the words "innovate" in the title or topic, revealed that the words evolution and eco-system are the two most used concepts from ecology in innovation studies.

Table 1. The use of ecological concepts in journal articles on innovation that appeared in the economics domain and which are related to sustainability

Concept	Number of innovation articles in which it is used				
(March 2020)	% in all innovation publications 1989	% in all innovation publications 1999	% in all innovation publications 2009	% in all innovation publications 2019	
Evolutionary	19670	0.6723%	4.7445%	6.0808%	5.5968%
Eco-system	5033	0.0000%	0.5615%	0.9112%	2.3654%
Variation	124				
	0.0000%	0.0561%	0.0271%	0.0235%	
Selection	317				
	0.0000%	0.0281%	0.1263%	0.0657%	
Retention	39				
	0.0000%	0.0000%	0.0090%	0.0070%	
Niche	727				
	0.0000%	0.1404%	0.1804%	0.2417%	
Co-evolution	888				
	0.0000%	0.1123%	0.4060%	0.2722%	
Helix	1080				
	0.0000%	0.0842%	0.2436%	0.4599%	

Source: personal calculations. The year in which it achieved the highest share of the 4 years included in the analysis is in bold (1989, 1999, 2009, and 2019).

The word evolution is used in two ways: as a process of change which is evolving (happening rather than being pre-ordained/controlled), and as a process of change in which variation, retention, and selection are important aspects. The second meaning is that of biological evolution.

In economics, the most well-known evolutionary approach is that of Nelson and Winter (1982), which is based on routines and differential growth of firms because of selection. Like species, firms have characteristics they cannot change at will. Routines are like genes, although they involve learning and capabilities. The notion of variation is notably absent, but variation generation is mentioned in Dosi and Nelson (1994) in their discussion of economic evolution as a dynamic process:

We use the terms evolutionary to define a class of theories, or models, or arguments, that have the following characteristics. First, their purpose is to explain the movement of something over time, or to explain why that something is what it is at a moment in time in terms of how it got there; that is, the analysis is expressly dynamics. Second, the explanation involves both random elements which generate or renew some variation in the variables in question, and mechanisms that systematically winnow out extent variation.

Variation refers to innovation, a mindful deviation from what exists (Garud & Karnoe, 2001) rather than blind mutation. The term innovation includes business innovation but also social innovation (new relations between actors) and (green) system change. In a study of the dye industry, van de Belt and Rip (1987) came up with a quasi-evolutionary approach, in which variation and selection are viewed as actively coupled: the selection environment is shaped by firms (through marketing, collaborative relationships, and lobbying) and variation is not blind but guided by the promises of success. As noted in Rip and Kemp (1998):

> [C]oupling between variation and selection can be institutionalised in a nexus, of which test labs in the dyestuff industry (van den Belt & Rip, 1987) are an example, environmental staff and departments in large firms

(Schot, 1992) are another example. (...) Alliances and networks can play a similar role in linking variation and selection.

It is noteworthy that, of the three biological elements, retention is given far less attention than variation and selection. Examples of retention are dominant designs of products, capital goods, organizational forms, routines, and ways of thinking inherited from the past, which are beyond choice and evaluation or decisively kept. Nature does not leap ("*natura non facit saltus*") and neither does technology which, despite expressions of revolutionary technology and radical technology, is cumulative with occasional discontinuities (Bassala, 1988; Ziman, 2000). Complex technology systems evolve out of simpler systems, based on the "adjacent possible" (Kauffman, 1995; Johnson, 2010). In the development towards greater complexity, there are strong similarities between biological evolution and socio-technical evolution, in the sense that they are both not designed into being, but the product of variation and selection. The interaction between variation and selection may give rise to technologies, designs, fuels, standards, practices, and expectations which are not easily abandoned (especially if the costs of changeover are large).

Nowadays, the view that variation and selection are coupled is widely shared among innovation scholars. The interaction may give rise to evolutionary patterns, based on variation and selection, resulting in trajectories that exercise selective pressures on radical novelties that break away from those trajectories, and which, because of competition from well-developed alternatives, are able to exist and grow in niches, places where selection pressure and resources are congenial to the existence of an innovation (Schot, 1992; Kemp et al., 1998), another notion from ecology.

Niches are one layer of the multi-level perspective of socio-technical transitions (Elzen et al., 2002; Geels, 2002, 2004). The other layers are regimes and landscape. The landscape (another notion from ecology) is a landscape in the literal sense, something around us that we can travel through; and in a metaphorical sense, something that we are part of, that sustains us (Rip & Kemp, 1998), making certain changes easier than others. The landscape involves the built environment but also cultural beliefs and policy agendas, as elements of a fitness landscape. Regimes are the central element of the multi-level perspective (MLP). In ecology, regime shifts are large, abrupt, and persistent changes in the structure and function of a system. Socio-technical regime shifts are defined in the same way; they refer to a change in

> the coherent complex of scientific knowledges, engineering practices, production process technologies, product characteristics, skills and procedures, and institutions and infrastructure that are labelled in terms of a certain technology (e.g., a computer) or mode of work organization (for example, the factory-based system of mass production). (Rip & Kemp, 1998)

Such changes are viewed as the result of landscape pressures, internal tensions of a regime and competition from niche innovations.

Whereas, in ecology, regime resilience is viewed in a positive light. From the point of view of achieving sustainability goals, the resilience of environmentally harmful regime practices and technologies acts as a great barrier to sustainable practices. The big question for steering is ¿How can we escape from lock-in in ways that are politically feasible and attractive for users? The general answer to this question given by evolutionary steering models is to alter the dynamics of variation and selection (Nill & Kemp, 2009).

The first strategy is that of Strategic Niche Management (SNM) (Kemp et al., 1998). SNM is an evolutionary approach aiming at fostering innovations with sustainability benefits and securing the sustainability of those innovations as a dual challenge. It is about growing promising alternatives into economically viable ones, something that has been done successfully through cumulative efforts for renewables.

The time-strategic evolutionary policy approach (Sartorius & Zundel, 2005) starts from the diagnosis of a possible lock-in problem working against the market introduction and diffusion of environmental technologies. It considers that the extent of lock-in and path dependence may vary over time, with stable and unstable phases of technological competition. The time-strategic approach to environmental innovation policy attempts to exploit these uneven techno-economic dynamics to make transitions towards more sustainable technologies easier. Three corresponding policy strategies are specified in accordance with the diagnosed time-dependent states:

- window preparation,
- window creation, and
- window utilisation.

The third strategy, transition management (Rotmans et al., 2001; Kemp et al., 2007; Loorbach, 2010) is concerned with portfolios for change. To avoid a new lock-in to suboptimal technologies, different paths should be explored, by actors taking an interest in those paths. The role for governments is to mobilise actor networks, support research, and innovation activities in promising paths. A mechanism of self-correction based on policy learning and social learning is part of transition management. It offers a framework for policy integration, helping different political actors and ministries to collaborate. Transition management is not done by a transition manager but consists of a set of principles informing transition endeavours by public and private decision makers.

The evolutionary model on innovation is based on a systems perspective, which holds that "innovation by firms cannot be understood purely in terms of independent decision-making at the level of the firm [but] (....) involves complex interactions between a firm and its environment" (Smith, 2000). The interaction takes place on two different levels: the level of interaction between a firm and its network of customers and suppliers, and a wider level, involving "broader factors shaping the behaviour of firms: the social and cultural context, the institutional and organizational framework, infrastructures, the processes which create and distribute scientific knowledge, and so on" (Smith, 2000).

One system model for innovation is the technology innovation system (TIS) model. TIS is a framework for emerging technologies that constitute alternatives to regime technologies (the phase out of regime technologies and products and dynamics of socio-technical regimes is not part of the framework). It is a socio-technical approach for studying the formative phase of emerging technologies characterised by:

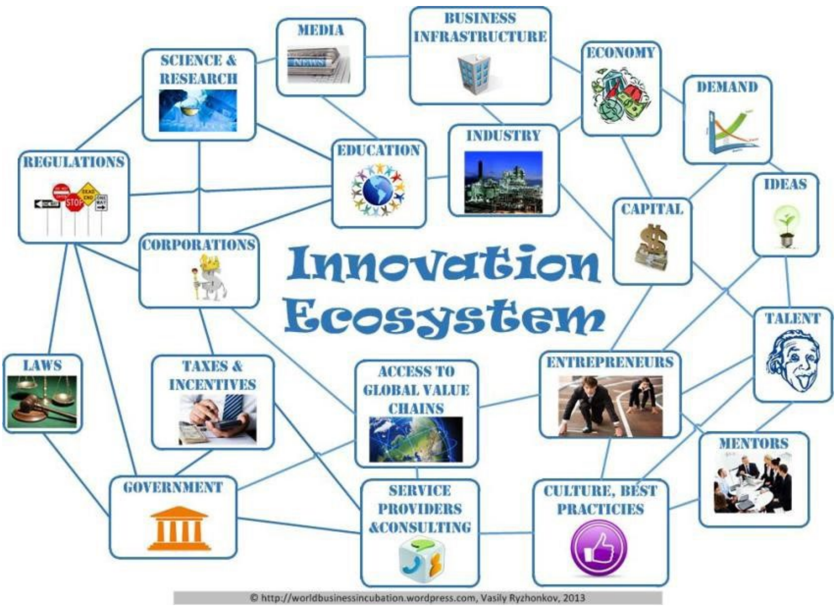
- large uncertainties prevailing regarding technologies, markets, and applications,
- price/performance of the products being not well developed,
- a volume of diffusion and economic activities that is but a fraction of the estimated potential; demand being unarticulated, and an
- absence of powerful self-reinforcing features (positive feedbacks) and weak positive externalities (Markard, 2019, based on Bergek et al., 2008, p. 419).

The TIS framework can be used for assessing the performance of a selected technological innovation system and for making policy recommendations on how to improve it (Markard, 2019), by drawing attention to key processes of building up a technological innovation system which are: experimentation, knowledge development, knowledge diffusion, guidance of innovation search activities, market formation, resource mobilisation, and creation of legitimacy (Bergek et al., 2008).

The metaphor of an eco-system for innovation

The importance of positive interaction effects (mutualism) for newly emerging technologies and business model innovation is captured in the use of the ecological concept of eco-system in the business literature. Again, references to the ecological literature are sparse, but the term achieved great prominence (it is the most used concept from ecology, after evolutionary). The ecosystem concept captures “the link between a core product, its components, and its complementary products/services (“complements”), which jointly add value for customers” (Jacobides et al., 2018). A graphic representation of the eco-system notion, which also includes finance is given in Figure 1.

Figure 1. A representation of the eco-system notion (Rhyzonkov, 2013)



The element of competition and hierarchical elements is missing from this model. It is underdeveloped in terms of the kind of interaction effects and locational aspects (such as the importance of regional proximity) (Oh et al., 2016).

Interaction effects

In an important article in Research Policy, Pistorias and Utterback (1997), differentiate between 3 types of interaction:

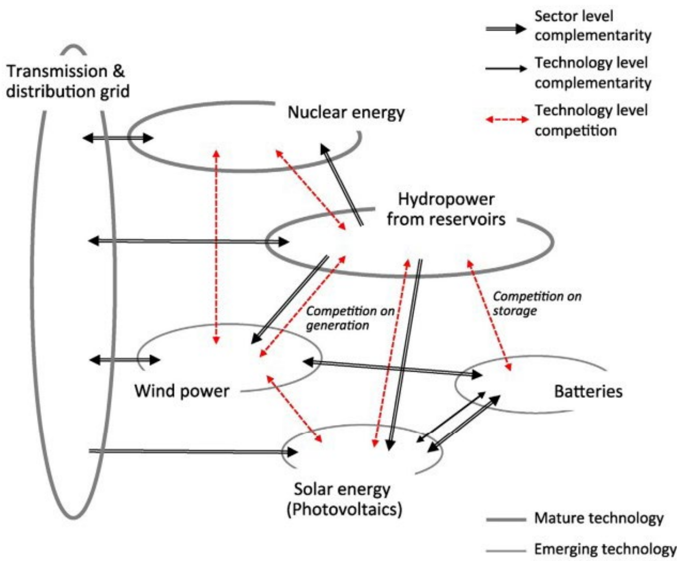
- Pure competition, where an emerging technology has a negative influence on the growth of a mature technology, and the mature technology has a negative influence on the growth of the emerging technology.
- Symbiosis, where an emerging technology has a positive influence on the growth of a mature technology, and the mature technology has a positive influence on the growth of the emerging technology (in biology this type of interaction is called mutualism).
- Predator-prey, where an emerging technology has a positive (negative) influence on the growth of a mature technology, and the mature technology has a negative (positive) influence on the growth of the emerging technology.

Table 2. Multi-mode framework to assess the interaction among technologies (Markard & Hoffman, 2016)

		Effect of A on B's Growth Rate	
		Positive	**Negative**
Effect of B on A's Growth Rate	**Positive**	Symbiosis	Predator (A) - Prey (B)
	Negative	Predator (B) - Prey (A)	Pure competition

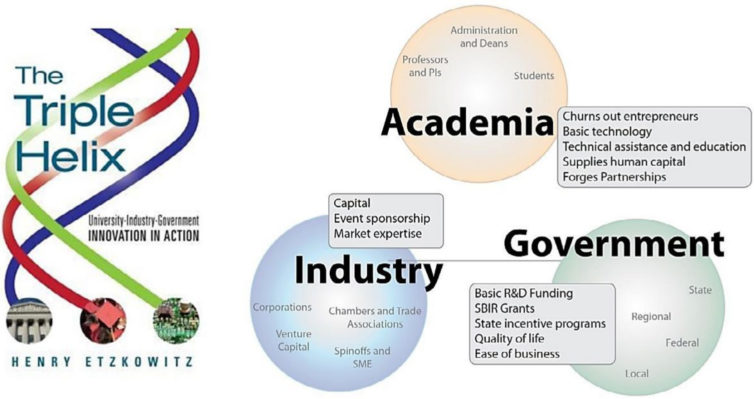
Source: Pistorius and Utterback (1997)

Figura 2. Complementarities and competition between technologies in electricity supply



An attempt to map relationships of complementarity and competition between technologies in electricity supply is provided in Figure 3. It shows the co-existence of different types of relations, the interaction of which gives rise to complex dynamics. According to Markard and Hoffmann (2016, p.67) in the beginning of a new technology innovation system, complementarities are mostly unilateral, with the focal technology depending very much on other technologies, products and services of suppliers, and human and financial resources. When maturing, it will attract more and more specialized services (for installation, maintenance, insurance, financing, for example), tailored to the focal technology for normal market reasons. In addition, the growing economic prospects may lead governments and investors to fund critical infrastructures or to force infrastructure owners to open their infrastructure to others. New systems require system building activities, but free rider problems and limited resources (time and money) in the early stage of development often leads businesses to focus on their own business and networks of collaboration (collective action problem) (Planko et al., 2016, p. 2344, in a study of smart grids).

Figure 3. Complementarities and competition between technologies in electricity supply (Markard & Hoffman, 2016)



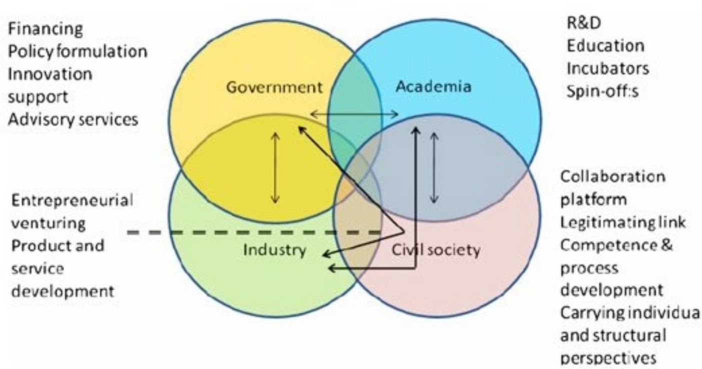
On co-evolution

Oftentimes, the term co-evolution is used in studies that view socio-technical change as an evolutionary process. The term coevolution refers to a situation when two or more evolutionary systems are linked together in such a way that each influences the evolutionary trajectory of the others (Safarzynska & van den Bergh, 2010). In socio-economic realism, co-evolution can be viewed as a special type of interdependency, where A influences but does not determine B and C, both of which in turn influence but do not determine A, although both A, B, and C change irreversibly (Kemp et al., 2017); in co-evolution, the different units of evolution enjoy relative autonomy in development. Since supply and demand are quite closely related, it is not sensible to talk about the co-evolution of supply and demand, but it is reasonable to say that technical change coevolves with institutional change (within systems of governance and organizations and culture) and talk about the co-evolution of the economy and the natural environment (Norgaard, 1984). Co-evolution helps to appreciate a special type of complexity, which stems from the relative autonomy of unlike processes, allowing steering to be concerned with different processes; for instance, the invasion of market thinking in new domains and the dynamics of natural eco-systems influencing variation and selection processes in energy. In the Netherlands, the use of transition management ideas for sustainable energy from 2002 to 2008 was undermined by the market liberalisation process (Kern & Smith, 2008).

Helix models for cooperation

The closer ties between universities, business, and government in the commercialisation of innovation led Etzkowitz and Leydesdorff (1995) to conceptualise such interactions as a helix model of cooperation. Helix models are vertically layered and horizontally differentiated (Leydesdorff & Ivanova, 2016).

Figure 4. The quadruple helix (Lindberg et al., 2014)



The triple helix model (in Figure 4) was superseded by the quadruple helix and penta helix model with civil society and intermediaries as additional actors. From the point of sustainable development, the inclusion of both types of actors is critically important because NGOs are needed for securing markets for green products and intermediaries for fulfilling critical functions with respect to mediating, informing, connecting, and coordinating (Gustedt, 2000, as cited in Guy et al., 2012). Next to connecting organisations, they may help them find new roles and strategies (boundary change) (Diepenmaat et al., 2020).

Cradle to cradle and Biomimicry as Nature-Inspired Design Strategies

Whereas evolutionary models of innovation tend to give a great prominence to retention and selection of innovation, design models are focused on variation. In the field of sustainable product development, two Nature-Inspired Design Strategies are: biomimicry and Cradle to Cradle (de Pauw, et al., 2014). The idea behind Cradle to Cradle is to "take nature as a model for making things" and design products that after their useful lives become resources for new products (McDonough & Braungart, 2002). The book received an enormous amount of attention, much more than Biomimicry ever got. The core idea of Biomimicry is to use designs from nature since nature has developed highly effective, sustainable ways of performing functions (de Pauw et al., 2014). Ideally, the two nature-based design strategies are combined with quantitative design tools for evaluating the environmental impact of the solutions across the product life cycle to maximize and secure benefits for the environment (de Pauw et al.,2014). In this regard, artificial intelligence (AI) can be viewed as a nature-inspired design (an example of biomimicry), since it tries to mimic a natural evolutionary form, a human brain with its logical, computational, and inferential faculties. AI can be used as part of Environmental Decision Support Systems, especially for Environmental Impact Assessment (Cortés et al., 2010).

3. Crucial differences between technological systems and biological systems

In this section, we examine crucial differences between technological systems and biological systems. According to Ziman (2000), editor of the book *Technological Change as an Evolutionary Process*, technological systems differ from biological systems in the following ways. A first obvious difference is that novel artefacts are not generated randomly, but almost always are the products of conscious design. Second, there is no strict technological equivalent of a biomolecular gene. Technological traits can be viewed as memes, units of cultural transmission, or a unit of imitation and replication, but memes as codes of instruction can be altered, disregarded, and combined at will with other codes, something that is not true for genes: "In technological evolution, memes from distant lineages often recombine, and multiple parentage is the norm" (Ziman, 2000, p. 6). Ziman notes in this regard that "the 'cladogram' of a technological artefact usually looks more like a neural net than a family tree" (p. 6). According to social constructivism, "all technology is socially constructed and therefore reflect purely the social interest of relevant social groups rather than any selection rational, technical or economic criteria" (Constant, 2000, p. 219), but this overlooks the role of complex interaction effects and changing circumstances that change people's interests and ideas. In a time where fossil fuels are under criticism, the interests of fossil fuel manufacturers change. Under increasing selection pressures, they struggle and must adapt their products and processes or obtain special protection through lobbying to survive.

The most fundamental difference between social and ecological systems is that the former is subject to evaluation and planned actions based on human consciousness. According to Westley et. al. (2002):

> Ecological systems key dimensions are space and time. While social systems include those dimensions, a third one, symbolic construction and meaning, is also added to fully understand the system. Essentially, this

third dimension significantly contributes to the difference between the two systems. It includes four elements of its own: the creation of a hierarchy of abstraction, which loosens the power of time and space, the inherent capacity of such meaning structures for reflexivity, the ability to generate expectations and look forward, and the ability of humans to externalize these symbolic constructions in technology. These elements also help to explain the fundamental lack of responsiveness or adaptability to environmental signals that characterize much of natural resource management. This chapter has merely outlined the nature of these challenges.

4. Insights from the arts and ecological humanities on sustainable development

Sustainable development is about reducing environmental pressures and increased material wealth. It is oriented towards the needs of consumption for those who are poor and the needs of all people regarding clean air, safe drinking water and protection against water flooding, heat, and droughts. The Sustainable Development Goals (United Nations, 2015) widened the focus to immaterial needs. Immaterial well-being is not a well-defined concept but can be considered to include political voice, gender equality, less unequal opportunity, and human flourishing in the broadest sense: in productive activities that are a source of satisfaction, uplifting and meaningful, feeling appreciated as a person, returning appreciation to others (because of mutual support and care), and absence of harassment and discrimination.

SD as the *wholly grail*, constitutes an ever-continuing quest (struggle) for societies and for individuals because of the intrinsic trade-offs and distributional effects of winners and losers. SD, as a progressive goal, is a difficult concept for policy because it is normative, elusive, and involves contradictory requirements of support (for green development and innovation) and control. Innovation may help us get closer to sustainable development goals but for sustainable development there are no engineering solutions, nor are their management principles (such as Cradle-to-cradle) through which sustainability development can be achieved.

Ecological humanities (or environmental humanities) offers a different lens on sustainable development which is absent in triple bottom line approaches and sustainability transitions: an ontology of connectivity and the importance of immaterial needs and ethics. Connections of people with places, nature, and landscapes are foregrounded. Indigenous knowledge and the arts are viewed not only from the point of view of achieving something but as aspects of being.

Gus Speth, a US advisor on climate change said:

> I used to think that top environmental problems were biodiversity loss, ecosystem collapse and climate change. I thought that thirty years of good science could address these problems. I was wrong. The top environmental problems are selfishness, greed, and apathy, and to deal with these we need a cultural and spiritual transformation. And we scientists don't know how to do that.

Buen vivir, as a community-centric, ecologically balanced, and culturally sensitive model of development, is often held up as a model for sustainable development. *Buen vivir* translates from Spanish into a "good life", according to Skidelsky and Skidelsky (2012), and it consists of the following seven elements: health, security, respect, personality, harmony with nature, friendship, and leisure.

A relevant new development is the demand, especially strong amongst young people (the millennium generation), for work that fits with values of autonomy and justice (Dumitru, 2015). As put by Melissa Stuckless in a LinkedIn discussion group on young professionals:

> We want to feel part of something bigger than our jobs. We are much more likely to stay with a company that is transparent and engaging. We want employers who are ethical and fair, not gluttonous, and harsh. We are loyal

to those who care about us; this is something that has been slowly changing the culture of management and continues to make developments.

The focus on green products and clean production in much of the discussion of sustainable development hides from view ways in which human flourishing is impaired through consumerist and individualistic lifestyles. Feeling connected, enjoying a great deal of autonomy, and having jobs that are purposeful and fitting with one's talents is shown to constitute basic psychological needs (Sheldon & Ryan, 2011). Different contexts can either foster need or satisfaction, and thus actualise our potentials for growth, creativity, intrinsic motivation, effective functioning, and well-being, or lead to need frustration and/or need thwarting, thus activating our vulnerabilities towards defensiveness, pathological functioning, and ill-being (Vansteenkiste & Ryan, 2013). All this points to the need for an alternative economy and social innovation that is catering to immaterial needs including self-actualisation.

SD, as redirected evolution, goes beyond greener products and less environmentally damaging production in questioning the process of accumulation, consumption growth, and competition as a good thing (which is the economic consensus). "If growth automatically generated well-being we would now be living on paradise" (Latouch, 2009, as cited in Gouch, 2017). The reality is that fixed resources are depleted, oceans are polluted with plastics and overfished, biodiversity is falling, and land is increasingly used by humans for production, reducing the space for other species. Humans are also responsible for climate change, by using fossil fuels for heating, motive power, and electricity production, and for financial investments in the last 200 years. Climate change is increasingly referred to as the climate emergency; even as climate crime, calling for drastic measures.

This hints at the need for system change in multiple sectors. From the point of steering, this presents a huge challenge because the system changes should occur in an orderly manner, producing positive outcomes in terms of enhanced well-being (material and immaterial), and using other technologies, practices, and institutional arrangements. According to Schumacher (1973), this requires social innovation in the form of smaller units of decision-making:

> What is the meaning of democracy, freedom, human dignity, standard of living, self-realisation, fulfilment? Is it a matter of goods, or of people? Of course it is a matter of people. But people can be themselves only in small comprehensible groups. Therefore, we must learn to think in terms of an articulated structure that can cope with a multiplicity of small-scale units. If economic thinking cannot grasp this it is useless.

Sociotechnical system changes are studied in the literature on sustainability transitions (Geels 2002, 2005; Schot & Geels, 2007; Markard et al., 2012) and in the literature on innovation (Garud & Karnoe, 2001; Planko et al., 2018). They unequivocally show that system change is difficult, even when system faults are being accepted by consumers and policy makers because structures, interests, and dispositions cannot be changed at will and because it takes time and effort to build convenient alternatives. As every development has unintended consequences and is surrounded by uncertainty about the effects, the various routes towards sustainable development are best pursued through guided evolution based on trial and error, informed by ideas of how demands for mobility and electricity, goods, etc., can be met more sustainably rather than by idealist visions. Fairness and justice should also be part of this to create "just transitions" (Swilling & Annecke, 2012).

It is easier to cater for fairness and justice in commons-based activities found in the social economy, whose activities are not subject to the discipline of profit-maximization and hierarchy: "social economy organizations are animated by the principles of reciprocity and mutuality for the pursuit of collective economic and social aims, largely through the social control of capital". According to Wright (2010):

> The social economy is the pathway of social empowerment in which voluntary associations in civil society directly organize various aspects of economic activity, rather than simply shape the deployment of economic power (...). The "social economy" constitutes an alternative way of directly organizing economic activity that is distinct from capitalist market production, state organized production, and household production. (pp. 140-141)

The social economy is thus a critical element of sustainable development when this is understood as a development that caters to the material and immaterial needs of people. From the point of need or satisfaction (which includes empowerment), a diverse economy is desirable. It is interesting to look at the arts, as an element of social life, a set of economic activities (operating under commercialisation pressures) and source of creativity and well-being:

> The arts, and the study of the arts as part of any rounded education, constitute in many ways the fabric of any society, in relation to which political and economic institutions and processes are expressions rather than determinants of the cultural life. These are the sources of individual and collective identity formation and of the kind of empowerment that comes through the recognition that one has expressive and performative capabilities – a recognition that also lies at the heart of art-based therapies for psychological and emotional disorders (Landy and Montgomery 2012: 167-219). One of the pathologies of contemporary civilisation is the tendency for the economic and political to make culture their handmaidens, rather than the other way around. (Clammer, 2014, p. 66)

It seems that marketization not only drives organizations to short product cycles (planned obsolescence) with an excessive exploitation of natural resources, but it is also undermining the arts so important to human flourishing (Tay et al., 2018): "sustainability is not just about economics, environmental concerns, and social issues but rather how those weave into an aesthetic of life with elements of ethics, spirituality and emotional interaction".

To us, human needs, in particular immaterial needs, should be put more firmly into discussion of sustainable development, something which is only weakly done within the SDG.

5. Conclusions

In this chapter, we discussed the evolutionary nature of innovation and social development. Because of evolutionary dynamics, society may get locked into unsustainable technologies, financing, production and distribution systems, and consumer practices. Escaping this is a huge challenge for individuals and society. A different consciousness (less consumerist and more eudemonic) is a key aspect of sustainable development, which, in our view, can only be developed through experience, commons-based activities of financing, production, and ways of living that are more relational, based on values of empathy, care, and mutual support.

Getting closer to sustainable development requires a multitude of changes, each of which is subject to quasi-evolutionary processes of variation, selection, and retention. The way forward is to recognise evolutionary potential and make good use of this: "what really matters is the evolutionary potential of the present and the incrementalist actions that are required to instigate the changes that are needed" (Swilling, 2020, p. 6).

From this follows the conclusion that sustainable development requires guided, self-correcting evolution, based on visions and ideas of progress but relying on evolutionary change in the form of 'Darwinist' processes of variation and selection (instead of relying on blueprints) for innovation. Experimentation is one way of fostering diversity of innovation but, as societies, we must be concerned with selection and retention too, via state policies that internalise negative effects, the nourishing of a social economy, and a phase out of unsustainable systems, products, processes, and practices. Precisely, getting rid of what exists (has been retained), is a huge task for individuals and society, which will not be achieved through consensus or benign dictatorship. It is a task for policy and not just politics.

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