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Systemic Definitions of Sustainability, Durability and Longevity

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Abstract

The sustainable progress of humanity requires a rigorous definition of concepts, models and ways of realization. Sustainability, durability, longevity are key concepts. This paper explores the current definitions of sustainability while sustainability is examined critically. Then are defined, in a systemic manner, using a functional segmentation model of external environment, of resource categories and products of anthropogenic systems: (1) the concepts of sustainability / durability / temporality / ephemerality of system categories, (2) longevity as the life duration (of existence, functioning and behaviour) of an i-type specimen within the category of systems under consideration. The systemic definition and ranking of influence factors allow future improvements of practical ways of assessing, planning and implementing sustainability / durability and sustainable / durable progress at various hierarchical levels of Humanity.

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1. Introduction

The major challenge for Humanity in the 21st century is the knowledge and progressive innovation, the foresight of favourable and unfavourable changes on ever longer terms, the actions meant for mastering complexities, crises of various kinds and origins, in order to design, decide and determine the realization of its sustainable progress, on unlimited term in space-time-resources-products. (Teilhard de Chardin, 1948 Mesarovic & Pestel, 1974; United Nations 1987, 1992; Hodge, 1997; Raskin, 2002; Meadows, 2004; Hughesa & Johnstonb, 2005; Romanian

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Government, 2008; European Union, 2010; Bergh & Hofkes, 2012; Deutsch, 2012; Pater & Popa, 2013; Popa, 2014; Rockström, 2015).

Achieving sustainable progress $P_s(t,f,c,g)$ by means of $\{f\}$ functional cycles, $\{c\}$ behavioural cycles and $\{g\}$ unlimited generations of entities of the planet Earth within our solar System / our Galaxy / Universe is increasingly recognized as major priority for Humanity, at all levels and in all areas. This requires, first of all, the rigorous, systemic definition of two categories of concepts that reflect global guidelines, fundamentally opposed:

- concepts of "virtuous" kind (+):progress P , sustainability T_s , durability T_d , resilience V , innovation I , competitiveness K , longevity L (as analyzed and defined herein),
- concepts of "vicious" kind (-):radicalization R_z , self-destruction A_d .

Next, we accept a systemic, overall definition of progress (Popa, Pater & Cristea, 2014) as guidance of researches and models presented in this paper:

Progress $P(t,f,c,g)$, as form of change, is defined by the establishment, operation, behaviour and evolution of real systems classes $S_R(t,f,c,g)$ characterized by the gradual, cyclical growth (through f functional cycles, c behavioural cycles and g successive-parallel generations), optimized, temporary / durable (on very long term) / sustainable (unlimited) of

- competitiveness $K(t,f,c,g)$ of categories of conscious real systems in their external environments (Competitive capacity, Flexibility of product offer, Value of product offer, Availability / accessibility of resources, Efficiency, Demand / acceptance of products in proximate external environments),
- structural-functional complexities $W(t,f,c,g)$ of real systems,
- structural-functional diversities $Z(t,f,c,g)$ of real systems,
- structural-functional integrations $J(t,f,c,g)$ of real systems,
- welfare $B(t,f,c,g)$ of entities

within the hierarchy of external $M_{ext}(t,f,c,g)$ and internal $M_{int}(t,f,c,g)$ environments of systems in the space-time-resources-products domain networks $\{D_{strp}(t,f,c,g)\}$ from the Universe / Multiverse.

The Universe / Multiverse is regarded as a dynamic infinity of space-time-resources-products domains, abiotic and biotic $\{D_{strp}(t,f,c,g)\}$ (Kauffman, 1997; Popa, 2003; Carr, 2009; Penrose, 2011; Deutsch, 2012; Ellis, 2012; Greene, 2012; Turner, 2013; Capra & Luisi, 2014; Popa, Pater, & Cristea, 2014; Weinberg, 2015). Within favourable "domain networks", socio-human, intelligent and wise entities may consciously achieve cyclic sustainable progress $P_s(t,f,c,g)$, in symbiosis with human, abiotic and biotic type entities. Entities of abiotic and

Science, Technology, Management, Government	Psychosociology & Culture					
	Progressivism (+)	Humanism (+)	Activism (+)	Activism (-)	Extremism (-)	Terrorism & Wars (- -)
				Passivism (~)		
Progress	● Sustainable Progress $P_s(t,f,c,g)$	●	●	No		
Stagnation	temporary?	temporary?	temporary?	●	●	●
Regress	temporary?	temporary?	temporary?	●	●	●●
Self destruction danger	No			●	●●	●●●
Important stages in knowledge and systemic action	Radicalization Ephemeral / Temporary / Durable					
	- Defining and characterizing used systemic concepts and methods - Systemic knowledge and modelling (system dynamics, logic models, heuristic models,) - Strategies & tactics & operative programs to achieve progress - Integrative innovation for progress - Preventing radicalization - Strong reducing / eliminating the causes of radicalization					

Fig. 1. Major challenges and systemic approaches for Humanity in the 21st Century and beyond.

biotic type can achieve, by self-organization and self-regulation, (a) both the resources, products and conditions for the sustainable cyclic progress and, vice versa, (b) the human unconscious or conscious orientations towards self-destruction

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