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Summary – The Cycle of Innovation and its Ecology
On Therapists, Entrepreneurs, Bureaucrats and Fatalists and their Role in the Process of Creative Deconstruction

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This edition of KIOES represents more than a loose collection of authors accidentally linked though the attendance of a joint break-out session at Forum Alpbach 2016: The papers are interconnected though a shared interest in exploring the homologies between structural and diachronic (historical) dynamics in nature and culture, and the key role of diversity (variety) as outcome and catalyst of the emergent process of (social) innovation. By crossing the lines between models from ecology, resilience science, cultural theory, social ecology and environmental history the papers should be perceived as an "interim report" in an ongoing effort to gain new perspectives and insights in explaining the origins and structural conditions of (social) innovations. The contributions in this edition demonstrate that transversal scientific boundary work offers a prolific context for raising new questions, inspiring ecologists and cultural scientists alike to see their own field with fresh eyes.

Homologies

Over the last few years "Ecologies" has become one of the most frequently used buzz-words in technology, innovation policy and corporate business (Hwang and Horowitt, 2015). Used in the majority of cases as bare analogy for building and hosting technological platforms, the cognitive gap in the interpretation of the word "ecologies" between entrepreneurs and policy makers on the one side and new ecologists (Jørgensen, 2007) on the other, could not be larger. The organization of the break-out session at Forum Alpbach 2016 was driven by the notion that innovation policy might profit tremendously from recognizing the striking *structural homologies* between ecosystem dynamics and the relational morphologies of highly innovative and successful socio-technological networks.

The process of social and technological innovation follows a well-known pattern, that was condensed by the Austrian economist Joseph Schumpeter in his iconographic metaphor of innovation as an ongoing cycle of "creative destruction". There is a significant homology between the process of invention → growth → saturation → deconstruction in the technological innovation cycle and the eco-cycle in nature (Gunderson, 2002), a homology regards the formative role of *total energy throughput* (flow and storage of energy in ecosystems/flow and accumulation of financial capital), *network structure* (chemical autocatalytic cycling in nature/structural folds in social networks), and of *quality of information* (genetic diversity and edge effects in ecosystems/cultural complexity and diversity of narrative frames in societies).

Regarding the latter, blending models from *resilience theory, ecosystem science* (Fath et al., 2015) and *cultural theory* (Thompson, 2008) it can be shown that different stages of the innovation cycle (invention → growth → saturation → deconstruction) require different types of "players" or "characters" to make the cycle work: an individualistic culture of the "doer" at the start-up stage, a hierarchical culture of the strategic manager for growth and scaling, an egalitarian codex to navigate the dramatic turbulences of destruction, an autonomist culture for pioneering and radical innovation, a culture of healing, let go of old, dysfunctional knowledge and practices. In our western knowledge system, these different cultures go along with different institutions: large organizations,

such as corporations or universities dominated by hierarchical mindsets, NGOs and community initiatives driven by egalitarian codes, start-up communities characterized by individualistic world views, artistic and scientific communities inspired by the idea of autonomy and independence. Models from the field of *computational thinking* (Kowalski, 2011) can explain how different levels of local/global and informed/uninformed search strategies are linked with these different cultural frames and regimes of assessing, judging, evaluating, organizing and disorganizing our world.

Responsive variety

With different institutions, different modes of knowing and problem solving come along. Different frames are like looking through different prisms at the world, with each being characterized by its specific bending of the light and its specific *shadow of not-knowing*. Each of the modes of knowing finds its *epistemological niche*: its place to thrive in the shadow of the not-knowing of the other frames. To use an example from cultural theory, it is the egalitarian that thrives in the shadow of what the hierarchist actively rejects or cannot see through his cultural lens and vice versa.

Attributes, such as excellence, utility, impact, resonance, beauty, empathy and transcendence, offer radically different scales and narrative frames to measure the outcome of something that is perceived as being "innovative". The idea that there is just one scale (as increase in effectiveness or efficiency, or acceptance among customers) is based on a limited and limiting understanding of how the new gets born and of how it overcomes the resistance of established players. Inventors and early adopters are frequently driven more by aesthetic or altruistic values (doing good) than by the prospect of economic gain (doing well). There must be meaning as fuel of innovation, capital is not enough to spark the fire.

The core hypothesis of our break-out session followed the idea, that the *linked diversity* of different values and knowledge cultures across different scales (Gunderson, 2004; Alexander, 2004; Salingaros, 2009) is building a *cultural and intellectual gradient* that enhances the *responsive variety* (resilience) of an innovation system and is mandatory for sustainable performance. Taking up Google´s (Schmidt, 2015) mantra that those organizations who define themselves through their product or technology will die, and only those will survive who define themselves through their platform or ecology, the goal of the break-out session was to discuss a generalized model of knowledge (including its different cultures of searching for solutions) that should inhabit an innovation ecology in order to be successful. Speakers from the field of policy making, computational thinking, resilience theory, cultural theory, and citizen and community science exchanged perspectives on the dimensions and composition of an innovation landscape that thrives even in critical situations. The role of the scientist, the hacker, the visionary, the entrepreneur, the bureaucrat, the therapist, the community organizer and even the "trouble maker" was determined, and the likelihood of the hybridization of these roles due to emergent social dynamics for example in the form of the "science entrepreneur", "facilitatist" or the "community entrepreneur" – was discussed (Winiwarter, 2017, this edition).

The session also addressed the practical question of the new frameworks and policy measures that are required to strengthen the responsive variety of our innovation systems. If the horizontal connectedness of an innovation system – the collaboration across different regimes of knowing – is to be strengthened, a completely *new set of funding instruments* will be required. The specific role of charitable foundations to fund cross-scale-science, along with the need for special governmental programs or institutional manifestations to strengthen the field of open innovation and citizen/community science, was discussed.

Renaissance thinking

The findings were linked with the general topic of Forum Alpbach 2016 – the quest for the possibility of and framework for a new Enlightenment. If scientific evidence shows that constellations with multiple and different regimes of organizing, each with its supporting mode of knowledge, bring forth more resilient and robust results in terms of learning and development – if it can be proven that an innovation landscape with a diversified portfolio of scales is more effective in the long run – then this would have an immediate impact on our understanding of the role of academia and other institutions that create and provi-

de knowledge. It would give strong support to those who stress the importance of measuring and evaluating knowledge not only in terms of "excellence" but also on the scales of "utility", "impact", "resonance" and even "beauty". It would also give strong support to those who are arguing for stronger cross-institutional collaboration and for a new transdisciplinary mindset of *Renaissance thinking* to overcome fragmentation and incoherence.

A new Enlightenment, taking its cue from William Blake's dissatisfaction with "Newton's sleep", and his embracing of what he called "a fourfold vision", would seek out and grant legitimacy to a range of institutional settings, each with its distinctive mode of knowing.

The *necessary ambiguity* that goes along with such an understanding of different sources and frames of (scientific) knowledge corresponds well with the reality of *participatory co-management, open innovation, hackathons, design thinking, community and citizen science and action research***.** It also advocates strongly for an open, inclusive and cohesive society that strives to overcome fragmentation and overspecialization and that is able to mobilize and nurture the potential of those who feel fatalistic and excluded. To promote *diversity and tolerance of ambiguity* is thus not a moral postulate, it is a vital matter of strength and possibility for sustainable survival, it is *the* decisive capacity, capability and culture that we have to establish in order to thrive in a world of dancing and cracking landscapes.

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