

Research abstract: Higher-level cognition and Governing Macro innovations

Abstract

Governing Macro innovations (MI-governance) is a challenge in managing novelty. The term macro innovation comes from Joel Mokyr, an authority on history of technology. He splits innovation in macro and micro type. Currently most innovation management is governing micro innovation. Macro innovation will require a cybernetic investigation to understand how it is governable. As such the research has to be put in a broader cybernetic research on Higher-Level cognition. The HL-architecture is a theoretical model in relation to governance. To make the state-of-the-art control system useful an implementation scheme has to be developed. Some good practices in innovation management seem to have similar features to the HL-architecture (SCRUM, open innovation). They can be used to create a more practical MI-governance model.

Macro innovation.

Mokyr defines and outlines micro and macro inventions [Mokyr:1990]:

- I define microinventions as the small, incremental steps that improve, adapt, and streamline existing techniques already in use, reducing cost, improving from a function, increasing durability, and reducing energy and raw material requirements. Macroinventions, on the other hand, are those inventions in which a radical new idea, without clear precedent, emerges more or less ab nihilo. (p.13)
- The distinction between micro- and macroinventions matters because they appear to be governed by different laws. Microinventions generally result from an intentional search for improvements, and are understandable -- if not predictable -- by economic forces. Macroinnovations are more difficult to understand, and seem to be governed by individual genius and luck as much as by economic forces. Often they are based on some fortunate event, in which an inventor stumbles on one thing while looking for another, arrives at the right conclusion for the wrong reason, or brings to bear a seemingly unrelated body of knowledge that just happens to hold the clue to the right solution. (p.295)

The idea of “emerges more or less ab nihilo” is exactly the research topic of self-organizing system.¹ The description on the so called “laws” that govern macro innovation seems based on random chance and as such not governable. The real problem is that macro innovation is based producing novelty, it creates knowledge-base and can only be controlled by meta-knowledge-base.

On to management

The problem of late 20th century innovation management seems to have led to a decrease of macro innovations [Mokyr:1990]. At first this may look unlikely. But steady progress rules out new opportunities, keeping the focus on the task ahead. An other problem is the rise of complexity, it makes coincidentally findings harder to recognize. Steady micro

¹ for a good survey see Gershenson PhD. introduction [Gershenson:2007]

innovation is changing our world at a high speed and fools us into believing they are macro innovations. When managing micro innovation has this effect on the world, what would MI-governance bring us? Several practices are recognized as stimulating macro innovations, like open-innovation [Chesbrough:2003] and SCRUM []. Similar to open-innovation Florida defines a new creative class [Florida:2002] that has openness as a basic moral value. MI-governance seems currently based on micro investments with open mind workers. This policy increase distribution and thereby the change of success. Could we do better?

Novice behavior.

With the HL-cognition research the problem of novelty is been investigated. Novelty is the focus of “novice behavior”, it should be seen in contrast to “expert behavior“ that focuses on information. The relevance for MI-governance can be easily illustrated. For example experts will work with long development cycles, novices use short once. Tools are different: where experts use a flowchart the novices will use whiteboard. Even the work ethic is different: experts try to eliminate anomalies of their work, novices will stimulate creativity. All these differences are related to how experts and novices use their knowledge system. The expert should know how the system works while the novice should adapt to learn the knowledge. To make a good scheme the concepts as novelty, information and knowledge need to be sticked defined. Novelty will become innovation when it leads to adaptation of the environment.² Knowledge is in peoples head [coenen:2006, p.] and implicit in social relations. Information is explicit and can be decoded to external media. Interesting is that the research is creating a knowledge base. By applying the theory of meta-system transition [Turchin:1977 , Heylighen:1995] the novices are just one special kind of expert.

Higher-level cognition.

Most economical references are practical, Simon’s on “the science of the artificial” [Simon: 1969] is an exception by created a fundamental expansion to cybernetics. The investigation on higher-level cognition is in the same line of thought: understanding artificiality. The research has been going on for a while [Kiemen:2003, Kiemen:2006]. Simply put, the system can pin-point one pice of knowledge as the focus. The learning adapt around the focus, this can of course lead to new relations that change the whole knowledge-base. There is however a constrain on the type of information that gets learned, depending on the type that gets pin-point: or physical properties are learned from a virtual concept or vica versa. This is a recursive bootstrapping system. Technical it is archived by defining several distributed evaluation, in different contexts (external, internal, directional and adaptational). They will influence each other by entwined feedback. In recent findings some information implicates that the architecture may be naturally implemented. One implementation is related to Mokyr’s historical view on the laws that govern macro innovations. Bruno Latour -- who is anthropologist on science -- came up with a control system for science, based on the influence of scientists, politics, economics and the public sphere. The other implementation is recognized as a specific structure in the neocortex (the global workspace entries). Both implementation face the same problem of controlling something highly adaptive, it is as such natural to find a same control-process.

Practical with MI-governance

For management the HL-architecture is theory that can clarify but not empower. With the examples given to illustrate novices, MI-governance does become empowerment. Currently SCRUM is the best practice, from our body of knowledge -- in particular Latour’s

² So called “potential innovation” (that never came true) are only novelty (not innovations) to this definition.

work -- we do recognize some weaknesses in the SCRUM and suggest some change to it: the processed information needs to stay complex. Keeping complexity can only be achieved when it has been taken into the very basics of the business plan: the management (SCRUM), the tools, work ethics (open innovation), etc. For the tools recent and ongoing research projects are relevant. The CRAB-project [CRAB:2004] was proposed to reduce the access cost of information for interdisciplinary researchers (novices). The CRAB-project suggested a complex information body. There would be a technical and a narrative level for each type of information. The information types are from policy to reach over development to valorization. Containing the whole gamma of related information. While the tool may still be relevant the starting point was wrong. The Knosos project [Knosos:2005] on the other had focus on knowledge sharing by web2.0 tools. In particular Tanguys Coenen's work on social software [Coenen] is relevant.

Round up

The most tricky aspect of the whole approach is that the described control system is used to managing the research on it. It may well be the most subtle bootstrap of them all. The MI-governance is a new idea and thereby the described novice behavior can be applied to it. By creating clarity on the HL-control-system a virtual concept is created, by applying it to existing practices, it should become a real management tool (physical). While more related knowledge can be used to build the theoretical understanding, it should go hand in hand with practical experiments (projects) to falsify the assembled (virtual) constructions.

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