Futures xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures

Interactions revolution: Bee colony and liquid organisations

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ARTICLE INFO

Keywords:
Interactions revolution
Liquid organisations
Self-organisation
Variety operators
Viable system model
Network society

ABSTRACT

This article discusses interactions in nature and in human organisations. Human organisations, to a large degree, have evolved with hierarchical relationships and power imbalances, making it common for people to experience unfair societies. Its aim is contributing towards overcoming some of the shortcoming of these top-down structures learning from nature's bottom-up structures. We set the scene for an interactions revolution towards more humane organisations in the context of our current digital society; these, the liquid organisations, are proposed in this article as the more fluid organisations that we need in today´s society. We discuss interactions in human organisations with the support of the Viable System Model, the Viplan Method and the bee colonies' evolutionary learning about interactions and requisite variety. We reveal aspects of what human organisations can learn from studying how natural selection has solved the problems of sensing and correcting imbalances of variety in self-organising situations where there is little or no metasystem to guide, design or engineer the requisite variety balances.

1. Introduction

We make the distinction between designing requisite variety and correcting imbalances of variety through self-organisation between actors and agents in interaction in a value chain (Ashby, 1964). Organisations usually confront situations where they lack variety to achieve their goals and management has to either muster resources and design structures to achieve desirable outcomes or have to accept failure. In nature the situation is different; often there is no boss to sort out imbalances in interactions but instead there are operational adjustments to correct imbalances in value chains. This is a characteristic of heterarchical organisations underpinned by on-going interactions, with controls from within rather than from the outside. They are the outcome of co-development of multiple parts in interaction. It is through these processes that organisational boundaries are defined and ecological chains of value adding activities take place.

Organisations may emerge from collectives of agents with interest in a common outcome. As these agents develop some degree of cohesion they become actors of an organisational system in interaction with multiple environmental agents, which articulate one way or the other their own interests and together form ecologies of value chains. If in these ecologies actors find that they are able to maintain their independent existence they are establishing themselves as viable systems (Beer, 1979).

An emphasis on interactions is at the core of the Viable System Model (Beer, 1972, 1979, 1985) however it is now with current technological developments that there is more space for their widespread implementation from the global to the local. Beer anticipated the interplay between big data and algorithms that are driving our digital societies:

"Now it is for data-collectors to know all the details, and for mathematicians to establish the reasons. For they can demonstrate

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https://doi.org/10.1016/j.futures.2018.07.007
Received 28 February 2018; Received in revised form 10 July 2018; Accepted 13 July 2018

causes, often without knowing all the details; just as people can entertain a generalization without knowing each instance of it singly – which they have not examined. …" (Beer, 1966 p.69)

These are insights that we explore further in this article. We set its scene discussing social networks in the digital society. This is followed by a short introductory section to the Viable System Model (VSM) as a model of interactions and complexity. We discuss the evolution of social networks in nature supported by our understanding of bee colonies and how they regulate their interactions (Foss & Espejo, 2018). We then discuss the transformations that current digital technologies, such as big data, algorithms, cloud computing and artificial intelligence, are producing in our human societies, exploring in particular what we call liquid organisations. Finally we conclude anticipating further organisational developments to learn more about managing complexity.

2. The network society and the interactions revolution

We are used to hierarchical organisations where a few people define from above what is desirable for the most. In these conditions the parts have to work out how to achieve desirable outcomes following imposed designs defined by those in situations of power. In practice design has strong limitations; however much management aims at designing from the top, those implementing them have to sort out problems locally, using peer to peer (P2P) interactions, mostly through processes of self-organisation[1]. Achieving desirable outcomes requires, often, larger than anticipated resources. Costly learning ensues. These costs could be reduced by actors correcting locally imbalances in their interactions only if they had autonomy. In practice the constraints imposed by management may be too high; they often restrict unfairly P2P interactions by limiting their autonomy. In the language of this article, these are instances where interactions are underpinned by undesirable *variety operators*[2], which not only hinder their local interactions but also increase the chances for the fragmentation of the ecological chains in which they operate.

However, current technological developments, in particular the all-pervasive P2P social networks, *offer the potential* of transforming people´s interactions as well as of increasing the space for individual action (Benkler, 2006). Networks, particularly through their huge potential for P2P coordination, *offer opportunities* to change the balance of organisational actors' interactions, reducing on the one hand unilateral controls and on the other increasing operational autonomy. Actors' opportunities for achieving closure in their interactions, that is, for transforming themselves from weakly connected collectives, to organisational systems with shared purposes and values, can increase as they improve resources bargaining, trust building and coordination. At the same time as these transformations take place, actors may become more aware of relevant environmental agents and learn more about their contributions to alternative value chains to overcome fragmentations. However, though digital technologies offer opportunities, their potentials will not be realised unless actors learn to deal with their limitations. Among other aspects, digitalisation is producing uncontrolled data overload, which weakens the opportunities for P2P interactions and organisational closure and leaves in the hands of those controlling these data the power to interfere with people´s privacy (Medina, 2015). These are challenges that magnify imbalances of *variety* among actors and between them and social agents. Corrections require actors with shared purposes, supported by strong variety operators to make possible the emergence of self-controlled organisational systems at the local level (Espejo, 2015a). These are important developments towards people's increased control of their lives, avoiding the overflow of senseless data and the intrusion of big brothers.

Liquid organisations, as discussed in this article, facilitate the confluence of digitalisation with local P2P interactions to pursue collaborative purposes. Technology is increasing the opportunities for local interactions and therefore for altering the balance between top-down and bottom-up self- organisation. It is now possible to make local self-organisation more transparent and economically viable (Barile et al., 2017). *These changes are at the core of the interactions revolution.* Potentially, we can rely much more than before on effective local and global self-organisation. In practice this means that social enterprises, such as the production of collaborative software (e.g. Linux) or collaborative research and publications (e.g. Wikipedia) or collaborative products and services in general (e.g. Cisco), can be done far more effectively, relying on large numbers of autonomous people in control of their own activities. Also, empowering communities, opening opportunities for citizens science and democracy and many more forms of local coordination are now enabled by digital technology. Crowdsourcing can increase opportunities for multiple enterprises and stronger democracies (Tapscott & Williams, 2007), however the challenge, unfortunately not always accounted for, is to contain effectively proliferating variety to enable organisational systems at the most local level. "Big brains" designing top-down large programmes and activities need to be replaced by distributed and coordinated "normal brains", producing bottom-up significant outcomes at a lower cost and more significantly by making possible everybody's contribution to the best of their abilities (Espejo, Schuhmann, Schwaninger, & Bilello, 1996). The top-down approach leaves in the hands of relatively few people correcting variety imbalances with environmental agents. Top-down communications constrain the flexibility of most actors and limit their contributions to desirable outcomes. Often policy initiatives, even if clear in their purposes, don't have 'enough band width', to transform policies into

[1] Self-organisation is defined as the transition of a system into an organised form in the absence of external or centralised control. Thus, one may emphasize two key features of a self-organised system or process: (i) an increase in organisation (structure and/or functionality) over some time, and (ii) the local interactions are not guided by any external agent (Ay et al., 2012).

[2] Variety operators are amplifiers and attenuators of variety in between parts in interaction. These variety operators correct imbalances between the low and high variety parts of the interaction to achieve a shared outcome. It is natural for parts in interaction to have different varieties in their quest to achieve a common outcome. For as long as the interaction is maintained to achieve the tacitly accepted outcome it will have, one way or the other, requisite variety and variety operators, including transducers, will be in place between them. These variety operators can be good or bad, adequate or inadequate, efficient or inefficient, but for as long as the interactions remains they will be in operation.