

The evolution of social ecosystem thinking: its relevance for education, economic development and localities

A stimulus paper for the Ecosystem Seminar - 22 June, 2016
Organised by the Centre for Post-14 Education and Work,
UCL Institute of Education

Ann Hodgson and Ken Spours

4 May 2016

Introduction

Ecosystem thinking – conceptualizing both nature and human society in an inter-connective and holistic way – is becoming more prominent due to the challenge of understanding the rapidly increasing complexities of economies, governance, new civil society organisations, the diversification of societies and existential threats such as climate change. The rise and attraction of this form of systemic and holistic thinking is being driven by the dynamics of globalization and its multiple tensions. In response, ecosystem thinking is spreading from its origins in observations of the dynamics of the natural world and conservation to metaphors used to reflect on the dynamics of public life and private enterprise including child development, education and social care, entrepreneurialism, technological and business development and now to the wider world of governance and politics. This is what we have termed ‘social’ ecological/ecosystem thinking. It is becoming a form of conceptualisation that connects the different levels of human existence - the individual, families, communities, regions, societies and nations – with the planet itself. In the main, it also comes with a distinct set of values. Far from the Darwinian interpretation of evolution and the survival of the fittest, social ecosystem thinking applied to the human world is now mostly associated with concepts of inter-dependency, collaboration, organic growth and sustainability. These values, and the form of connective and holistic thinking being developed to support them, have the potential to forge a positive future. In fact, social ecosystem thinking gives back to us the ideal of a future that we can shape and develop rather than being resigned to simply living in ‘the expanded present’¹.

The terms ‘ecologies’ and ‘ecosystems’ have been traditionally associated with the natural world to refer to dynamic interactions between plants, micro-organisms, animals and their environment. Observations of these natural environments led to the development of a number of abstract concepts to explain how they function. Ecologies/ecosystems have been variously described as complex and dynamic systems that work together as a functioning unit, inter-dependent relationships, processes of adaption, stasis and development. They have been seen as exhibiting features of fragility and resilience and

¹ The concept of the ‘expanded present’ was developed by Christopher Pollitt in his reflections on the problem of ‘institutional amnesia’ under new public management (2008).

shaped by 'keystone species' within the ecosystem as well as being affected by external forces (Seely-Brown, 2002).

Over recent decades these observations, and the abstractions derived from them, have inspired theorists in different fields to use the terms ecologies and ecosystems both as metaphors and as a particular form of system thinking to help explain and understand multiple, complex and inter-dependent human and social relations as well as strategies for innovation and change. The terms social ecologies and ecosystems will be used interchangeably in the early part of the paper. Later on, however, distinctions will be made between 'social ecologies' and 'social ecosystems' as we seek to uncover how the former might evolve and move in a more positive direction towards the latter through deliberative human agency.

The stimulus paper

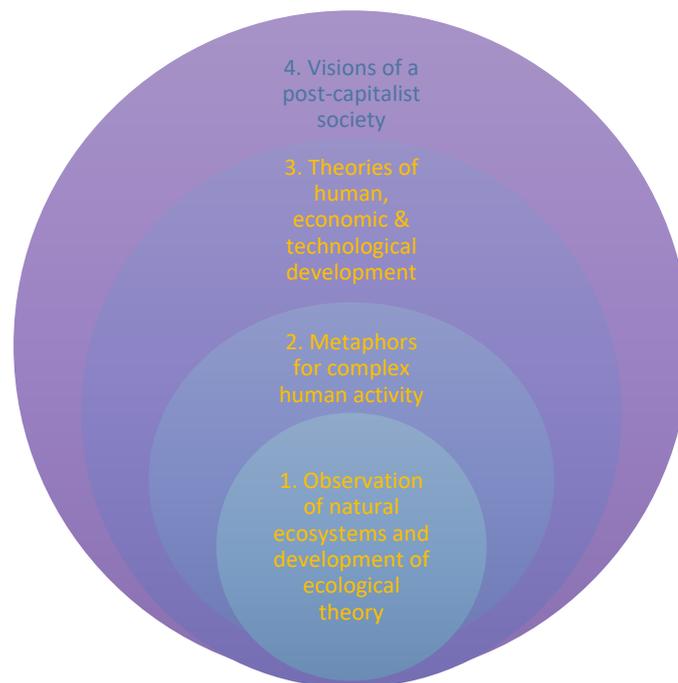
This paper, intended to inform the upcoming Centre for Post-14 Education and Work seminar series on ecosystem thinking in education, training and lifelong learning, tries to move beyond the boundaries of previous ecological writings in the human and societal realms. These have been concerned with observations of the natural world and the application of natural world metaphors to human and organizational situations. The paper attempts to go further due to its focus on the application and evolution of these concepts over time and in relation to an ever-expanding range of contexts. In doing this it will suggest that ecological and ecosystem thinking has theoretical and modelling possibilities that take it well beyond the natural world. The paper is structured around four stages of ecosystem thinking, although we concentrate primarily on Stages 3 and 4, which have much more to offer to our concern in this paper with the relationships between education, work, forms of governance and civic life. The latter part of the paper focuses specifically, therefore, on how social ecosystem theory can provide a useful lens with which to view these relationships. It concludes with a challenge to the researcher community to test out the concept within a number of practical contexts on different scales in order to assess its strengths and limitations.

The ecological/ecosystem concept - four stages of evolution

Here it will be argued that the extensive metaphorical use of social ecological/ecosystem analysis has now progressed beyond a form of comparative and analogous description to become a new form of system thinking that offers possible theories of social, technological, economic and political change. The apparent evolution of ecologies/ecosystem thinking can be illustrated by observing its stages of development over the past 50 or 60 years. This suggests that the social ecological/ecosystem concept itself is on an evolutionary path from a dynamic model of the natural world (Stage 1); to a metaphor for complex human activity (Stage 2); to theories of human, skills development and technological systems (Stage 3) and finally, arguably, to a societal and global vision of a new type of post-capitalist society (Stage 4). However, as Figure 1 illustrates, all four stages can co-exist and are nested within one another.

The movement of ecological thinking from one stage to another has not simply been the result of the internal intellectual development of the concept, but also of wider factors. First, there is a growing realisation that social ecosystem thinking helps in the understanding of complexity and relational activity, hence interest across the political and economic spectrum, in both private and public spheres, about the potential of this form of 'complexity theory' to help understand human behaviour, to improve the quality of leadership, governance and the way modern organisations function. The movement from one stage to another (e.g. from metaphorical use - Stage 2 - to theoretical use - Stage 3 -) is being propelled not only by its more extensive use, but also the limitations of metaphorical approaches. This is bringing about an expansion of Stage 3 and the development of what we term 'social ecosystem theory'. At the same time, the increasing use of the ecological metaphor and the development of ecological/ecosystem modelling are also attracting interest from those who seek to develop civil society networks allied to technological development (Stage 4). As we will see later in the paper, this has the potential to produce a more radical interpretation of ecosystems, in which they are viewed as an important feature of a post-capitalist society that is more sustainable, self-regulating and collaborative.

Figure 1. Four stages of conceptual evolution



Stage 1. Observing natural environments and developing ecologies/ecosystem theories

This stage has involved an increased understanding of the dynamics of natural ecologies - spaces and habitats – with a particular interest in the concept of ‘ecological resilience’². This original conceptualisation of the natural world remains the most widely understood use of the concept of ecological/ecosystem in the minds of the public and for this reason we do not explore it further here.

Stage 2. Applying natural ecological theory as a metaphor for understanding human activity and organisation

The use of the abstract understandings generated in Stage 1 have been metaphorically applied to an ever expanding range of human and organisational activity, for example, child

² The concept of ecological resilience focuses on the degree of system self-organization , adaptation and rebalancing (See Gunderson and Holling, 2002; Walker *et al.*, 2004).

development and special needs (Bronfenbrenner, 1979), communication and information systems (e.g. Nardi and O'Day, 1999), business innovation (e.g. Bollier, 2000), deliberative governance (e.g. Hajer and Wagenaar, 2003), regional skills development (e.g. Finegold, 1999; Buchanan, 2006; Hall and Lansbury, 2006) and higher education, learning and professionalism (e.g. Barnet, 2010; Stevenson, 2015; 2016).

With its increasingly metaphorical use over the last two decades, social ecologies and ecosystem concepts could be seen to be entering a new phase in which they suggest new connections between different disciplines and research literatures – biological and environment science, spatial and human geography, system dynamics, communication and information technologies, governance, psychology and learning. By virtue of their spread, the metaphorical use starts to take on additional dimensions and moves towards becoming a theory used to comprehend the world and to be used in the change process.

Here the paper draws on four examples in different fields to briefly illustrate how ecologies and ecosystems have been used metaphorically and to assess their significance.

The work of Folke and colleagues (2005) could be seen as a bridge between Stage 1 and Stage 2 in their examination of the role of knowledge, feedback, learning and co-ownership across a variety of organisations and levels of governance – termed 'adaptive governance' (p. 449) - in the development of resilient natural eco-systems. Their basic argument is that in order to nurture natural ecosystems, a particular form of ecosystem governance is required. This approach to adaptive management appears closely linked to other work on deliberative governance (e.g. Hajer and Wagenaar, 2003).

Nardy and O'Day (1999) developed the term 'information ecologies' – 'a system of people, practices, values, and technologies in a particular local environment' (p. 49), such as a library or a school. They see these kinds of ecologies showing strong 'dependencies' among their different parts; they note the 'diversity' of participants and 'co-evolution' in which adaptations lead to change both locally and across the system as a whole. They also identify 'keystone species' - central actors whose presence is crucial to the survival of the ecology within a defined locality or local habitation.

Siemens (2003) in his concept of 'learning ecologies' argued that we need to design learning environments in which learners interact more actively and with greater freedom and that the growing capacity of the Internet, particularly Web 2, provides new and exciting possibilities. He suggested that an ecological approach means going with the natural grain of something, not working against it. Drawing on the work of John Seely-Brown, then chief scientist at the Xerox Corporation, Siemens defined an ecology as an open system, dynamic and interdependent, diverse, partially self-organizing, adaptive and fragile. This concept was then extended to include the following characteristics of a learning ecology: a collection of overlapping communities of interests cross-pollinating with each other which are constantly evolving and largely self-organizing. The learning ecology approach was contrasted to more traditional teacher-led forms of teaching and learning.

The fourth example concerns the concept of 'ecologies of practice' in health and social care (Fisher, and Owen, 2008). Drawing on the work of Stronach and colleagues in relation to nursing practice (2002), Fisher and Owen contrasted 'ecologies of practice' with 'economies of performance'. They highlighted the inter-dependency of the various actors in the care and child support system – in this case the care practitioners and the young mothers – in which the care professionals often drew on experiential and relationally-acquired knowledge of the 'service user' and in which the ethic of caring was placed above managerial performance- related concerns.

While quite different in their foci, these four cases share a number of common features. The term 'ecologies' has been used to denote inter-dependent relationships; feedback and deliberation; processes of adaptation; self-organisation; and the concept of flexible, networked and open systems, thus utilizing the abstractions gleaned from the observation of natural ecologies. In several cases, these ecological features have been contrasted with more traditional, authoritarian and performative approaches to policy, organization and learning. The metaphorical use of ecologies was thus suggesting alternative more participative forms of thinking and practice that functioned in some cases as a critique of new public management and neoliberal ideology.

The use of conceptual metaphors (the Greek root means to transfer or to carry) is widely recognised as an aid to human cognition by using images of concrete things as a 'bridge' to understand the abstract (Zheng and Song, 2010). More specifically, the ecosystem metaphor has been used to advance knowledge of complex system problems, the relationship between parts and wholes and between order and disorder and adaptiveness (Proctor *et al.*, 2005). Metaphors also transfer meanings across discourses, arising out of an interplay of scientific and popular meanings. In doing so they can slip between rigorous and speculative meanings (Weingart and Maasen, 1997).

The ecosystem metaphor has, therefore, particular strengths and weaknesses. Its strength lies in that it can be regarded as a particularly robust 'correlational metaphor' in which the complexities of the human version relate to the complex processes of the ecosystem of the natural world. The concept of ecologies is more than metaphorical; it helps conceptualise time-space relationships in linked but distinct worlds (Casasanto, 2014). At the same time, the very strengths of metaphorical thinking also expose its limitations. In the metaphorical transfer from the natural to the human and social world, certain meanings change. For example, in ecological thinking about the natural world, the emphasis has been on resilience and adaptation, whereas in the social/human world the emphasis has been on growth and development. There comes a point, therefore, that the differences between the original world and the new one become too big for the plausible continuation of transfer. In this situation the metaphor moves from being 'correlational' to 'analogous' (Casasanto, 2014). In this latter condition the metaphor has to be developed further or retired. This brings us to Stage 3 and what we term 'social ecosystem theory'.

Stage 3. Beyond the metaphor - building ecological theories of individual human, economic, skills and technological development

Running in parallel with Stage 2 has been the emergence of more extensive applications of social ecological/ecosystem thinking that arguably take the concept beyond its metaphorical use into a theoretical realm. By the term 'theory' we are referring to ways of thinking about human behaviour through the components of theory - 'concepts' and 'principles'. A

concept is a symbolic representation of an actual thing, whereas a principle represents the relationship between two or more concepts. Together they help us understand what is going on around us by suggesting their underlying patterns and relationships and, through this, they also help us to predict future events. In terms of social ecological theory building two contributions stand out.

First, the work of Urie Bronfenbrenner (1979) that viewed child development within a set of nested ecologies across different scalings. This was to provide another way of conceptualising connections between the individual and wider societal influences that led to an improved understanding of the interlocking environments that affected the development of children. Second, was the work of David Finegold (1999) and his identification of four dimensions of technological development that could lever a region or national economy from a 'low skills equilibrium' to a 'high skills ecosystem'. These two approaches – ecological scalings and factors for changes - were combined by Hodgson and Spours (2013, 2015a) to develop the concepts of a Low Opportunity Progression Equilibrium (LOPE) and a High Opportunity Progression Ecosystem (HOPE) in relation to the development of universal upper secondary systems in the UK.

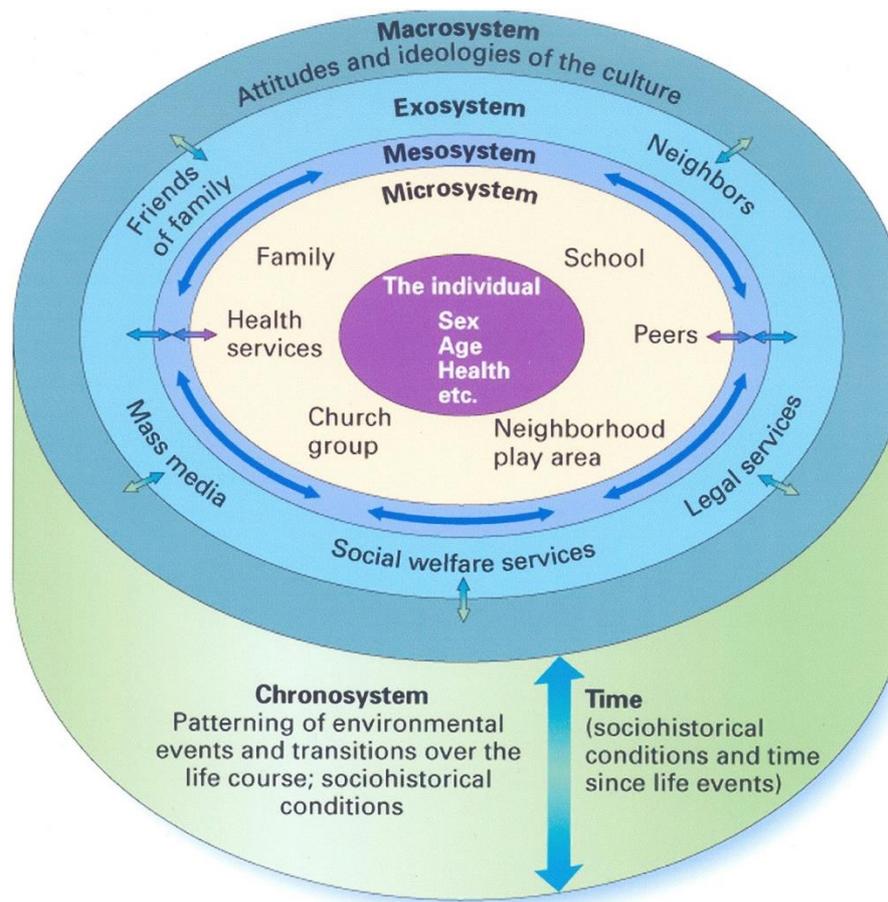
At the same time, and beyond the boundaries of education and training, an increasing awareness of the global environmental crisis, the growth in social complexities and a quantum leap in digital technologies has been spawning ecological and sustainable versions of material things – buildings, architecture, cities, transport systems and even what has been termed 'the internet of things' - IOT ecosystems (Deloitte, 2016). The technological and communicative world is being increasingly viewed through an ecosystem lens.

In articles that utilize the concept of ecologies metaphorically the ecological discussion is often brief, used simply to reflect upon the dynamics of the topic under discussion. The works of Bronfenbrenner and Finegold are different in this respect. In their writings, the ecological and ecosystem concepts play a more central organizing role and, in doing so, mark the transition from Stage 2 ecological metaphorical thinking to Stage 3 - ecological theory.

A nested human and social ecological system – Bronfenbrenner

Bronfenbrenner (1979) developed the concept of a human ecological system where he proposed that human development (in particular child development) has been influenced by factors operating at different 'systems levels' within a broad ecological structure, in which each level exerts reciprocal influences on the others – see Figure 2.

Figure 2. Bronfenbrenner's human ecological system



1. The 'microsystem' contains the factors within a learner's immediate environment. (e.g. school, family, immediate neighbourhood).
2. The 'mesosystem' encompasses the interrelations of two or more settings in which the developing person actively participates. This might include relations between home and the learning institution, involving the role of education professionals.
3. The 'exosystem' consists of settings 'that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by, what is

happening in the setting containing the developing person' (p. 25). This could include the organization of the institution, its policies and wider system levels, including local and regional agencies and government.

4. The 'macrosystem' envelops the micro-, meso-, and exosystems. Macrosystems in Bronfenbrenner's conception are particularly associated with wider society, in which all settings at each level are to be seen within their historical, socio-economic and cultural contexts.
5. In a later edition of his work, Bronfenbrenner (1994) added a fifth dimension, the 'chronosystem' that recognized the patterning of environmental events and transitions over the life course, as well as socio-historical circumstances.

Aside from its impact on child development, the wider significance of his work lies in its ability to link the young person (or adult) to wider society via the interactive levels of human relations and organisations in what has become an increasingly complex formation of state and civil society. It is for this reason that Bronfenbrenner's work has been utilised across the diverse areas of education and social care. From the perspective of the understanding of ecological systems, he created a dynamic multi-layered ecological system that could be translated in different settings and given more spatial interpretations (see e.g. Hodgson and Spours 2009, 2013a, 2015a). Bronfenbrenner's ecological systems theory was thus much more than a metaphor; it was the beginnings of a *social ecological theory* comprising a series of extended and inter-dependent social landscapes.

The movement from static equilibrium to self-sustaining ecosystems – David Finegold

David Finegold (1999) in his analysis of 'high skill eco-systems' added yet another dimension of ecological theorising. Researching the rise of software and computer companies in California in the 1990s, he showed how particular enterprises became successful due to their participation in what he termed 'self-sustaining eco-systems'. These are defined as '*a geographic cluster of organizations (both firms and research institutions) employing staff with advanced, specialized skills in a particular industry and/or technology*' (p. 61). He contrasted these with the 'low skills equilibrium' experienced by the economy and

education system of the UK in the 1980s (Finegold and Sockice, 1988) and in doing so emphasized the importance of thinking in terms of 'ecosystems' rather than 'equilibria' because of the static nature of the latter (p. 63). In his 1999 work, Finegold identified four inter-related 'elements' contributing to the creation of dynamic and self-sustaining business eco-systems that have since given rise to global companies such as Google and Apple:

- 'catalysts' which can trigger development (e.g. government demand and investment and key individuals in the case of California's computer and biomedical industries) (pp 66-67);
- 'nourishment' from world-class research universities that have provided a stream of new talent (pp. 67-68);
- a 'supportive environment', including physical infrastructure such as transportation and housing, a climate that attracts and retains knowledge workers and a regulatory regime sympathetic to risk-taking (pp. 68-70);
- 'interdependence' and co-operation between the actors in the region based on flatter hierarchies within enterprises, together with strong local and regional networks (70-71).

There is a double significance to Finegold's concept of building self-sustaining ecosystems in terms of *ecological theorising*. First, by contrasting the processes of how companies and even national economies might move from static equilibrium to a high skills ecosystem, he provided a set of conceptual tools which governments, universities and companies can consider when collaborating to encourage high skills and high value-added forms of economic and technological development. The second implication of Finegold's work is that his contrast between 'static equilibrium' and a 'self-sustaining ecosystem' allows a more precise use of ecological terms. Drawing on this distinction between different ecological circumstances, Hodgson and Spours (2015a) have suggested that the term 'ecology' can be used in a neutral sense to describe a set of inter-dependent relationships regardless of their condition. As in the natural world, a human or organisational ecology can be more impoverished or more flourishing. In the context of a neutral or generic use of the term ecologies, the concept of 'ecosystem' is then used to denote a positive, self-sustaining and

improving dynamic at different levels or scales that is contrasted to the negative condition of 'static equilibrium'. These distinctions – ecologies, static equilibrium and ecosystem/social ecosystem - will be used in the paper from this point onwards.

Thus far the paper has progressed to Stage 3 of the evolution of ecosystem thinking – the emergence of social ecosystem theory. The next part of the paper broadens out to explore how ecosystem thinking can be connected to wider political economy debates, how it might be situated historically and the consequences for understanding processes of wider change. This part of the paper moves us towards Stage 4 of the evolution of ecosystem thinking that sees its use in conceptualizing transitions, transformation and a future ecosystem-type world.

Moving towards Stage 4. Ecosystems as post-capitalist forms of organisational and societal development

Emerging out of Stage 3, ecosystems can be seen as located within the history of human development and its forms of social and economic organisation (e.g. Laloux, 2014); associated with new democratic forms of governance particularly at the local and regional levels (e.g. Hodgson and Spours, 2012); as an aspect of new social and networked political organisations (e.g. Adnan, 2016; Spours, 2016); and with new ways of supporting social change through 'funding ecologies' (Kippin, 2015; Kippin and Reid, 2015) in which philanthropic support becomes '*one of a number of levers that include bottom-up, citizen-driven change, state mobilisation via public services and forms of legislation and enforcement*' and where independent social funders '*see their role less as guardians of self-identified change from issue-to-outcome, and more as partners within a well-functioning ecosystem of support for others.*' (Kippin, 2015: 4). These examples are part of the development of transformational thinking in which the concept of ecosystems become associated with economic and societal transitions and potentially with post-capitalist visions of change.

One of the difficulties that has faced social ecosystem theory arises from the fact that it is rooted in the observation of the natural world and abstractions derived from it. As such,

ecological conceptions have not been explicitly related to the wider world of political economy; nor have they been historically situated. This part of the paper attempts to make good those connections and, in doing so, to open up the possibility of a Stage 4 evolution of the theory itself.

A historical perspective – social ecosystem thinking as another stage of human development

Frederick Laloux, in this book 'Reinventing Organisations' (2014), has undertaken a historical analysis of the evolution of different states or stages of organizational development over the last 10,000 years since the birth of agriculture. Each stage is symbolized by a colour and metaphor (see Figure 3).

He suggests that each of these organizational stages/types exists, often in hybrid forms, but that 'Teal' (a blue/green colour) is the future necessary state, based on sharing ideas and self-management for evolutionary purposes. The Teal organization (Laloux lists several leading edge companies in both Europe and the Americas) operates from the premise that organizations should be viewed as living organisms and should therefore function more like complex adaptive systems (ecosystems) than machines. This new organizational form is based on a structure of flexible and fluid peer relationships in which work is accomplished through self-managed teams. Laloux argues that ecosystem types are emerging due to the constraints of preceding modes of organisation (including those considered Green), a desire to harness all talents to respond quickly to emerging needs and to achieve a higher level of human consciousness that can coexist within a fragile world. Accordingly, Laloux's concept of the TEAL organization has drawn attention from both progressive private organisations, because of its capacity to make the most of human creativity, as well as those on the radical Left who see in the social ecosystem conception a more social and democratic politics and an ecological future.

Figure 3. Five historical stages of organizational development ³

Color	Description	Guiding Metaphor	Key Breakthroughs	Current Examples
RED	Constant exercise of power by chief to keep foot soldiers in line. Highly reactive, short-term focus. Thrives in chaotic environments.	Wolf pack	<ul style="list-style-type: none"> • Division of labor • Command authority 	<ul style="list-style-type: none"> • Organized crime • Street gangs • Tribal militias
AMBER	Highly formal roles within a hierarchical pyramid. Top-down command and control. Future is repetition of the past.	Army	<ul style="list-style-type: none"> • Formal roles (stable and scalable hierarchies) • Stable, replicable processes (long-term perspectives) 	<ul style="list-style-type: none"> • Catholic Church • Military • Most government organizations (public school systems, police departments)
ORANGE	Goal is to beat competition; achieve profit and growth. Management by objectives (command and control over what, freedom over how).	Machine	<ul style="list-style-type: none"> • Innovation • Accountability • Meritocracy 	<ul style="list-style-type: none"> • Multinational companies • Investment banks • Charter schools
GREEN	Focus on culture and empowerment to boost employee motivation. Stakeholders replace shareholders as primary purpose.	Family	<ul style="list-style-type: none"> • Empowerment • Egalitarian management • Stakeholder model 	Businesses known for idealistic practices (Ben & Jerry's, Southwest Airlines, Starbucks, Zappos)
TEAL	Self-management replaces hierarchical pyramid. Organizations are seen as living entities, oriented toward realizing their potential.	Living organism	<ul style="list-style-type: none"> • Self-management • Wholeness • Evolutionary purpose 	A few pioneering organizations (see "Examples of Teal Management")

The more radical interpretation of his work can be assisted by relating his different stages of organizational development to changes in the basic mode of production. Laloux does not make this connection in his work, but it is not difficult to observe a broad correspondence between each of his organizational stages and the historical development of different types of economy – red/slave; amber/feudalism; orange/capitalism; green/socialized capitalism and TEAL/post-capitalism (Spours, 2016). This connection is vital in terms of opening up the possibility of Stage 4 of ecological theory evolution – its application to wider economic and societal change.

³ Laloux's organizational stages adapted by Rod Collins *Reinventing Management, Part 1: What Colour Is Your Organization?* Huffpost Business, 4 March 2016.

A political and societal perspective: ecosystem thinking as a response to crisis

Laloux's concept of the historical evolution of organizational thinking not only lends itself to modes of production, but can also be understood as a way of responding to crisis.

Looking back on the past decade since the banking crash of 2008 and all that has followed, it is possible to assert that ecosystem thinking has the potential to reach beyond the worn-out binaries of marketization, on the one hand, and top-down managerialism, on the other, that have been associated with New Public Management. Offered and often imposed as an alternative to what was characterized as an inefficient public sector, New Public Management has proved to be both expensive and ineffective not least because of the unpredictable outcomes of the use of powerful national policy levers and the alienating effects of instruments of performativity. The use of diktats and fear, compounded by policies of austerity, are driving professionals (teachers and clinicians in particular) from important areas of public life. At the same time, smart ideas coming from the leading edge of business and organizational thinking increasingly recognize the role of moral values, inter-dependency and collaborative activity. Put simply, the intellectual tide is fast flowing away from neoliberalism and its outmoded concepts of organization.

But there has been a historical crisis of alternative thinking due to the initial neoliberal surge in the 1980s/1990s, the end of state socialism and the collapse of the polar world of capitalism versus socialism. These developments exposed the failings of both social democratic and state socialist conceptions. They also removed two tenets of the future: first, that capitalism could be tamed and modified (social democratic dream); second, that socialism would inevitably emerge from advanced capitalism (state socialist dream). As a result, over recent decades there has been fragmentation of thinking about futures that comprise the residues of social democracy and traditional socialism, together with strands of thinking around democracy and civic participation; environmentalism and feminism.

Overlaying this twin crisis has been the dramatic development of new digital technologies that have accelerated lateral forms of communication on a global scale. But even these momentous technological developments are being outstripped by intersecting economic,

climate-related and migration crises that potentially lead to social and political disintegration. Viewed overall, there is a sense that the old is dying and the new is struggling to be born ⁴.

It is within this broader, turbulent economic, political and intellectual landscape that new forms of connective thinking are emerging in terms of technological developments, business, politics and culture. The potential of new relational forms of thinking, however, should be seen as more than a reaction to the twin economic, political and intellectual crises. They are swimming with the tide and adding to the confluence of thinking in relation to a range of related developments - understanding complexity in an increasingly globalized world; the potential of collaborative, productive relationships in all walks of life; and the growing role of values such as care, inter-dependency and concern for the environment and our relationship with the planet. These ideas could be seen as part of and a contribution towards the surge of what might be termed the emergence of 'radical civil society' (Spours, 2016). This refers to the growing presence of collaborative thinking and activism being articulated through national and international networks and websites such as AVAAZ, 38 Degrees, NEON and Open Democracy and new political forces such as Syriza in Greece, Podemos in Spain, Alternativet in Denmark and the Pirate Party in Iceland ⁵. There is also a deeper cultural dimension. It may be the case that biological and environmental metaphors, and now theories and visions, are capable of catching a cultural tide of concern as people become increasingly anxious about the threats from climate change and wish to see human relations and the future of humanity in more environmental and relational terms.

Understanding stasis and the effects of partial reform through ecosystem thinking

Ecosystem thinking can also help us understand not only how new productive, healthy and organic processes can be created but how situations of stasis arise that are a manifestation of chronic crisis.

⁴ Antonio Gramsci (1971 translation) *Selections from the Prison Notebooks*, London: Lawrence & Wishart. p 129.

⁵ For a survey of these new networked and ecosystem political developments see Adnan (2016).

It is clear, for example, that the UK continues to face severe productivity problems that endanger its economic future linked to lack of investment and low skill levels. What can be termed the 'New Low Skills Equilibrium' (NLSE) in 2016 can be viewed as the original LSE with new historical and system features. Back in 1988 Finegold and Soskice described it thus:

The best way to visualize this argument is to see Britain as trapped in a low-skills equilibrium, in which the majority of enterprises are staffed by poorly trained managers and workers produce low-quality goods and services. The term 'equilibrium' is used to connote a self-reinforcing network of societal and state institutions, which interact to stifle the demand for improvements in skill levels (22).

They argued that the LSE could only be overcome by developing a social partnership model similar to Germanic and Nordic systems that were developing strong vocational systems based on what in retrospect might be seen to be a social democratic approach to skill building⁶. This path, however, has not been followed in the UK over the past 30 years due to the rise of dominant neo-liberal Anglo Saxon economic and education models that have been pursued in differing ways by both Conservative and New Labour Governments.⁷

It is important to understand the dynamics of the NLSE that contains both complexity and unevenness, which are the result of political adaptiveness (Newman, 2000). Here we use the late Stuart Hall's (2003) concept of the 'Double Shuffle' to suggest that each of the fundamental dimensions of the NLSE contains both dominant and subordinate features, the latter of which may hold potential seeds of future ecosystem development, but are currently being stifled by the former.

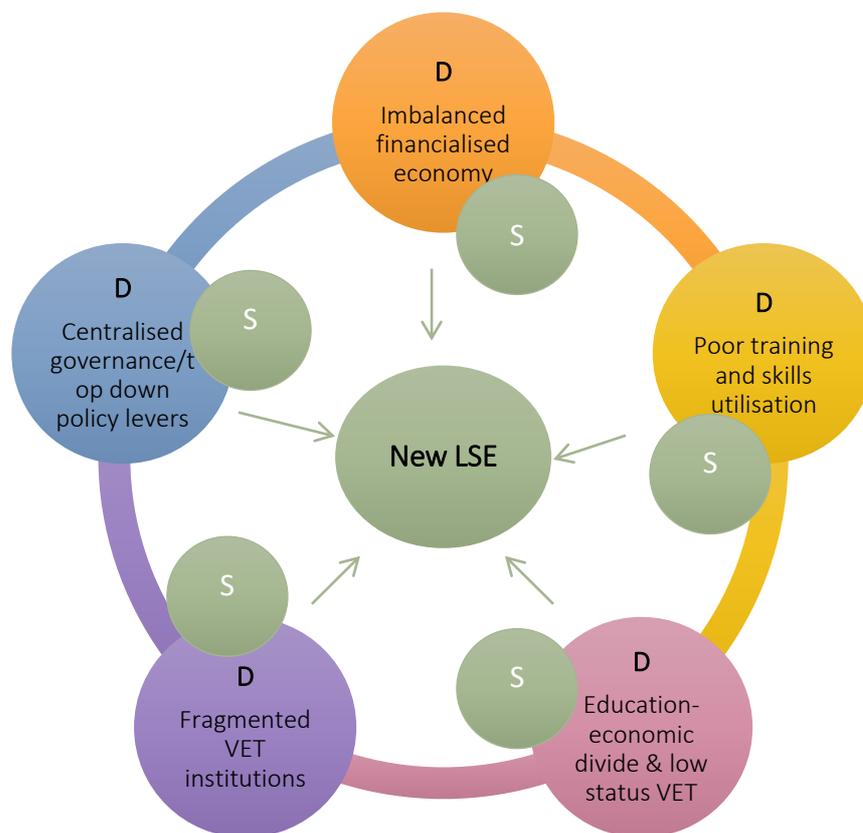
The dominant features (D) can be viewed as manifestations of the Anglo-Saxon models of the economy and state – marketised/financialised economic relations; under-developed

⁶ For a recent analysis of social democratic approaches to skill building see Busemeyer, M. and Trampusch, C. (2011).

⁷ An analysis of the impact of the Anglo Saxon education model on upper secondary education is to be found in Hodgson, A. and Spours, K. (2014).

links between education and employment; poor training and skills utilisation; a fragmented and low status vocational education and training system; and the political domination of the national over the local (see Figure 4). Interacting with these are the subordinate features (S) resulting from relentless pressures for regulation around the environment or health and safety; policies by all political parties that attempt to create stronger synergies between education and working life through, for example, increasing the number of apprenticeships; strategies for tackling low productivity; and ideological convergence around such issues as 'localism' and greater devolution.

Figure 4. The New Low Skills Equilibrium (NLSE) in 2016



The stasis emerging from this 'double shuffle' approach not only gives rise to complexity, it also results in unevenness because the combinations of dominant and subordinate features do not work out evenly across the economy. There are important areas of economic dynamism in London and the South East and in some sectors, where more positive

ecosystems can emerge (for example the development of 'innovation districts' in London⁸), but the NLSE persists both despite and because of constant 'policy busyness'.

Summary

Ecosystem thinking is emerging as a new way of conceptualising human relations, economic development, different forms of collaboration and changing notions of civil society. But on its own, and separated from political economy theory it looks conceptually stranded, restricted to its metaphorical uses and limited forms of theorising. This section of the paper has attempted to address this conceptual isolation by locating ecosystem thinking historically and linking its evolution to forms of organization that are themselves related to particular modes of production and types of society. But crucially, by integrating ecosystem thinking and political economy we are able to conceptualise both processes of stasis and potential transformation. The persistence of static equilibria poses the question as to the combination of forces and conditions required to create a more dynamic and organic process of change that prioritises the development of new types of collaborative civil society formations with less reliance on market forces and a top-down state.

A key to the notion of organic and transformational development appears to be the accentuation of the local and regional dimensions in which collaborative networks are assisted by a facilitating (Coffield *et al.*, 2008) and entrepreneurial state (Mazzucato, 2011) that itself is part of a growing web of international dialogue and joint action.

In the final part of this paper we focus in on how social ecosystem thinking can be used as a framework for understanding the complex but potentially synergistic relationships between education and training, employment and local/regional development.

⁸ See Hanna, K. (2016) *Spaces to think: innovation districts and the changing geography of London's knowledge economy*. London: Centre for London.

Developing a spatial concept of ecosystems – a framework for the development of education, training and the local economy

This part of the paper attempts to conceptualise localities and the spaces for 14+ education and training, lifelong learning and the development of regional economies. Its central concern is to understand and reconceptualise the dynamics of local and regional education and training landscapes at a time of considerable economic, organisational and policy turbulence – the area-based reviews process affecting further education and sixth form colleges together with the further development of vocational specialisms associated with Institutes of Technology; preparation for devolution of the adult skills budgets; reform of vocational qualifications and pathways; the apprenticeship levy and expansion of apprenticeships involving not only large companies but also local and regional networks of FE colleges, independent training providers and small and medium enterprises (SMEs); the increasing role of higher education institutions in assisting economic and technological innovation; and the necessary revival of adult education and lifelong learning following years of cuts and policy neglect.

The main aim is to develop a spatial ecological framework of understanding for education and training and, through this, to construct holistic models and strategies that can link local, regional and national developments. In their work on ecologies and ecosystems Hodgson and Spours (2013a; 2015a) brought together the work of Bronfenbrenner and Finegold to develop the concept of fluid multi-level scales or terrains that are defined not simply by local government, but by the organic activities of the various social partners. These activities, and therefore the fluid spaces that they define, include the activity of learners (e.g. their sense of local identity, opportunity and travel-to-learn patterns); the decisions of education professionals in the organization of education provision (e.g. how far and in what ways education institutions collaborate/compete to offer a relevant curriculum); and the way networks of employers and wider social partners act in the development of skills and economic growth often on a regional level.

Central to this was the interpretation of Bronfenbrenner's work on human ecological scalings - micro, meso, exo and macro – but used in a more spatial sense. His four ecological levels

of human development – micro, meso, exo and macro - were extended to five, with an additional exo layer (exo 1 local; exo 2 regional) to align them more closely with governance structures in education and the economic and technological activities highlighted in Finegold’s high skills ecosystems. From this fusion they developed the concept of ‘local learning ecologies’ (LLEs), that encompasses the relationships between the learner and her/his learning environments on an extending set of scales - the immediate learning environments of the family, teacher/student relationships and the classroom (Micro); the school/institutional environment (Meso); the locality or local area (Exo 1); the economic regional landscape (Exo 2), all of which are nested within and influenced by the national level (Macro).

Due to their interest in the education and training of 14-19 year olds in upper secondary education and particularly the issue of vocational learning, Hodgson and Spours focused their attention primarily on the Exo 1 level – the local learning ecology (LLE). If the focus moves to economic and work-based development, however, the terrain necessarily becomes larger because it has to embrace the development of economic collaboration between companies and a range of social partners including higher education; various types of regeneration agencies; and also a recent political innovation, combined local authorities, such as the so-called ‘Northern Powerhouse’. It is possible, therefore, to extend Hodgson and Spours’ original concept of an area-based LLE to that of a regionally-based High Progression and Skills Ecosystem (HPSE) (CEW, 2015). Nested within this larger regional education and economic landscape (Exo 2) it is possible to see LLEs as a number of smaller-scale and more locally-based, education-led collaborations focused very much around developing a more expansive upper secondary curriculum and primarily designed to promote positive learner progression and transitions into further education and employment.

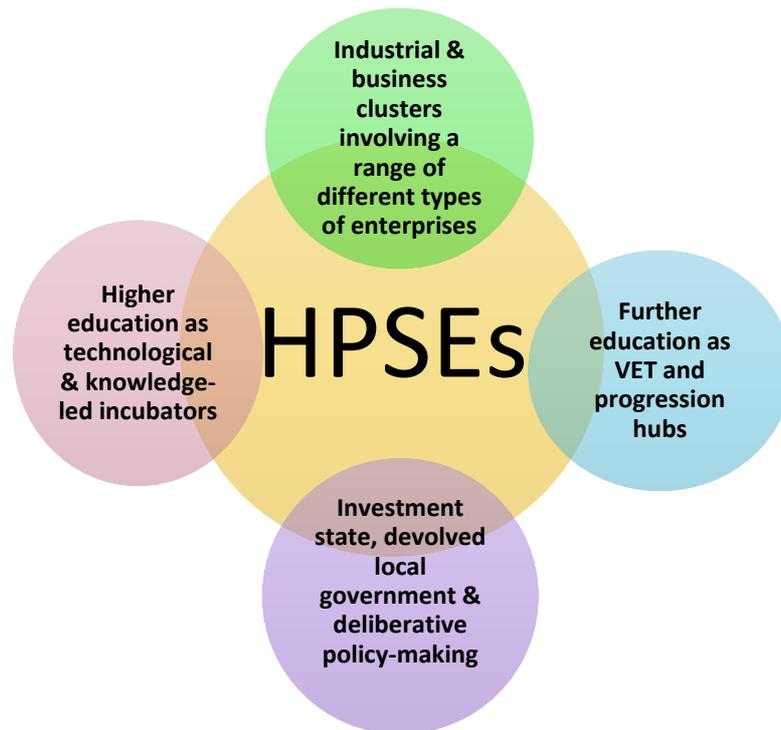
The more fluid definition of areas and regions has important implications for the organization of education, skills and regional economies. It means thinking beyond existing politically defined boundaries of local government and beyond the divisions between private and public enterprises. It requires conceptualising how organically generated educational and economically productive activity can be supported by various forms of

clustering, networking and collaboration that involves a wide range of social partners, underpinned by a more confident local government and a more facilitating national state.

High Progression and Skills Ecosystems (HPSEs) – extending the Triple Helix

Here we suggest these broader and more regionally-based networks, High Progression and Skills Ecosystems' (HPSEs), allow us to explore how a potentially synergistic relationship between further and higher education providers and clusters of employers and their networks might lead not only to the development of a stronger local VET system (in terms of the relevance and quality of the curriculum and effectiveness of progression routes), but also improved skill supply and utilization to fuel innovation in the workplace (see Figure 5). This type of ecosystem could have particularly important implications for the economic and technological development of small and medium-sized enterprises (SMEs). This approach to collaborative ecosystem has been understood more widely as the 'Triple Helix' that brings together business, universities and governments into collaborative ecosystems (Bock and Johnson, 2015; Nyman, 2016). Here we are suggesting an extension of the Triple Helix to also include further education and sections of upper secondary education that are concerned with vocational education and learner progression.

Figure 5. The components of HPSEs



‘Market-oriented’ and ‘social partnership’ ecosystems

While the work of Brofenbrenner has contributed to a more spatial concept of ecology, Finegold’s concept of static equilibrium in VET, skill and economic development - the New LSE and the countervailing logic of ‘high skills ecosystems’ (HSEs) - has provided means of conceptualizing processes of organizational ecological change. Finegold’s concept of HSEs focused on the very particular Californian Bay area environment. However, economic and technological developments and debates over the last 20 years have suggested that HSEs can take different forms. While Finegold identified one type of HSE, here we suggest there are at least two types - *market-oriented* and *social partnership based ecosystems*.

Ecosystems can be seen to lie on the nexus of private and public economic activity. Market-oriented ecosystems (e.g. London Digital City) comprise, for example, clusters of firms of different sizes using high skills and innovative practices that connect digital development, advertising and finance. In the UK these ‘niche’ clusters have become situated adjacent to

the City of London (e.g. Silicon Roundabout) and once established become a magnet for workers and companies nationally and internationally. The Mayor of London's 'Tech Capital of the World' strategy is based on the dynamic of 'fintech' (financial technology). While these high innovation, market-oriented eco-systems appear to emerge naturally in a financialised economy, on closer scrutiny they have an inter-dependent relationship with the public realm for their further development. The work of the Harvard Business School on 'Enriching the Ecosystem' makes it clear that this involves not only city infrastructure, such as transport and housing (the responsibilities of regional government), but the creation of connections between education and these clusters of companies; the relationship between small and large businesses; generating ideas and bringing together different leaderships (Moss Kantner, 2012).

Elite market-oriented clusters can rely on a steady stream of educated labour that is prepared to migrate to the city and is the product of national and international higher education systems that do not necessarily interact directly with these clusters of companies. This more detached relationship, however, is vulnerable to the criticism that it does not necessarily foster innovative and entrepreneurial minds⁹. Furthermore, niche market-oriented ecosystems reflect the uneven development of new LSEs and therefore these dynamic islands can sit alongside areas of general stagnation. This uneven development creates the case for a second type of HSE.

Social partnership HSE development that embraces not only elite and niche companies, but a much wider range of organisations, is now attracting more attention. Australian skills eco-system pilots, for example, have focused on skill utilisation by workplaces and the generation of 'decent work' (Buchanan, 2006). Rather than going with the flow of a neo-liberal economy, they work against the headwinds of flexible labour markets, low quality production, low skill development and skills shortages. Critical of a narrow competency approach to work definition, these pilots are responding to some new economic

⁹ The senior vice president of people operations at Google commented that they could not find any relationship between graduate recruits, their university grades and their innovation role within the company; quoted in Smith, E. (2013) 'This is the age of educational anxiety: but good grades don't always make great workers', *New Statesman*, 30 August, <http://www.newstatesman.com/education/2013/08/age-educational-anxiety> Accessed 11 October, 2015.

developments - the emergence of more hybrid and complex 'vocational streams' or 'jobs families' (Wheelahan and Buchanan, 2015). Based on the formation of networks across different sectors and involving a wide range of social partners (Hall and Lansbury, 2006), the social partnership approach aims to produce a strong synergy between education, training and workforce development and thus may be relevant in 'harder to grow' conditions where there are not the 'natural' confluences of technologies, the availability of highly skilled and educated employees, work space and private finance.

Criticism of elite market-oriented HSEs has given rise to different kinds of responses. Advocates of entrepreneurial networks in the US, for example, suggest that governments should not emulate Silicon Valley because of its unique conditions nor should they try to pick economic winners. They should instead, aim to engineer the growth of relational networks of all types of companies including low, mid and high-tech firms grounded in local and regional conditions (Mazzorol, 2014).

In the UK context London-based elite ecosystems have given rise to a counter-movement, notably 'Creative Commons' that problematizes their relationship to local communities by arguing that new pathways have to be found into this vibrant ecosystem for local young people (Sims *et al.*, 2015). It is claimed that 'innovation districts' do just that. Innovation districts are: '*geographic areas where leading edge anchor institutions (such as research universities) and companies cluster and connect with start-ups, business incubators and accelerators*' (Katz and Wagner, 2014: 1), that offer the potential to support both the growth of the knowledge-based economy and *inclusive* economic development in cities such as London. According to Katz and Wagner (p.10), innovation districts require a judicious blend of 'economic assets' (firms, institutions and organisations that drive innovation); physical assets (public and private spaces and infrastructure that promote connectivity) and 'networking assets' (relationships between key actors to enhance knowledge exchange to generate new ideas), thus suggesting a more collaborative and social partnership approach to development. The Kings Cross Development with its 'Knowledge Quarter' is seen as a good example of how this type of ecosystem has regenerated what was a deprived socio-economic area through a long-term and deepening partnership between private, public and civic organisations, including education institutions, research organisations, property

developers, architects, start-ups, cultural industries, clusters of businesses of various sizes and local and regional government. As Hanna (2016) notes: *The benefits of innovation districts for inclusive growth do not, however, appear by default. They require good governance and good design. Good governance is crucial in building constructive, long-term relationships between firms, institutions and local authorities. Leveraging innovation districts to boost local skill levels requires a proactive approach.* (p. 64). It is to a discussion of this aspect of HSEs that we now turn.

The role of the entrepreneurial state, local devolution and deliberative policy-making

The collaborative construction of a learning, skills and production ecosystem has to be considered in the context of a renewed policy emphasis on devolution of powers to local and regional levels, such as the Government's current concept of the Northern Powerhouse and local 'devo deals'. This brings with it the challenge of understanding the significance of the new devolution environment and the forms it might take. Some have criticised the Government for promoting a partial approach to devolution when in reality retaining a highly centralist approach (e.g. Keep, 2015). There is, nevertheless, the possibility of a more 'democratic localism' based not on the separation of the local from other levels of governance, but a rebalancing of institutional, community, local, regional and national relationships (Hodgson and Spours, 2012).

While there is a growing political consensus around the need for greater industrial and technological innovation supported by the devolution of powers to localities and regions, fundamental disagreements continue to exist over the policy of austerity and the balance between cutting public expenditure and increasing investment and taxation. At the centre of this political disagreement is the role of the national state and its relationship to economic innovation. Rather than seeing the state as crowding out private initiative, Mazzucato in her research on the 'Entrepreneurial State' (2011), which draws on examples of successful economic innovation from around the world, suggests that the modern state needs to take a more proactive role as risk taker and risk backer in areas where the more risk averse private sector would not tread. State leadership is notable in the fields of

fundamental scientific, technological and environmental development. Proposals for the creation of a National Investment Bank to support high tech development in the regions could be seen as part of this progressive state logic and as part of a 'greening' of the economy (McNeal and Silim, 2012). Reflections on the development of Australian skills ecosystems suggest even more roles for the national state, including industrial policy, minimum wage policy and labour market regulation (Payne, 2007).

Finally, an entrepreneurial and enabling state that sees the world in a more ecological way would seek not only to devolve more powers to the local level on the principle of subsidiarity (that all powers should be devolved unless there is a compelling reason to do otherwise), but also to reform the policy-making process to make it slower, more inclusive and deliberative with a focus on implementation as well as policy development (Raffe and Spours, 2007; Hodgson and Spours, 2012).

The role of further education – hubs for developing technical and vocational education and training (TVET)

FE colleges invariably claim to be at the heart of their local community and economy and committed to working with local employers and other stakeholders. All too often, however, they fail to they achieve their 'place-shaping' potential (Gibney *et al.*, 2009) or to become the 'dynamic nucleus' of their communities (Sharp, 2011) because they end up reacting to powerful surrounding forces – school selection practices; employer voluntarism and HE elitism – and are defined by the actions and cultures of others (Hodgson and Spours, 2015b). If they want to break free of this reactive logic, an ecosystem analysis suggests that colleges will have to develop a number of related capacities:

1. Shared values and a commitment to the locality that permeates throughout the organization.
2. Area-based system leadership.

3. VET specializations co-created with employers with clear signposting of progression routes and skills escalators¹⁰.
4. The ability to build and sustain strongly collaborative networks of different providers and other social partners.

The innovation role of universities

Higher education institutions (HEIs) also have an important role to play in relation to their economic and civic roles. Universities are knowledge creators and due to their size, employment and student recruitment power can influence the character of towns and even whole cities or regions. At their best they function as local economic developers (e.g. through innovations such as science parks and innovation districts) and are able to attract investment, local entrepreneurs and knowledge specialists. As we have seen earlier, the role of universities and their contribution to innovation ecosystems has been articulated through a variety of 'triple helix' projects. While this term is not explicitly used in the UK, the collaborative logic is becoming a strong trend in London as evidenced by the cases of UCL and the University of the Arts Central St Martins at Kings Cross; UCL and Loughborough University at London East; London College of Communication at Elephant and Castle; and Imperial College at White City (Hanna, 2016). Elsewhere in the UK Michael Stevenson has been researching HEIs that function as orchestrators of talent and economic development by focusing on local mutual interests; becoming seriously engaging in local partnerships and leading innovation through knowledge transfer strategies (Stevenson, 2015: 2016).

Unfortunately, however, many HEIs do not pay sufficient attention to these multiple innovation roles (Schmuecker and Cook, 2012) because their capacity to drive skills development has been mediated by competing agendas, the perverse effects of national policy incentives and market fluctuations. The system challenge is thus to create a policy environment in which it becomes natural for FE and HE to work together and with wider

¹⁰ See 157 Group (2016) *Skills for Work, Skills for London* for an interesting model of how this might work in London. <http://www.157group.co.uk/skills-work-skills-london>

social partners, not just in relation to widening education participation, but to foster what Glasman refers to as the new 'vocational economy' ¹¹.

Cross-boundary networks and expansive forms of leadership and professionalism

More fluid concepts of areas and regions require new collaborative and boundary-crossing or bridging forms of organization. In the English context, the aim of supporting learner progression within upper secondary education and transition into employment and higher education has seen the consideration of large vertical collaborative networks that bring together not only 14-19 education providers, but also employers, training providers, local government and regeneration agencies and higher education. In ecological terms, what have been termed 14+ Progression and Transition Boards (14+ PTBs) cross the Bronfenbrenner-type ecological boundaries of Meso, Exo 1 and Exo 2 (Hodgson and Spours, 2013a).

Creating and leading these inclusive and boundary crossing networks requires both the development of capacities for a new form of leadership and a different form of professionalism. In leadership terms, these could be seen as closer to the concept of 'stewardship' used by environmentalists. Senge and colleagues (2015) have explored the concept of 'system leadership,' which seems to offer some fruitful ideas in this regard. Having observed how 'system leaders' operate they have identified three core capabilities – 'the ability to see the larger system'; 'fostering reflection and more generative conversations'; and shifting the collective focus from reactive problem solving to co-creating the future' (pp3-4). They claim that: *'Over time, their (system leaders) profound commitment to the health of the whole radiates to nurture similar commitment in others. Their ability to see reality through the eyes of people very different from themselves encourages others to be more open as well. They build relationships based on deep listening, and networks of trust and collaboration start to flourish.'* (p.3)

¹¹ Maurice Glasman's concept of the 'vocational economy' is discussed in Westwood, A. (2012) 'Universities and a vocational economy: why we should rethink HE's role' *The Guardian* 16 January, <http://www.theguardian.com/higher-education-network/blog/2012/jan/16/vocational-economy> Accessed 11 October 2015.

This could be seen as a form of 'networked professionalism' (Frost, 2010) and in the context of debates in further education, the development of 'triple professionalism' (Hodgson and Spours, 2013b) that prioritises collaborative communication and multi-agency working capacities alongside subject and pedagogic expertise. These expanded ideas of professionalism extend the idea of 'ecologies of practice' discussed by Stronach *et al.* (2002) and Owen and Fisher (2008) beyond the interdependency of the professional/participant relationship, to multi-agency collaboration and the process of co-configuring differing professional cultures into a more unified way of working (Warmington *et al.*, 2004).

Conclusion

This paper has attempted to chart four stages of ecosystem thinking and to develop an approach to ecological and ecosystem thinking that ventures beyond metaphorical uses. It has focused primarily on the Stage 3 theorising approach, which uses spatial ecological concepts on a variety of interlocking scales. This has been applied to 14+ education, training and work to examine the role of further and higher institutions in the development of HPSEs at the local and regional levels. The paper has also attempted to create links between social ecological/ecosystem thinking and wider debates and developments in political economy. These latter connections help us to understand the wider significance of this particular form of system thinking for our immediate professional and personal lives, but also for the building of a more democratic civil society (Stage 4).

Further development of social ecological/ecosystem thinking will depend both on connective theoretical reflection and on concrete and grounded research that illustrates the dynamics of relationships in different areas of educational life and their relationship with the economy and wider societal development. Accordingly, the upcoming seminar will be taking forward and critically reviewing the analysis in this paper by asking questions about:

- the relationship between political devolution and local skills ecosystems;
- the role of universities and further education colleges in place-shaping and the building of HPSEs;
- how ecosystem thinking might contribute to debates on teaching, learning, the curriculum, leadership and professionalism.

References

- Adnan, A. (2016) *The 21st Century Political Party: Are you being served?* Compass publications.
- Barnett, R. (2010) *Towards an ecological professionalism*, paper presented to the European Conference of Education Research (ECER), Helsinki, September.
- Bock, A. and Johnson, D. (2015) Entrepreneurial Ecosystems: Fixing the Triple Helix *The European Business Review*, 20 November
<http://www.europeanbusinessreview.com/?p=8376> Accessed 4 May 2016.
- Bollier, D. (2000) *Ecologies of Innovation: The Role of Information and Communications Technologies*. A Report of the Eighth Annual Aspen Institute, Roundtable on Information Technology
(<http://www.aspeninstitute.org/atf/cf/%7BDEB6F227-659B-4EC8-8F84-8DF23CA704F5%7D/C&SECOINNOV.PDF>) Accessed 11 April 2016.
- Bronfenbrenner, U. (1979) *The Ecology of Human Development: Experiments by Nature and Design*, Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U. (1994) Ecological models of human development. *International Encyclopaedia of Education*, Vol. 3. 2nd Edition. Oxford: Elsevier.
- Buchanan, J. (2006) *From 'Skill Shortages' to Decent Work: The Role of Better Skill Ecosystems*. Sydney: NSW Department of Education and Training.
- Busemeyer, M. and Trampusch, C. (2011) *The Political Economy of Collective Skill Formation* Oxford: Oxford University Press.
- Casasanto, D. (2014) 'Development of metaphorical thinking: The role of language' in M. Borkent, J. Hinnell, and B. Dancygier (eds) *Language and the Creative Mind* California: Stanford Publications.
- Centre for Post-14 Education and Work (CEW) (2015) *Building high progression and skills eco-systems: The role of further education in leading local learning, economic innovation and civic development* UCL Institute of Education.
- Coffield, F., Edward, S., Finlay, I., Hodgson, A., Steer, R. and Spours, K. (2008) *Improving Learning, Skills and Inclusion: The impact of policy*. London: Routledge Falmer.
- Deloitte (2016) *The Internet of Things ecosystem: Unlocking the business value of connected devices* (<http://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/internet-of-things-iot-enterprise-value-report.html>) Accessed 10 April 2016.
- Finegold, D. (1999) 'Creating self-sustaining, high-skill ecosystems', *Oxford Review of*

Economic Policy, 15, (1) 60-81.

Finegold, D. and Soskice, D. (1988) The failure of training in Britain: analysis and prescription, *Oxford Review of Economic Policy*, 15 3, 21-53.

Fisher, P. and Owen, J. (2008) *Empowering interventions in health and social care: recognition through 'ecologies of practice'*. *Social Science and Medicine*, 67 (12). 2063 - 2071.

Folke, C., Hahn, T., Olsson, P. and Norberg, J. (2005) *Adaptive Governance of Social-Ecological Systems* *Annual Review of Environment and Resources* Vol. 30: 441-473.

Frost, N. (2010) 'Professionalism and social change: the implications of social change for the reflective practitioner' in H. Bradbury, N. Frost, S. Kilminster and M. Zukas (eds) *Beyond reflective practice: new approaches to professional lifelong learning*. London: Routledge.

Gibney, J., Yapp, C. Trickett, L. and Collinge, C. (2009) *The 'New' Place-shaping: The Implications for Leaders in the Further Education Sector* London: LSIS.

Gramsci, A. (1971 translation) *Selections from the Prison Notebooks*, London: Lawrence & Wishart.

Gunderson, L. H. and Holling, C.S. (eds) (2002) *Panarchy: Understanding Transformations in Systems of Humans and Nature*. Island Press: Washington DC.

Hajer, M. and Wagenaar, H. (eds) (2003) *Deliberative Policy Analysis: understanding governance in the network society*. Cambridge: Cambridge University Press.

Hall, R. and Lansbury, R. (2006) Skills in Australia: towards workforce development and sustainable skill ecosystems, *Journal of Industrial Relations*, 48, 5, 575-592.

Hall, S. (2005) 'New Labour's double shuffle', *Review of Education, Pedagogy and Culture* 27 (4), 319-35.

Hanna, K. (2016) *Spaces to think: innovation districts and the changing geography of London's knowledge economy*. London: Centre for London.

Hodgson, A. and Spours, K. (2009) *Collaborative Local Learning Ecologies: Reflections on the Governance of Lifelong Learning in England* IFL Sector Paper 6, Leicester: NIACE.

Hodgson, A. and Spours, K. (2012) Three versions of 'localism': implications for upper secondary education and lifelong learning in the UK. *Journal of Education Policy*, 39, 2, 193-210.

Hodgson, A. & Spours, K. (2013a) 'Tackling the Crisis Facing Young. People: Building 'High Opportunity Progression Eco-Systems' *Oxford Review of Education*, 39, 2, 211-228.

Hodgson, A. and Spours, K. (2013b) Why IfL should promote 'triple professionalism' *InTuition*, Issue 13, Summer.

Hodgson, A. and Spours, K. (2014) Heavy fog in the Channel, Continent Cut Off: reform of upper secondary education from the perspective of English exceptionalism' *European Educational Research Journal* 13 (6) 683-698.

Hodgson, A. & Spours, K. (2015a) 'An ecological analysis of the dynamics of localities: a 14+ low opportunity progression equilibrium in action' *Journal of Education and Work*, 28, 1, 24-43.

Hodgson, A. and Spours, K. (2015b) 'The future for FE colleges in England: the case for a new post-incorporation model' in A. Hodgson (Ed) *The Coming of Age for FE? Reflections on the past and future role of further education colleges in England*. London: IOE Press

Katz, B. and Wagner, J. (2014) *The rise of innovation districts: a new geography of innovation in America*. Available at: <http://www.brookings.edu/about/programs/metro/innovation-districts>, accessed 18/4/16.

Keep, E. (2015) *FE and Localism in the Context of Wider Debates Concerning Devolution* FETL Research Paper Number 1, SKOPE, University of Oxford.

Kippin, H. (2015) *Supporting social change: a new funding ecology*. London: Collaborate.

Kippin, H. and Swinson Reid, R. (2015) *A new funding ecology – a blueprint for action*. London: Collaborate.

Laloux, F. (2014) *Reinventing Organisations: A Guide to Creating Organizations Inspired by the Next Stage in Human Consciousness* Brussels: Nelson Parker.

Mazzorol, T. (2014) *6 ways governments can encourage entrepreneurship* World Economic Forum (<https://www.weforum.org/agenda/authors/tim-mazzarol>) Accessed 7 April 2016.

Mazzucato, M. (2011) *The Entrepreneurial State*, London: Demos.

McNeil, C. and Silim, A. (2012) *Further Higher? Tertiary education and growth in the UK's new economy*, London: IPPR/UCU.

Moss-Kanter, R. (2012) *Enriching the Ecosystem* Harvard Business Review <https://hbr.org/2012/03/enriching-the-ecosystem> Accessed 11 October, 2015.

Nardi, B.A. and O'Day, V.L. (1999) *Information ecologies: using technologies with heart* Cambridge: MIT Press.

Newman, J. (2000) 'Beyond the New Public Management? Modernizing Public Services' in J. Clarke, S. Gewirtz and E. McLaughlin (eds) *New Managerialism, New Welfare?* London: Sage.

- Nyman, G. (2016) *Ecosystems of triple collaboration*
<https://www.triplehelixassociation.org/helice-current-issue/ecosystems-of-triple-collaboration> Accessed 4 May 2016.
- Payne, J. (2007) *Skills in context: what can the UK learn from Australia's skill ecosystem projects?* SKOPE Research Paper No 70. SKOPE: University of Oxford.
- Pollitt, C. (2008) *Time, policy, management: governing with the past* Oxford: OUP
 prescription', *Oxford Review of Economic Policy*. 4, 3, 21–53.
- Proctor, J., Brendon, M. and Larson, H. (2005) Ecology, Complexity and Metaphor *BioScience* 55 (12) 1065-1068.
- Raffe, D. and Spours, K. (2007) *Policy-making and Policy Learning in 14-19 Education* Bedford Way Series, Institute of Education, University of London.
- Schmuecker, K. and Cook, W. (2012) *Beyond bricks and mortar boards: universities and the future of regional economic development* London: IPPR.
- Seely-Brown, J. (2002) *Growing up Digital: How the Web Changes Work, Education, and the Ways People Learn* USDLA Journal, Volume 16, 2.
- Senge, P., Hamilton, H. and Kania, J. (2015) The dawn of system leadership, *Stanford Social Innovation Review*, Winter 2015. Pp.1-18.
- Sharp, M. (2011) *A dynamic nucleus: Colleges at the heart of local communities The Final Report of the Independent Commission on Colleges in their Communities*, Leicester NIACE.
- Siemens, G. (2003). *Learning ecology, communities, and networks: Extending the classroom.* (http://www.elearnspace.org/Articles/learning_communities.htm) Accessed 11 April 2016.
- Sims, S., Wilson, B. and Tyrrell, J. (2015) *This is for everyone: Connecting young people and the tech city cluster* Centre for London http://centreforlondon.org/wp-content/uploads/2015/03/CFL_THIS_IS_FOR_EVERYONE_REPORT.pdf Accessed 11 October 2015.
- Smith, E. (2013) 'This is the age of educational anxiety: but good grades don't always make great workers', *New Statesman*, 30 August,
<http://www.newstatesman.com/education/2013/08/age-educational-anxiety> Accessed 11 October, 2015.
- Spours, K. (2016) *The Very Modern Prince: the role of the integral political party in the networked age* Compass discussion paper. London: Compass.
- Stevenson, M. (2015) *The Virtual Polytechnic: A talent and innovation ecosystem for Birmingham* Birmingham City University.

Stephenson, M. (2016) *Communities of Talent Universities in local learning and innovation ecosystems* PA Consulting, Technology and Innovation.

Stronach, I., Corbin, B., McNamara, O., Stark, S. and Warne, T. (2002). Recognition through “ecologies of practice”, *Social Science & Medicine* 67, 12.

Walker, B., Holling, C. S., Carpenter, S. R. and Kinzig, A. (2004) Adaptability and Transformability in Social-Ecological Systems. *Ecology and Society* 9: 5.

Warmington, P., Daniels, H., Edwards, A., Brown, S., Leadbetter, J., Martin, D. and Middleton, D. (2004) *Interagency collaboration: a review of the literature*, University of Birmingham.

Weingart, P. and Masaan, S. (1997) The order of meaning: the career of chaos as a metaphor *Configurations* (5) 463-520.

Westwood, A. (2012) ‘Universities and a vocational economy: why we should rethink HE's role’ *The Guardian* 16 January, <http://www.theguardian.com/higher-education-network/blog/2012/jan/16/vocational-economy>
Accessed 11 October 2015

Wheelahan, L., Buchanan, J. Yu, S. (2015) *Linking qualifications and the labour market through capabilities and vocational streams* LH Martin Institute, University of Melbourne and The Workplace Research Centre, University of Sydney, Adelaide: NCVET.

Zeng, H. and Song, W. (2010) Metaphor analysis in the educational discourse: A critical review *US-China Foreign Language* 8 (9) 42-48.