Transformative Learning: co-design with communities’ collective imagery as data for social innovation

CHUENG-NAINBY Priscilla* and LEE John

University of Edinburgh

* Corresponding author e-mail: p.chuengnainby@ed.ac.uk
doi: 10.21606/drs.2018.360

This paper reports a co-design practice which aims to enact social innovation by connecting local communities’ needs to global data networks. We introduce low-fi physical tools that mediate a community’s shared imagery as the creative space for collective meaning-making. We discuss our practice of a co-design framework within the systemic view of social innovation processes. By discussing a community workshop method that structures locals’ “collective imagery”, we seek to develop insights into the potential linkage of social innovation to systems of open data. We discuss three village regeneration projects that encourage a community’s transformative learning enacted through an analogical installation. We explore the concepts through broader practical and theoretical considerations, especially connectivist and transformational learning processes, and the use of information technologies in engaging social innovation with communities. We propose the need to consider ontological differences between a local community workshop and the open data for social innovation to impact a systemic change.

codeign; social innovation; creative imagery transformative learning;

1 Co-design with Community as Social Innovation

Design researchers often face challenges when directly engaging communities to co-design for large-scale social innovation (Fuad-Luke, 2013; Manzini, 2013; Kimbell, 2012). Not only are the design problems often undefined and the outcomes not immediately evidential, the challenges lie in devising creative tools that can facilitate communities in visualising their collective imagination (DiSalvo, Clement, and Pipek 2012). With the undertaking encompassing many activities and processes at many levels, design for social innovation becomes a very different creative process from the traditional design process.

It is useful to view such a process by adopting the concept of the Social Innovation Spiral (Murray, Caulier-Grice, and Mulgan 2010), moving from narrow-scale, local activities outwards towards broader, more global implications (Figure 1). The phenomenon involves “the use of mapping
techniques to reveal hidden needs and unused assets” at the local level and the “creative blending and recombination of disparate elements and ideas”. Success will depend on processes that create or promote “alliances between the top and the bottom, ... the ‘bees’ (the creative individuals with ideas and energy) and the ‘trees’ (the big institutions with the power and money to make things happen to scale)” (ibid.).

In facilitating the social innovation process, we ought to engage directly with the communities (DiSalvo, Clement, and Pipek 2012; Kimbell 2012a; Kimbell and Bailey 2017). Manzini (2016) urged the importance of the use of global digital networks to empower local communities for good causes, with the design workshop as a sense-making and meaning-making local process. Insights gathered from these workshops are relatively local and therefore need a way to connect globally to achieve systemic change. This requires new frameworks to combine smaller innovations across many elements to achieve real change in social, business, law and data infrastructures.

This paper proposes an extension to a co-design framework that seeks to create a conceptual space for often isolated local communities to connect, to learn and contribute new ideas at a global level. We discuss a systemic framework for locating the local workshop within the global context and digital network: social challenges, data flows, and institutions. We hope that the workshop will facilitate the local communities in the co-design of a learning experience that is potentially globally impactful for social innovation.

Figure 1. The Social Innovation spiral (Murray, 2010, p. 11)

The social innovation spiral (Figure 1) depicts a nonlinear process in six stages from micro to macro: prompts, proposals, prototyping, sustaining, scaling and systemic change. In theory, the design should happen iteratively at all stages and in parallel to a digital system. But in practice, the designer often only manages to influence the first three stages while the global digital network works backwards from the systemic change level to meet design research at the stage in between prototyping and sustaining. We argue that this in-between gap is the cause of why a design workshop often falls short in its influence at a systemic level. And the reason lies in the ontological differences between elements of a design space and a digital network. An integrative framework is desirable for design research to bridge over these ontological differences.

Herein we discuss an established co-design practice with a creative ontologically-informed approach to guide creative workshops to be carried out directly with the local communities with low-fi physical tools. We explain how the use of these tools promotes the development of innovative
thinking through creative learning processes that result in a largely implicit, analogical representation. This representation nonetheless implies commitments to a conceptual structure—a creative ontology—that can be seen to underlie the understanding of the issues and any solutions at the local level. We observe that, at the global level, “open data”, recognised in the explicit formats of the semantic web, is the key to integrating these levels—connecting the “bees” to the “trees” (Murray, Caulier-Grice, and Mulgan 2010) across local practices and digital networks. To achieve connection, we need to integrate the ontologies at the local and global levels.

We approach this through an analysis of the workshop activity as a form of transformative connective learning, exposing insights into the conceptual shifts and alignments that allow the group outcome to emerge. We are enabled to propose a certain parallelism between learning processes at local and global levels, and also to explore a process of reflection that allows the local ontology to become more explicit and able to be digitised in future. Currently we utilise low-fi tools to formalise the local ontology to connect to the global data. This conception of the nature of ontologies informs the theory of collective imagery as the foundation of a co-design practice leading to a structured, albeit implicit, representation of the collective intelligence.

1.1 When Everybody Co-designs

The co-design workshop is conducted with local communities to visualise and structure the hidden and disparate elements in societal issues to create transformation through collective imagination (DiSalvo, Clement, and Pipek 2012). Lucy Kimbell (2011, 2012b) connects the local-global link through the designer who has the unique capability to enact design thinking embodied in the manipulation of physical artefacts. In some way this workshop practice enables design prototyping with the public through the workshop with design thinking (Kimbell and Bailey 2017). By bringing together various stakeholders, we lead the community to unexpected revelations and shifts in thinking. In this, we can conceive of the possibility for everybody to come together as the designer for social innovation (Manzini 2013; Manzini and Coad 2015).
When everybody co-designs, we need coherent tools that take into consideration diverse cognitive styles and creative processes (Sanders, Brandt, and Binder 2010; Sanders and Stappers 2014). We have developed the “collective imagery” framework (Chueng-Nainby, 2010b; Chueng-Nainby & Gong, 2013), in which the design space and interaction are mediated in an embodied analogic installation termed the Collective Imagery Weave (hereafter “Weave”). The Weave enacts a co-creative space as a systemic act of collective meaning making (Figure 2, 3, 5-7).

This research has two objectives: 1) to examine the Collective Imagery framework to facilitate any community in collectively imagining their future to design for social innovation; 2) to consider the Collective Imagery Weave as a systemic process to bridge the local-global transformation “from the bees to the trees” on a wider scale. The first objective involves a study of a collective imagination phenomenon within a socio-cognitive framework; while the second challenge involves the study of an integration of the ontological differences between design elements embodied at the local (community) and the global (open data) levels.

1.2 Co-design with Collective Imagery

Much work in design cognition has focused on externalisation of imagery as pictorial and figuratively useful (Goldschmidt 2014; Kavakli and Gero 2001). The Collective Imagery framework draws inspiration from the notion of creative imagery and the Geneplore model with a broader view of imagery to facilitate pre-inventive forms and the divergence of insights (Finke, 1989; Finke, 1990; Finke, 1995a; Finke, 1996). Figure 4a shows the process of creativity in the Geneplore model: generative and exploratory. During the generative phase, a designer constructs mental representations called preinventive structures, which are used to devise creative ideas in the exploratory phase (Finke, 1996). In the pre-inventive phase, ideas (design elements) are structurally connected for the emergence and restructuring of creative concepts. Finke (1995b) describes “connectedness” and “imaginative divergence” as two distinct qualities that can be incorporated into the Geneplore model for creativity to be relevant to reality.
The Collective Imagery framework extends the notion of creative imagery to collaborative settings. To overcome the problem in the observation of a phenomenon which is largely internalised within a diversity of cognitive styles in the pre-inventive phase, we adopted the practice-based and research through design approaches (Koskinen et al., 2011; Gaver 2012) in several action research iterations. We first devise an analogic installation – the Weave – to envision and enact both the internal and external representations of the communities’ Collective Imagery within a community workshop. The resulting Collective Imagery weave installations may take different forms (Figure 2, 3, 5-7).

The Collective Imagery is a conceptual structure of design elements that mediates communities’ shared imagination space. It can be taken partially as collaborative imaginaries, mentioned by Disalvo et al. (2012) and Kimbell (2012), though it draws further upon a cognitive aspect with emphasis on the pre-inventive structure of the imagery (Finke 1995), which works not only at the level of consciousness. Design elements in the forms of ideas, facts and possibilities are represented in an analogical and narrative structure constructed by the communities in an iterative cycle of deconstruction, construction and reconstruction (Chueng-Nainby & Gong, 2013). Two tools are generally implemented as the design interventions at the workshops: 1) a Collective Imagery weave...
which is a physical form of collective imagery, and 2) drama improvisation (Figure 6), which is an experiential form of collective imagery.

1.3 Past work on Collective Imagery
The Collective Imagery framework has been implemented across products, systems, and service designs for health, heritage tourism, village regeneration, for both private and public sectors; locally and globally (Chueng-Nainby 2014, 2017; Chueng-Nainby, Fassi, and Xiao 2015; Chueng-Nainby & Gong 2013; Chueng-Nainby, Lin, & Hu 2015; Chueng-Nainby et al. 2016; Mulder-Nijkamp & Chueng-Nainby 2015; Preez et al., 2015) through which we seek to identify co-design tools that can externalise a community’s shared creative imagery. The co-design workshop process is identified as an emergent creative process in three iterative stages: deconstruction, construction and reconstruction (Chueng-Nainby & Gong 2013). The tools have evolved from a two-dimensional brainstorming method with yellow sticky notes to a large community-led weave installation utilising colour tag cards, wool and later bamboo sticks and rattan (Figure 2, 3, 5-7), with the use of drama improvisation as an experiential prototyping tool to explore possible solutions (Chueng-Nainby, Lin, & Hu 2015). We have witnessed the positive impact of low-fi tools that are familiar to the communities especially when physical and embodied. The tools are so versatile that even the locals can find their own version. We observed this at the Yangzigoucun village when the villagers visualised their ideal home design by using stones and willows, pointing and sharing with a long stick on the soil-ground (Figure 3).

The workshop activity involves an initial phase where concepts are exposed, brought into conjunction – possibly conflict – and potential connections pursued. Imaginative divergence is sought in which the concepts are structured into narratives, and the narratives combined into larger structures, where new kinds of connectedness are developed. The imagery involved here is not in the simple sense of pictures; rather it is a structure that facilitates connections, especially the emergence of those unanticipated combinations.
2 Co-design Services for Regeneration

The intersection of service innovation and co-design offers an understanding of the complex structure of design space where everybody can design (Manzini & Coad 2015), which helps us to bring contextual understanding of wicked design problems to a holistic solution (Sangiorgi 2009). This paper draws upon the complex nature of village regeneration as a design goal in three villages: Heritage service design as architectural conservation at YangZiGoucun in Inner Mongolia and CangDong in Guangzhou; and farming services at Gokceada Island in Turkey. The studies also addressed the call to establish a framework for co-design tools and processes that can be evaluated for its impact (Meroni & Sangiorgi 2012; Sanders, Brandt & Binder 2010).

2.1 The Communities’ Collective Imagery

Everyone in the villages is invited to the workshops that were centred around the weave structure as the physical manifestation of a self-organising creative activity where elements emerge from within the system itself. Each workshop was carried out for less than a week, shown in pictures at Figure 6 from left to right and top to bottom: a) idea generation - in keywords, drawings and pictures on tags; b) element gathering - collect and display all the tags; c) narrative linking - find five to ten related tags to make a narrative stick; d) narrative structuring - connect a few sticks according to the narratives to make a weave structure; e) conceptualisation - generate a micro concept on the emerged themes on the weave; f) concept mapping - select and connect the micro concepts into a macro map; g) story making - drama improvisation in exploring possible solution; and h) story telling - present the solution in drama for the community’s evaluation.

The iterative process of deconstruction (ideation), construction (sorting), and reconstruction (the Weave) occurs with the Collective Imagery weave facilitated by tools that allow easy iteration and to finish with collective meaning making. The first two days involved constructing the Collective Imagery weave with the local villagers and authorities to collectively generate the ideas of service through imagination. This led to the themes of the service areas they agreed collectively to work on. From the third day, the designers worked collaboratively to reconstruct solutions with the help of the weave and drama.

Prompted by a facilitator’s probe such as “imagine all the good things about the village ten years ago, write in one or two keywords or sketch a picture on the red colour tags”, with the next probe about ten years ahead, the communities generate a big table full of design elements in colourful tags. Each workshop typically includes four to six probes during generation. Prompted by probe questions, conceptual structuring begins with connections of two elements or more to make a narrative connection that will later combine to form facets into a coherent structure (Figure 5 and
6). The resulting weave, when orientated to a design context, offers a conceptual structure of a design solution.

Two types of emerging structures have been observed (Figure 7): 1) a system of connections which gives rise to clusters as concepts (left); and 2) a conceptual structure constructed from narratives connected into stories of thematic design concepts (right). A story is a system (sequential or not) of interconnected narratives, seen as an abductive way of linking elements.

2.2 The Weave Structure

The co-design process for social innovation, however envisaged, cannot be entirely explicit and logical. It is a practice that emerges among the participants, of recognising that a physical structure captures something important about the connections between narratives (Figure 2-3, 5-7). This structure is a network: it represents connections between narratives, and overall the outcome and sometimes history of the group process, which can be characterised as connectivist (Dron 2014). The participants assemble the narratives into a structure in just one, concrete and comparatively satisfying representation among the many ways in which the narratives might have been brought together. There is something fitting about the juxtaposition that cannot in itself be clearly articulated, but that leads to particular articulations in the subsequent stage where the structure is described.

We see here a collective, shared, enactive process of reflection in which communities create for themselves a tangible support, a weave structure that tacitly records their development and can promote transformative shifts in their collective understanding of a situation. This is analogous to the way in which external representation is characteristically implicated in creative work: drawing, sketching, writing, modelling, experimenting, are all processes that permit a new perspective to be taken, a new angle to be seen. Design is barely able to occur without some such process – when externalisation can reveal without making explicit: the sketch, the maquette, may be inchoate, vague, merely suggestive, yet revelatory of the thinking of its creator, to its creator. And where the creator is collective, the object provides for each individual a view of the developing thinking of the group. Thus, the design thinking of our community, hung about an externalisation that helps to connect the developing concepts, has the potential to transform through enabling a perhaps radical re-viewing of the situation. It is through this process that Collective Imagery can enable innovation.

The weave structure has been made available to the public, put on display as an art installation that people may view, investigate and interact with. The structure is not a clear statement, an argument or a proposition, but it echoes and invokes the issues, the problems, tensions, constraints that have been instrumental in its creation. The Gokceada example shows the head of the village and the villagers expressing elements of their wishes after a probe such as “tell us what contributes to an ideal day for you in the village”.

The observing public have access to the workshop discussion by browsing the weave structure, which presents itself as a provocation to address the issue for themselves, to develop their own discussion – internally, individually or in a group. It does not offer solutions to specific problems, but possible directions and inspirations for the communities to reflect upon over time. It has been observed that people are open to the physical structure, which represents their issues and facilitates a possible change of habits among the communities. The structure opens up thinking to unexpected concepts and approaches.

The weave is aesthetically appealing and it cries out to be interpreted semantically, which offers a route to a wider collective understanding: the content can be codified, digitised and presented in various data forms. The crucial insight for us is that the physical structure emerges as an integral part of the practice supported by the cognitive processes. The Collective Imagery process can be seen as an extended and distributed system of cognition (Clark and Chalmers 1998; Verela and Thompson 1992). It is an especially important phenomenon as it is shared in its preinventive form, which isn’t always itself amenable to interpretation in terms of specific symbols and explicit
significations for protocol analysis. The weave structure and the elements of it can be said to support ambiguous meaning which can be inspirational and useful for co-design.

Design begins with learning through meaning making (Tovey 2016). The workshop participants are learning about the context and situation that they are addressing, and to connect their own and each other’s understandings of it. In a collective space, they are starting the process of designing a new approach to the situation by developing a new organisation of these understandings. The learning process facilitates “creative blending and recombination of disparate elements and ideas” (Murray, Caulier-Grice, and Mulgan 2010). Wals (2007, p. 500) identifies this as transformative learning which leads to new or alternative thinking and values, towards a resilient society co-created and therefore co-owned by the reflexive citizens. Through reflection (Schön 1983) and various kinds of dialogue, people come to understand the nature of the process, but generally without being able to articulate it explicitly. They are enculturated into a community of practice (Wenger 1998), which allows them to evaluate and develop their innovation.

During the workshop, transformative learning happens in the form of a collective meaning-making activity. It unfolds in revealing the narratives that concern a community when they start to combine these narratives and investigate a possible consensus, in a dialectical loop of construction, deconstruction and reconstruction (Figure 5) that aligns with the social learning process described by Wals (2007, p. 498) as “a critical analysis of one’s own norms, values, interests and constructions of reality (deconstruction), exposure to alternative ones (confrontation) and the construction of new ones (reconstruction).” The making of meaning is enacted through practices that involve external artefacts as an implicit part of the process.

Mezirow (2000) defines transformative learning as “becoming critically aware of one’s own tacit assumptions and expectations and those of others and assessing their relevance for making an interpretation”. One particular characteristic of transformative learning that is relevant to social innovation is the process of effecting change in a frame of reference – the structures of assumptions within which an adult can define their world to understand experiences, and eventually move towards self-reflection. A frame of reference “encompasses cognitive, conative, and emotional components, and is composed of two dimensions: habits of mind and a point of view” (Mezirow, 1997). During the workshop, participants generate keywords to make narrative structure in the form of a Collective Imagery weave. This activity can be seen as a way of mapping out the habits of mind. The drama improvisation later is a way to establish a new, shared point of view through a rapid prototyping of experiences.

“Meaning-making”, emphasises that meaning has to be made – it is not simply given, or implied by environmental and causal relationships – and it is made by and between people. Wals (2007, p. 497) notes that “deconstructing the diverging norms, values, interests and constructions” brings an understanding to one’s roots and persistence which begins the collective re-making of meaning for change and the emergence of joint actions. This is coherent with Mikhail Bakhtin’s interplay of differences as meaning-making to construct the social world, instead of transmitting information in a given world (Baxter, 2006, p. 108).

The long-term effect of restructuring meaning in this way has been felt with all three projects. The restructuring of the community’s habits of mind through narrative/story-making both in the weave and drama during the workshop catalysed a transformational process in the individuals within their communities. At Yuanzigoucun where we carried out a performative intervention in the clearing of rubbish, one result was reflection among the family who generated the rubbish, leading them to stop. The Mayor of the Gokceada island has been involved in the project from the very start and continues to work with the communities to bring the proposed solution to the market place. The community in CangDong has adopted the service design of the cycling tourism into their eco-tourism plan. The communities and especially the NGOs have expressed their appreciation of the effectiveness of the workshop to break the ice with the communities, which they have tried very
hard to do, but it seems the community-based weave installation has initiated a sense of ownership and hence the motivation to participate in the change.

Social innovation depends largely on learning that transforms attitudes, assumptions, expectations, and ultimately behaviours (Wals, 2007); we can speak of learning on the part of individuals, but also of communities, which equally have the capacity to learn, change, develop and transform. Communities as collections or networks of individuals can be seen to learn through reconfiguration of the relationships between the individuals, much as networks learn through transforming connections between the nodes. It will not be possible to trace transformative learning through specific changes in individuals, but rather a collective shift in reconstructions by the group through tracking their weave construction. But it is the outcome at the community level that will be crucial from the viewpoint of promoting social innovation.

2.3 Collective Meaning Making as Connectivist Learning

The transformative learning processes here can be thought of as connectivist learning processes. Siemens (2005) and Downes (2006) proposed this idea as a new “learning theory for the digital age”, alluding to the fact that people no longer learn as isolated individuals, but in complex, far-reaching and self-organising networks where interacting with diverse information sources and other individuals are core features. They envisaged these networks typically as large scale and based on digital communications, and this is the pervasive approach in the substantial literature on connectivist learning. However, one can consider these as being sometimes rooted in networks that are much more local and based on processes that are tacit, and shared but not necessarily acknowledged.

From our perspective, the workshops consist of groups who are working together to develop communication around particular issues, and they do this as a network of actors. Our central concern is, unusually, with people who are interacting first and foremost in a physical space; a shared, embodied environment where they construct and exchange information, material and representations. Connectivism often presents as a kind of collective constructivism, and we embrace this in particular. The environment and specific form of our interactions is very different from the usual context of connectivist discussion, but much else is similar. Moreover, we envisage that the activity of the group is itself located within the wider network of connections that connectivism usually invokes – the internet and the web in general. For us, the physical and the virtual can be interpenetrating realms of media bearing the interaction of the group and its wider relationships.

There thus emerges a sort of parallelism between connectivist learning processes at the local level and at the wider level. Locally, we have the practices of the workshop; globally, connective learning practices can work as digital networks, more as posited by Siemens (2005) and Downes (2016), between communities, between individuals in different communities, between members of other communities (e.g. NGOs, governments, educators), to make new meaning based on insights the local communities have derived. This process demands abstraction rather than embodiment, is not founded in enaction, but is nonetheless built on practices of sharing and reconstruction that can result in transformative conceptual change. Deeper interconnectedness can be achieved through a reciprocal informing of the local workshop practice, perhaps in “real time”, directly from the global realm: a two-way integration of thinking at different levels. This is where we locate the particular potential of digital technology to enhance the overall process.

3 Local-Global Connections

We interpret the Collective Imagery as a kind of design thinking mediated by the weave structure, through which locals may envision a possible local-global connection. For this to happen, the understanding of the structure itself needs to become more explicit. The elements that act as the building blocks for the structure need to be recognised as a kind of ‘data’ that in principle can be
related to more global data. This ultimately depends on defining a relationship between the ontological structure of the workshop data and that (or those) of data at a more global level.

3.1 The ontology of co-design for social innovation
Ontology, in information science, reflecting its origins in the philosophical concept of “what there is”, is an attempt to capture the basic types of objects, properties and relationships in some domain. We can view the conceptual structure of Collective Imagery as a network of ideas within a collective space to be connected and constructed into a systemic design. The system can imply particular concepts relating to the design problem, the nature of possible solutions and contextual issues. These concepts then imply an ontology, a structuring of the possibilities at the most basic level.

The understanding of the ontological structure informs the design of distributed networks of products and services that can empower communities to co-design data-driven informed solutions. We seek a way to identify the ontological structure by analysing the construct of Collective Imagery from the practice of co-design (Chueng-Nainby et al., 2016). This paper attempts to describe the theoretical concepts underpinning the Collective Imagery as a kind of systemic design thinking when co-designing for social innovation.

Seeing the Weave as data requires an extensive act of interpretation: it is a multiply-ambiguous structure, embodying perhaps many conceptual approaches to the workshop problem. Interpretation needs in the end to be iterative and interactive, engaging the workshop participants in a gradual revealing of their own implicit understandings of the material of the situation. Moreover, it will be necessary for the interpretation to be appropriately encoded. We therefore envisage, ultimately, an “intelligent assistant” – a digital tool that the participants can work with to derive the interpretation. The data involved are often vast, hence a machine learning approach is adopted to assist in analysing the often informal and thick data implied by the insights-driven weave. An ontology for the structure is postulated, in a sense, as a grammar for decoding the language of the Weave; a hypothesis that will need to be revised and optimised for the task of capturing the significance of particular elements within the practice. So far, we are working towards a method for interpreting the Weave, which we can then develop as the foundation of the assistant tool.

Once the conceptual structure is identified, the potential here is for local communities to develop and represent their discussions, their innovations, and the basis of their social commons, using a scheme that can be shared widely, even globally, among networks of actors – much like the practice of prototyping for policy making (Kimbell & Bailey, 2017). But much will then depend on finding a suitable relationship with existing information.

3.2 Ontologies of global understanding: the semantic web
The “semantic web” (Berners-Lee et. al., 2001; Shadbolt et al., 2006), offers a vision of “a common framework that allows data to be shared and reused across application, enterprise, and community boundaries” (W3C 2013). It reflects data in the real world that allows human and machine, and particularly applications on different machines, to connect through a set of databases (W3C ibid.). To do this, it depends on defining “common formats for integration and combination of data” (ibid.), which are also known as “vocabularies”, or ontologies. The ambition is to allow the “meaning” of data to be captured, so that the web can be understood as “an unending set of databases which are connected not by wires but by being about the same thing” (ibid.); and as far as possible to promote “open data”, so that data can be freed from restrictive proprietary and other limitations on its use.

3.3 Creative Ontologies
The ambition that data may all be unified at some deep semantic level evidently depends on the idea that there is a “real world” in which there are things that can be objectively identified and have an existence entirely independent from the agents who operate with them. Typically, this world is conceptualised as consisting of objects, which have properties and relationships among them, all definable in an ontology. If the agents all work with the same ontology, and the ontology correctly
represents the real world, then the ambition can be realised. However, Lee (2011) argues that the attempt to derive and agree or impose standard ontologies fails. There is dissent and disagreement, or simply emergent difference, over the entities that should be included, and/or how they should be treated. Moreover, it is not desirable that there should be a fixed set of agreements about ontologies: this tends to stifle innovation, inhibit creativity and restrict discourse. We note that the suggestion here does not undermine the promise of open data; it means, however, that there needs to be equal openness about the ambiguity of data, the intentions behind the ways in which it is collected and the ways in which it is used. We therefore encourage an approach (cf. Lee ibid.) in which ontologies are seen as a way of capturing agreement, where it exists, but also of capturing and focussing discussion of disagreement.

3.4 Ontology and the Weave

In an attempt to identify the possibility of a systemic integration of design elements from local workshops to open data, we discuss an example conducted in a social transport domain (You, 2016), extending insights gathered from an earlier approach to “digitisation” in the Gokceada project (Chuang-Nainby et al., 2016), which attempted to exploit machine learning. Figure 8 shows the process of the digitisation (You, 2016), which in the context of the above discussion means the interpretation of the Weave structure into data. Keywords written on the tags were collected as narratives threaded on sticks (Figure 8a and 8b). The structure was subsequently digitised when the keywords were grouped and categorised, and used to develop a thematic map (Figure 8c).

The map is initially a flat structure, refined into a hierarchical framework, of a kind often seen in semantic modelling, of the initial ontological concepts (Figure 8d). This structure was represented in a typical semantic web formalism as an ontological structure (Figure 8e). It can be evaluated in a number of different ways. A probabilistic model was used to estimate goodness of fit with the original materials of the workshop. A connection with the semantic web was initially modelled through use of the “WordNet” (2015) lexical database to identify synonyms and sub-/super-class relationships that could inform, or contrast with, the assumptions of meanings emerging in the workshops. WordNet here represents a range of open, or other, data sources that could be related in many possible ways to the content of the workshop. Our next step would be to combine this with direct feedback from the participants for a more obviously interpretative process.

Crucially the semantic web, and thus ontologies, is the basis of a means to share and proliferate the processes and outcomes of local design-based discussions such as our workshops, but we do not want to require the participants to think only computationally. In this, an integrative approach to combine with design thinking is sought, rather than a reductionist approach.

3.5 Connecting to the open data

In future when the local workshops’ low-fi Collective Imagery tool is digitally enhanced, we propose that the analysis and external linking could in principle be done during the workshop itself – creating a short feedback loop between the local and more global. The use of the web can be a means to pursue the two-way connections between the local and more global, by allowing participants in the workshop to access open data and structuring concepts with the input. The Weave offers a lens for the communities to view their ideas and to engage in collective meaning making through transformative learning; it is also an external representation through which they can identify ontological presuppositions of their thinking. It allows reconstruction to unfold as prototyping the global insights through local workshops, in which process differences among local and global ontologies will emerge as a collision between local expertise and global “knowledge”. Such collisions must be respected as an opportunity for potential reconfiguration of knowledge on both sides.
Figure 8. The ontological analysis process informed by (You, 2016)
Table 1 summarises how the various stages can be traced through the social innovation spiral (Figure 1). The first three stages (prompts, proposals and prototypes) are associated with local activities. They tend to emerge from a close familiarity with a specific situation. The second three are more concerned with a global focus. It might be said that stage 4 is on the cusp, in that local sustainability can be pursued in its own right, but ultimately is very hard to take to its full potential without serious attention to the global context within which it is required to subsist. The community workshop has the scope to address all of these issues if it can exploit the links through open data to pursue the global ramifications of local propositions.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Locals</th>
<th>Globals</th>
<th>Community Workshop</th>
<th>Open Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prompts</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>2. Proposals</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>3. Prototypes</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>4. Sustaining</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5. Scaling</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>6. Systemic change</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

4 Conclusion: Transformative Learning in Social Innovation

We have reported Collective Imagery as a co-design framework for social innovation through community-based design workshops. We interpret the phenomenon as an example of transformative learning, in which the communities gather to collectively regenerate, reinterpret and restructure their Collective Imagery to find collectively a new point of view on some familiar topics. Transformation of any kind requires creativity and learning. This creative learning process is deeply entangled with the participants’ engagement in the physical, embodied activity of sharing their developing ideas through the accessible structure of the imagery weave and drama improvisation. Thinking of the Weave as the local distillation of the communities’ need with the possibility to abstract and digitise into an ontological map to connect to open data is helped through a vision of the semantic web. The local can be thus empowered to inform the global, and also be informed by it. It is envisaged that in future the workshop method will seamlessly cross the physical (local workshops) and digital (open data) – connecting the “bees” to the “trees” for real benefit in the context of social innovation.

5 References


Tovey, M. (2016). Design Pedagogy: Developments in Art and Design Education. Routledge.


About the Authors:

**Dr. Priscilla Chueng-Nainby** is an interdisciplinary researcher across design and computing, focusing on the systemic data-driven co-design workshops with communities for service design innovation. She designs public engagement tools to envision and enact communities’ collective intelligence to collectively innovate for museum design and healthcare. Her work has been widely exhibited, see www.priscilla.me.uk.

**Professor John Lee** is Professor of Digital Media with cross-disciplinary research in architecture, design and informatics. Much of his research centres on various aspects of cognition, communication and uses of technology in design and learning...