Futures 70 (2015) 56–64

Contents lists available at ScienceDirect

Futures

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

# Starting with Universe: Buckminster Fuller's Design Science Now

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ARTICLE INFO

*Article history:*
Available online 30 December 2014

*Keywords:*
Comprehensiveness
Big data
Design science
Buckminster Fuller
Worldviews Network

ABSTRACT

Increasingly, decision makers seek to harness "big data" to guide choices in management and policy settings as well as in professions that manufacture, build, and innovate. Scholars examining this trend tend to diagnose it at once as techno positivist in its insistence on design yoked to quantifiable variables and computational modeling and, alternatively, as an imperative integral to realizing ecologically sustainable innovation. This article investigates this tension. It reflects on the role of futurists, designers, architects, urban planners, social scientists, and artists in interpreting and utilizing *comprehensiveness* as a design frame. Among nine experimental foresight workshops at the inaugural *Emerge* conference at Arizona State University, many focused on producing physical objects or media, one modeled and expanded upon a method pioneered by architect and polymath R. Buckminster Fuller. At a time when many of the capabilities to realize Fuller's specifications for big data have matured, I investigate whether comprehensive design as framed by Fuller's method shows promise as a trend enabling ecologically sustainable innovations. A historical look at Fuller's Design Science and the reflection on it in the *Emerge* workshop marks an opportunity to highlight and interpret the resurgence of comprehensive thinking in design while navigating the contradictions this orientation engenders.



## 1. Introduction

Global change induced by human activity is occurring at rates unprecedented in our history. Racing ahead too is our enhanced propensity to monitor, describe and contextualize this change by amassing eco-bio-social and geospatial data. Increasingly, decision makers seek to harness this "big data" to guide choices in management and policy settings as well as in professions that manufacture, build, and innovate with the hope of achieving a more complete view of problem spaces. At the same time, computational tools for systemic analysis of myriad natural, social and economic phenomena are shaping and redefining the way we view the scope and reach of problems, innovations and interventions. Global systemic interaction is now a dominant frame for decision making in important planning and policy concerns in defence, resource, economic and environmental management (Bloomfield, 1986; Godin, 2008; Hughes & Hughes, 2000; MacKenzie, 1990; Miller, 2004, 2005). Scholars argue that markets, science, technologies, and landscapes we have today are in conversation with increasingly holistic models of the problem frame.

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http://dx.doi.org/10.1016/j.futures.2014.12.011
0016-3287/

Evidence that innovators in multiple sectors are responsive to the notion of systemic interaction marks the ascendance of *comprehensiveness*. This frame is now a driver of design and planning, particularly as it relates to future studies. Recent work on futures and foresight methodology proposes tools for conducting meta analysis of alternate scenarios, as in "integral futures" and the companion concept of "integrative foresight". These methods emphasize inclusive participation in scenario building (Hideg, 2013; Ramos, 2010; Slaughter, 2008). Both are examples of efforts to take comprehensiveness into account methodologically. These novel methods for futuring project the complex and global decision frames that structure the problem spaces of today's designers and decision makers.

Scholars examining this trend diagnose it at once as techno positivist in its insistence on design yoked to quantifiable variables and computational modeling and, alternately, as an imperative integral to realizing ecologically sustainable innovation. Historians and cultural theorists have documented this wave of data-informed design as an expression of a modernist trend in "Total Design" wherein the innovator, whether she be an artist, designer, architect, or industrialist, exercises control over all environmental elements (Wigley, 1998). Others assert that artists and designers include scientific and social science data as inputs into increasingly techno positivist research processes in order to establish legitimacy and to secure resources for the humanities among the hard sciences and engineering disciplines (Dutta, 2013). At the same time, sustainability scientists concerned about industrial production as a negative driver of global change insist that taking stock of the effects of material production and manufacture on environments at the design stage is an urgent matter.

This article reflects on the role of futurists, designers, architects, urban planners, social scientists, and artists in interpreting and utilizing comprehensiveness as a design premise on the occasion of the inaugural *Emerge* conference at Arizona State University, entitled *Artists and Scientists Redesign the Future*. Among nine experimental foresight workshops, many focused on producing physical objects or media, one modeled and expanded upon a method pioneered by architect and polymath R. Buckminster Fuller, a figure among the first wave of 20th century thinkers to articulate a process that incorporated advances in strategic planning and computational modeling. The workshop involved experimental methods to heighten participants' awareness of global systems as nested in cosmic ones. Participants then interrogate the implications of these connections in relation to a given environmental design challenge through facilitated discussion. The workshop was conducted by members of the Worldviews Network, a collaboration of pioneering research and informal science education institutions committed to integrating visual systems and design thinking. The network is supported by a three-year environmental literacy grant from the National Oceanic and Atmospheric Administration's (NOAA) Office of Education.[1] A historical look at Fuller's Design Science and the reflection on it in the *Emerge* workshop marks an opportunity to highlight and interpret the resurgence of comprehensive thinking in design.

At a time when many of the capabilities to realize Fuller's specifications for big data have matured, I investigate whether comprehensive design as framed by Fuller's method shows promise as a trend for leading architects, urban planners, social scientists, and artists to produce ecologically sustainable innovations. I outline practical lessons that can be extrapolated from Fuller's "Design Science" for contemporary foresight practice. Fuller's legacy challenges contemporary futurists and designers to put theories about the benefits of reflexive design into practice while navigating the contradictions that this position engenders.

This article first relates the activities of the *Emerge* workshop, "Starting from Universe", illuminating its characteristic methodologies – the use of immersive data visualization and facilitated dialog – to inspire design that takes a comprehensive problem frame into account. I next place the workshop activities in historical context by introducing Buckminster Fuller's Design Science process as exemplary of the modernist sensibility in Total Design. I outline the grounds for a critique of Fuller's approach as techno positivism. In the discussion section, I suggest ways that parts of Fuller's process that have been overlooked by his critics might be reclaimed. The process has the potential to increase the reflexivity of innovators who not only marshal myriad data inputs, but also contend with social and cultural values in defining the goals of a given project. Finally, I distil practical lessons from Fuller's original process that could better inform contemporary design and futures practice.

## 2. Starting with Universe: the ASU *Emerge* workshop

The 2012 *Emerge* workshop began with fifteen attendees sitting cross-legged in a darkened twenty-five foot inflatable 'GeoDome' theater, viewing an immersive projection of a "cosmic zoom", the scene quickly moving out and away from the familiar "blue marble" of the Earth, through the solar system and the Milky Way to pause at the edge of a giant cluster of galaxies represented by the Sloan Digital Sky Survey containing more than 930,000 galaxies and more than 120,000 quasars out to the edge of what astronomers call the "observable universe".[2] This sense of universe is painstakingly crafted from 1s and 0s using a real time rendering data visualization software. It was in this atmosphere that this group of arts and theater faculty, graduate students, corporate and freelance designers, planetarium managers and visualizers began a two-day debate to determine what Fuller calls "the preferred state" of education for ecological design with the help of this curved scrim and immersive patterns of light and color (Fig. 1).

The 2012 *Emerge* workshop, *Starting from Universe: Design Science Now*, prototyped a new "Design Science" – drawing from a process articulated by Buckminster Fuller to link scientific data about the cosmos to ecological conditions on Earth

[1] See http://worldviews.net/.

[2] For detail about digital universe atlas, see (*Carter Emmart Demos a 3D Atlas of the Universe|Video on TED.com* n.d.).