Chapter 15
Big Data – Small World:
Materializing Digital Information for Discourse and Cognition

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ABSTRACT

This chapter furthers discourse between digital data content and the creation of physical artifacts based on an interpretation of the data. Building on original research by the author, the chapter asks the questions: why should we consider translating digital data into a physical form? And what happens to how we understand, read, and relate to digital information when it is presented in this way? The author discusses whether or not the concept of the data-driven object is simply a novel visualization technique or a useful tool to add insight and accessibly to the complex language of digital data sets, for audiences unfamiliar with reading data in more conventional forms. And the author explores the issues connected to the designing of data into the material world, including fabrication techniques such as 3D printing and craft-based making techniques, together with the use of metaphor and visual language to help communicate and contextualize data.

INTRODUCTION

In the 1990's the arrival of domestic computing and mainstream digital technologies signaled the start of a concerted effort to digitize all forms of creative, cultural and scientific content from the past, present and future. Two decades on the digital is a fully integrated meta-form that drives many of our communication tools, social activities and work practices (Gwilt, 2010). After this initial wave of digital integration, more careful consideration as to the relationship between our physicality, environmental surroundings and material artifacts, and how this links with a range of digital technologies is beginning to take place. A reconsideration of biological necessities and the recognition of the human hardwiring into Euclidian space has begun to raise questions about the singularity of digital culture. As yet the promise of a transcendent digital virtual reality has failed to live up to expectations and a new way of interacting with the digital is beginning to unfold. In the computer games world game-play has been combined with

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gestural interfaces where players can see the unmediated expressions of their competitors. Biomorphic forms in architecture and product design signal a new zeitgeist in urban design as digital technologies have developed the processing power to model and visualize the complex curvilinear shapes and patterns found in nature. In the built environment everyday objects such as chairs and automobiles are increasingly enabled with sensors and user-feedback technologies that can respond to and even pre-empt our individual needs and relationship with the physical world. The Internet of things is becoming a reality, realized through digital connectivity and the concept of 'everything, all the time'. Sensing technologies are capable of remotely collecting our every interaction and this capacity plays an important role in the big data revolution. Wireless mobile technologies have moved the experiences of the digital computer into the street and the public arena where their use is becoming increasingly commonplace, connecting the digital with real-world events and locating our engagement with computing technologies into real-time social, cultural and political contexts. These distributed, pervasive digital technologies are beginning to have a major impact on the fabric of society, from how we access healthcare, to how we do our shopping, work, travel, and communicate.

The technological and perceptual dispersal of the digital computer from something that sits on the office desk, into increasingly embedded, distributed and multiform constructs, also disarms the often talked about binary opposition between the digital and the physical. As computing technologies become increasingly located and related to place and social contexts of use, the potentials for the digital to augment and interact with material culture become more opportune. In terms of information visualization this closer relationship does two things: it provides new opportunities for content forms; and drives the desire for data visualizations that speak to both our real-world and digital interactions. The cultural theorist Pierre Levy (1998) refers to this diverse range of digital integration as a type of accelerated techno-cultural heterogenesis. The shift in emphasis back toward the physical does not however, mean that we are about to give up the connectivity, convenience and enabling potential of our digital technologies. Although the experiences promised by immersive virtual reality have yet to find a place in our mainstream engagement with computers, the types of informed digital/material constructs described in this paper are beginning to gain wide spread recognition. Terms like augmented, and mixed reality are increasingly being used to describe a set of relationships, technologies and expectations for a variety of combined, digital/material constructs. These neologisms are becoming part of the public vocabulary in an increasingly technologized society.

Predictably then, the tendency toward the materialization of the digital is also occurring in the area of computer-based information visualization, which is in itself a relatively new phenomenon. The materialization of digital data is facilitated by the development of a number of new manufacturing technologies such as 3D printing and Rapid Prototyping techniques that allow for the translation of digital data into physical forms. I will discuss the potential of these techniques later in the chapter through a number of applied examples. In the next two sections we will continue with a short overview of contemporary data collection and information visualization.

DATA COLLECTION, BIG DATA

Digital technologies continue to provide numerous embedded data collecting points that glean information from our everyday interactions with the world, both analogue and digital. The data trails of people, computers, economies, healthcare services, communication and leisure activities are leading to an