Chapter 4
Clash of Cultures:
Fashion, Engineering, and 3D Printing

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ABSTRACT

In 2012, a Belgian company called Materialise hosted a fashion show featuring designs from a worldwide millinery competition. The featured pieces were paraded down a catwalk by professional models, and an overall winner chosen. What made this fashion show unusual was that the attendees were predominantly clinical and industrial engineers, and the host was a specialist engineering and software development company that emerged in 1990 from a research facility based at Leuven University. Engineers and product designers rather than fashion designers created the millinery and the works were all realized through additive manufacturing technology. This chapter provides an example of how fashion design has become a creative stimulus for the development of the technology. It illustrates how disruptive creativity has the potential to advance scientific research, with the two worlds of engineering and fashion coming together through a collaboration with industrial design. The chapter highlights the challenges and possible implications for preparing trans-disciplinary research teams.

INTRODUCTION

Additive manufacturing, now more commonly known as 3D Printing (3DP), began as a prototyping technology in the mid-1980s. After gaining traction in product design, architecture and engineering as a resin based visual modeller, this technology has matured with the development of new materials and equipment. These have opened up new areas for research and possibilities for production applications, as detailed by leading researchers in the field, Gibson et al (2014), Lipson (2013) and Anderson (2012). Although the technology is now starting to impact across almost all fields, from animation to construction, over the twenty years of its initial development the majority of research in the area of direct manufacturing for 3DP has been concentrated into two main themes. The first is medical, with specialists in areas such

DOI: 10.4018/978-1-5225-9624-0.ch004

a regenerative medicine, orthopaedic surgery and artificial heart development recognising a myriad of potential applications for the technology, from the bioplotting of cells to titanium implants. The second is industrial, with applications for 3DP explored in commercial applications such as for automotive and aerospace, with particular advances in light-weighting and material performance. Yet scientific research into additive manufacturing has been slow to capture attention both in terms of funding and in the eyes of the public as well as potential industry partners. In the last three years, fashion design has proved to be a vehicle for all three. 3D Printed fashion has caused disruptive change in the development of research in this field. The inspiration provided by fashion designers has provided a basis for innovation that has been realized by industrial designers and engineers in recent practice. This chapter discusses the value of trans-disciplinary research practice based on teams that include both scientific researchers in fields such as engineering and medicine, as well as creative researchers from design and art. It also outlines some of the challenges facing these teams that arise from a clash of cultures in values, approach, practice, aims and outcomes. It then goes on to more specifically provide an example of collaborative practice where fashion and engineering, and then fashion, industrial design and engineering, come together. The example highlights the role of the industrial designer in the collaboration, in providing a practical link for creative practitioners interested in working with 3D Printing technology, but without the understanding of design for 3DP or technical skills to achieve it on their own, to realize their ideas. However, this example highlights how the complexities of design for process in relation to 3DP mean the industrial designer has to evolve the design as part of the process, rather than providing a form of 3D documentation after the design has been completed, which challenges dominant practice in a field such as fashion design. The objective of this chapter is to illustrate that for collaborations around this cross-disciplinary technology to work, and for new trans-disciplinary research practice between creative and scientific researchers that transcend conventional practices to emerge and be effective in new ways, the different roles within the team have to be interrogated and ground rules established to avoid a clash of cultures on many different levels.

BACKGROUND

According to Milton and Rodgers (2013), “Unlike scientific research, design research is not concerned with what exists but what ought to be. Research in a design context breaks with the determinisms of the past; it continually challenges, provokes and disrupts the status quo” (p.11).

Research into additive manufacturing, now more commonly known as 3D Printing, has been embedded in scientific research communities since its inception. Dominated by materials science, mechanical engineering, robotics and medical research, it has developed incrementally, resulting in additional forms of the technology, such as material jetting and selective laser melting, and an increasing range of material properties, such as the bimetals developed by researchers at NTU. Progress in the field has been disseminated in research journals that are predominantly materials and technology focussed and that research has tended to be technical, as in the example by Qain (2015) on metal powders for additive manufacturing in the Journal of Minerals, Metals and Materials.

Although multidisciplinary, the roots of research in this area cannot be characterized as cross disciplinary. Yet studies on the organisation of research practice are suggesting that innovation in research is stimulated by multidisciplinary teams and by trans-disciplinary thinking, where trans-disciplinary research is characterized as working in new areas between disciplines. The argument is that a trans-disciplinary