

Chapter 1

Introduction and Background to Technology and the Arts



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Abstract Interactions between disciplines are reviewed. The long history of the relationship between the arts and sciences is summarized, and the challenges at the interface are outlined. The historical developments between technology and the arts are summarized, including computer arts, computer animation, digital media, and digital humanities. The current enablers for progressing interdisciplinary collaborations are presented. The possibility for a new Renaissance between technology and the arts is discussed.

Keywords Forms of knowledge · Scientific revolution · Cultural context · Computer arts · Story-telling · Reciprocal relationships · Renaissance teams

1.1 Interactions Between Disciplines

Interactions between disciplines have always had the potential to be exciting and ground-breaking. It can take the participants on all sides into new areas, often uncovering new understandings and new forms of knowledge. However, cutting across the boundaries of disciplines can take researchers out of their traditional comfort zones, and can be uncomfortable and challenging for all parties. It has been assumed in the past that it is a priority for a particular discipline to protect its legacy, its areas of interest, and the particular body of knowledge that it has established and would claim as its heritage. This is the foundation upon which new knowledge is expected to be built. This has been mirrored to some extent by the structures set up in the academy to study and disseminate knowledge and research in the disciplines. This foundation built over many years can result in inertia and a wish to maintain the status quo.

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However, new disciplines can arise at the boundaries between existing disciplines. Examples are oceanography, cognitive science, genetic engineering, tribology, and digital media. Developments and advances such as these have focused attention on the interface areas between disciplines, and they are increasingly being recognized as important for support and investment.

1.2 Relationships Between the Arts and the Sciences

There has been a long history of antipathy between the arts and the sciences due to different modes of discourse, different forms of language, and different ways of working. This appears to have been caused principally by the early forms of education from the foundation of the academy until the scientific revolution from the sixteenth to the eighteenth centuries. Prior to this revolution, many understandings of the natural world were often misguided and erroneous because they were not based on a systematic and rigorous methodology. It is understandable therefore that attention in the academy should concentrate on what was regarded as the development and disciplining of the mind by means of subjects such as grammar, rhetoric, and logic. Later on, physics, metaphysics, and moral philosophy based on an Aristotelian framework were also included. Mind took the pre-eminence over matter. The natural world was regarded as an environment for the use of tools and the work of tool-smiths, and therefore not suitable for academic study. It was not until the key discoveries of the scientific revolution that a systematic enlargement of the curriculum in the academy took place, to produce the arts and the sciences as we have them today.

1.3 Historical Developments in the Relationship Between Technology and the Arts

1.3.1 Computer Arts

The Computer Arts Society [1] in the UK was founded in 1968. Its objective is to promote the creative uses of computers in the arts and culture. It acts as a forum to bring together those with interests in the cultural impact of information technology, and the various ways this impact can occur. This can involve those who create cultural artefacts by information technology or manage collections or those who are seeking to interpret and understand the cultural implications of the artefacts. An archive of the collections of the Computer Arts Society is hosted by the Victoria and Albert Museum in London, UK, and is part of their Computer Art Collections. Mason [2] and Brown et al. [3] detail the early history of computers and the arts up to 1980.

Franco [4] detailed the work of Edmonds on generative systems art from the 1960s to the present day. This explored the relationship between art and computer

technologists in terms of concepts, tools, and forms of art. Candy et al. [5] reviewed the history of art and technology collaborations highlighting the contributions of practitioners and researchers at the interfaces between technology and the arts.

In the UK in the 1980s, Lansdown and Earnshaw brought together the output from the joint work of the Computer Arts Society and the Displays Group of the British Computer Society. This work consisted of contributions to visualization, computer art, design, and animation [6]. It was recognized that the boundaries between these various disciplines were blurring due to the increasing power and capability of the computer and the facilities of software packages, with interfaces that were more accessible and user-friendly for arts users.

Computer Art and Technocultures was a 3-year project supported by the Arts and Humanities Research Council (AHRC) in the UK to study the history of computer-generated art. The project was based jointly at Birkbeck College and the Victoria and Albert (V&A) and was completed in August 2010. A display at the V&A on Digital Pioneers was exhibited from December 2009 until April 2010. An associated symposium, *Ideas before their Time* [7], was held at the British Computer Society, and a two-day conference, *Decoding the Digital* [8], at the V&A on 4–5 February 2010. Dodds [9] and Beddard and Dodds [10] provide an account of the V&A's collections and their relationship to art history, and their social and technological context and implications. It also examines the outputs of the AHRC project. These are also summarized as part of the project [11].

1.3.2 Computer Animation

Making images move has been a preoccupation of computer technologists from the earliest days of computers [12]. Prior to this, successive frames of an animated sequence had to be composed on print media and then filmed, which was a time-consuming process. With the advent of computer displays and software, image sequences could be created and displayed directly. This facilitated ease of editing and re-display, which was more time consuming with print-based media.

Today there is a wide variety of desktop software packages that enable home users to create animations with audio tracks. Vince [13] discusses animation techniques, animation hardware, and animation software such as Softimage, Maya, 3d Studio Max, and Lightwave. Post-production techniques are presented, and animation applications are reviewed. Such Computer-Generated Imagery (CGI) has found widespread use in the applications such as special effects in films, computer games, advertising, computer-aided design, and simulation. However, computer technology of itself does not provide an automatic or easy solution. The imagination and creativity of the person formulating the animation need to be the fundamental driving force. The hardware and software technology are just tools and need to be used appropriately [14]. Animated films such as Pixar's *Toy Story* [15], which won awards, illustrate this point. It is the story which draws in, and captivates, the viewer. Therefore, in order to be effective artistically, animation sequences are designed and chosen

to best represent the story. Story-telling is itself an art and has a long history [16], whether in oral form or using various forms of media that were available at the time in earlier centuries.

1.4 Digital Media

Collaboration in the production of digital media may involve a variety of discipline specialists. This is because of the diversity of its constituent parts such as hardware, software, digital images, digital, audio, sensors, games, interaction devices, and social media. This in turn may involve different constituencies such as industry, the academy, research and development organizations, and Small and Medium Enterprises (SMEs) with all their different cultures and working practices [17, 18]. The challenges are therefore significant. However, for those with a good collaboration methodology geared to generating successful outcomes, the rewards can be substantial.

1.5 Digital Humanities

On the wider front, the humanities disciplines such as history, literature, and philosophy are increasingly using computational tools and facilities to advance their research. Digitized texts can be searched, word frequencies can be calculated, and indexes and concordances can be produced [19]. In addition, image processing and 3D recording can be useful for pictorial data and 3D spaces such as museums and heritage sites [20]. Two broad areas of digital humanities research may be identified: firstly, the use of digital tools to perform and extend research in the humanities and, secondly, the use of humanities applications to perform research in computer science in the development of new interfaces and more advanced tools. Thus, there is a mutual reciprocity between technology and the humanities, even if this is not initially recognized [21]. The cultural context of computing also needs to be taken into account when evaluating its contributions. Such interdependencies are of increasing importance when seeking to understand current interdisciplinary activity and define potential ways forward for the future.

1.6 A New Renaissance?

The Renaissance in the fourteenth century onward marked a transition from the medieval era to modernity, and it opened up the possibilities of new horizons and new ways of thinking and working. Similarly, Renaissance Teams [22] in the twenty-first

century offer the opportunity to utilize the expertise now available and work together toward a common objective which can transcend the traditional boundaries of the past.

This point is illustrated and exemplified by the contributions to this book.

This book brings together a variety of national and international authors who present current research and development at the interface between technology and the arts and humanities. The chapters are grouped into themed sections as follows:

Section 1: A Panoramic View of the Field.

Section 2: Facilitating Communication between the Arts, Technology, and Audiences.

Section 3: Interactions Between the Arts and Data.

Section 4: Audio Visual Installations to generate Collective Human Responses.

Section 5: The Convergence of Digital Design, the Arts, Computing, and the Environment.

Section 6: The Use of VR and AR to extend Creativity, Reach, and Engagement in the Arts.

These sections present an increasing reach across the interface using the following modalities—communication, interaction, installation, convergence, and the utilization of VR and AR technologies. The book concludes with an assessment of the extent to which the current opportunities and challenges are being addressed and realized.

The convergence of IT, telecommunications, and media is bringing about an explosion of data and also a revolution in the way information is collected, stored, and accessed. There are three principal reasons why this is happening—reducing cost, increasing quality, and increasing bandwidth. This is likely to result in a closer relationship between technology and the arts and humanities.

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