BENTKOWSKA-KAFEL, A., DENARD, H. and DREW, B. *Paradata and Transparency in Virtual Heritage*, Farnham: Ashgate. 2012. 336p, ISBN-10: 0754675831 ISBN-13: 978-0754675839. £54

This latest volume in the *Digital Research in the Arts and Humanities* series will be essential reading for anyone who creates, consumes, or curates 'computer generated imagery'. Arranged in three sections 'Conventions and emerging standards', 'Data interpretation: methods, and tools', and 'Data management and communication', this wide-ranging text covers areas as diverse as 'Walking with Dragons: CGI in wildlife 'documentaries'' through 'Lies, damned lies and visualizations', to 'Transparency for empirical data'.

The first section of the book concentrates on the dis-connect between the use of Computer Generated Images (CGI) in entertainment, and as objects in academic research, and the standards that are beginning to emerge around the concept of 'transparency'. As Anna Bentkowska-Kafel states in the introduction "By demonstrating scholarly excellence and best technical practice in this area, this volume is concerned with the challenge of providing intellectual transparency and accountability in visualization-based historical research".

Paradata differs from metadata in that it does not describe the object or artefact that you see, but the human processes by which it came into being. Whilst a CGI of a character in a fictitious movie can be purely a figment of the artist or author's imagination, the CGI of an historical structure or event needs paradata information to give it legitimacy. The 'London Charter' is a standard establishing core principles and guidelines for the computer-based visualization of heritage materials, the first instantiation of the charter was drawn up in 2006, and has now reached Version 2.1 (2009).

In chapter 5 Donald H. Sanders examines archaeological evidence trails and how 'digital archaeology' can solve problems relating to evidence and outcomes, providing virtual worlds as visual indexes of all the information that has been gathered about a site. The chapter examines the historical 2D visualization of archaeological excavation through plans, stratigraphy and photographs, and the development of virtual reality into archaeology in the 1990s. The chapter concludes with the question 'Virtual heritage; is it authentic or fantastic?' offering the conclusion that'…visualizations …can instil greater confidence in [our] ability to produce believable interpretations of history rather than mere pretty pictures of the past.'

In Chapter 8 'Walking with Dragons' by Mark Carnall, he discusses the BBC series 'Walking with Dinosaurs' in the light of our familiarity with CGI as used in feature films such as 'Ice Age', Jurassic park' and others. The rise of the CGI documentary, which blends computer models with real environments, blurs the distinctions between what is real and virtual intentionally. The difficulty of authenticating what we see on-screen lies in how any paradata can be accessed. In the case of 'Walking with Dinosaurs' two accompanying books were published, with one of these 'Walking with Dinosaurs: The evidence', providing readers with information about the difficulties of drawing solid conclusions from evidence that

can lead to multi-theory hypotheses. The chapter goes on to discuss the dissemination of programmes such as these on DVD, with its access to supplementary materials available on-disc.

Other chapters examine the physiological connections between what is seen and what is understood, how paradata is collected as part of the 3D modeling workflow, and the concept of transparency for empirical data.

The final section of the book 'data management and communication' examines difficulties experienced by those who produce detailed, realistic virtual models, because these are often equated with 'entertainment'. Chapter 15 examines the concept of 'Transparency for empirical data' looking at the Dublin Core metadata structure and the UNESCO 'Conceptual Reference Model (CRM)'. The 16 contributors, across 18 chapters, discuss a wide range of issues around the concepts of paradata, transparency, and virtual heritage. In her conclusion Anna Bentkowska-Kafel emphasises the importance of "records of process (paradata) [becoming] a standard, integral part of heritage visualisation practice". The primacy of 'process' in the visualisation pipeline is stressed with the observation that "computational models are better understood as temporary states in a process of coming to know, rather than fixed structures of knowledge".

By addressing a range of conceptual and technological challenges this title demonstrates that providing intellectual accountability, or 'transparency', is the key to establishing computerised visualisation methods as a rigorous, constructive, and vital contribution to historical research and its communication.

Stephen Bowman
Deputy Librarian
University of Chichester
s.bowman@chi.ac.uk