Guest editorial

Technology and records management: disrupt or be disrupted?

Disruptive technologies
Definitions of disruptive technologies vary and include "a new technology, such as computers and the Internet, which has a rapid and major effect on technologies that existed before" (*Collins Advanced English Dictionary*, HarperCollins), "a new technology that completely changes the way things are done [overturning] a traditional business model" (*Cambridge Business Dictionary*, Cambridge University Press) and one that "supersedes an older process, product, or habit.[and] usually has superior attributes that are immediately obvious, at least to early adopters" (Smith, 2020). What emerges from these definitions is that such technologies offer potential for change, cause change, "are difficult to prepare for because they can appear suddenly" (Smith, 2020), and that their adoption carries potentially significant risk as well as reward. This is the perspective taken for our themed issue.

The origin of the term disruptive technologies is widely attributed to Clayton Christensen, who passed away in January this year, but it is disingenuous to do so, as it first appeared in a 1995 paper – *Disruptive technologies: catching the wave* – which he *and* Joseph Bower co-authored (Bower and Christensen, 1995). Both were scholars at the Harvard Business School at the time; Bower held the more senior position and is the first named author on the paper. However, it was Christensen who "popularized" the notion in a business context when he first proposed his theory of "disruptive innovation" (Christensen, 1997). While Bower and Christensen did not offer a definition of disruptive technologies *per se*, they discussed them in the context of the failure of established companies to "stay on top of their industries" (Bower and Christensen, 1995 p. 43) in the face of new technologies.

Current disruptive technologies include artificial intelligence (AI), machine learning, quantum computing; Internet of Things (IoT); blockchain and other distributed ledger technologies; edge computing; immersive experiences such as virtual, augmented and mixed reality; advanced technology based tools such as search, discovery and disclosure and graph databases. Many are covered in these themed issues.

In a records, archives and information management context, we are very familiar with disruptive technologies – the first printing press to the typewriter, fax machine and photocopier were all "disruptive" in their time. Email, office and line of business systems, social media and, of course, all of the hardware and storage devices continue to be. So what is new or different about disruptive technologies today? Are they, by any other name, emerging technologies? Gartner have preferred to use the latter in their annual Hype Cycle of key technology trends (Gartner Inc., 2019a) and are now using the phrase "strategic technology", which they describe as "one with substantial disruptive potential" (Gartner Inc., 2019b). It is in this context that the idea for a themed issue dedicated to such technologies was born.

Aim and content of the themed issues
The aim was to focus on the opportunities – i.e. the potential – as well as the challenges of disruptive technologies for archives and records management, and also for records professionals. Such was the response to the call and the quality of the submissions that it is being published in two parts across two separate issues – the first part brings together contributions examining a variety of disruptive technologies and the second focuses on distributed ledger technologies and record linking. The contributions include viewpoints,

critical reviews, research, case studies and conceptual papers. The contributors are researchers, academics and practitioners from across the world with some different disciplinary perspectives.

The range of technologies featured in the first of the two issues is AI, natural language processing (NLP), algorithms, IoT and virtual reality. Some contributions explore examples of how these technologies can be or are being used to innovate (disrupt) records processes – for example, algorithmic methods to automate appraisal (Shabou *et al.*), NLP and machine learning for appraisal and sensitivity reviews (Hutchinson), and IoT devices for environmental monitoring (Maceli) – while Lischer-Katz explores how virtual reality is demanding disruption of established archival digital preservation practice. Others explore how archival science theory and records management principles can be used to manage data produced or processed by these technologies to improve the quality of a contemporary French corpus used by AI tools, and hence improve the tools (Chabin), and to manage government agencies' IoT data (Sodring). In contrast, and taking different multidisciplinary approaches, both Andresen and Bunn explore how we might explain the content of records that are the output of automated or algorithmic processes and machine learning in the context of transparency, accountability and trust.

The second issue primarily focusses on distributed ledger technology, in particular blockchain, and is complemented by two articles using different technology to link records/ record collections. For those less familiar with blockchain technology Sodring provides a very good introduction while Bhatia, Douglas and Most provide a review of this technology, which began as a whitepaper produced by the US National Archives and Records Administration. Both papers explore potential/actual applications of blockchain in a record keeping context, and how it addresses key concerns of authenticity and trustworthiness. The information governance implications of distributed ledger technologies such as blockchain are analysed by Franks and Lemieux *et al.* with both papers offering (different) analytical approaches. Franks offers a model for assessing the records management and information governance challenges such technologies present, to inform the design of solutions that address record keeping requirements. Lemieux *et al.* analyse the decentralisation implications of distributed technologies for three facets of information governance (viz. custody, ownership and right to access data) through two case studies in different national contexts. Bralic, Stancic and Stengard explore the use of blockchain as an alternative method for long-term preservation of digitally signed records, which can be combined with any digital archive. These articles are particularly valuable for our discipline in the context of predictions that "blockchain will be fully scalable by 2023" (Burke, 2020). In contrast to distributed *technologies*, Bell and Bryant *et al.* explore the use of computational methods for distributed *collections* of records. Bryant *et al.* share the work of the European Holocaust Research Infrastructure project to link and hence virtually integrate multiple trans-national Holocaust-related archival collections, some of which are not wholly in digital format, while Bell shares the experimental results of using different record linkage techniques to understand the holdings of archival collections, already catalogued and ordered, at The National Archives of the UK, one of which is the UK Government's Web archive.

Ethical issues of new digital technologies are either explicitly raised in some of the articles across the two issues or are implicit within them. It is therefore appropriate that the themed issues close with an article focussing on ethics with Ibiricu and Van der Made calling for an "ethics by decision" approach and offering a ten-step process for developing a Code of Ethics for such technologies. Their contribution is very timely, given transparency and traceability is one of Gartner's top 10 strategy technology trends, which they state are

"critical elements" for supporting digital ethics and privacy requirements (Gartner Inc., 2019b; Burke, 2020).

Conclusion
Together the articles in the two themed issues offer practical examples of how disruptive technologies can and are being deployed for managing records in innovative ways, exploring the challenges they present and their impact (realized or potential) on records processes, creators and users. The contributions challenge established theory and practice, identifying opportunities for records professionals and for reorienting records management and archival principles. They identify the need for further research and development, debate and collaboration.

Almost a quarter of a century ago, Christensen wrote "the ultimate uses or applications for disruptive technologies are unknowable in advance. Failure is an intrinsic step toward success" (Christensen, 1997, p. 99). As records professionals, we might reflect on this in evaluating the potential of such technologies, identifying our role in their adoption and in developing our own strategies. We can either use disruptive technologies to change how we achieve records management and archival science goals and functions or allow them to change us and our role, either positively or negatively. This is the proactive vs reactive approach – the decision is ours to make.

Julie McLeod
Department of Computer and Information Sciences, Northumbria University, Newcastle upon Tyne, UK, and
Richard Marciano
College of Information Studies, University of Maryland at College Park, College Park, Maryland, USA

References

Bower, J.L. and Christensen, C.M. (1995), "Disruptive technologies: catching the wave", *Harvard Business Review*, January-February, pp. 43-53.

Burke, B. (2020), "Gartner: top 10 strategic technology trends in 2020", *Computer Weekly*, 2 January, available at: www.computerweekly.com/opinion/Gartner-Top-10-strategic-technology-trends-in-2020

Christensen, C.M. (1997), *The Innovator's Dilemma: when New Technologies Cause Great Firms to Fail*, 1st Ed. Harvard Business Review Press.

Gartner Inc (2019a), "5 Trends appear on the Gartner hype cycle for emerging technologies", available at: www.gartner.com/smarterwithgartner/5-trends-appear-on-the-gartner-hype-cycle-for-emerging-technologies-2019/

Gartner Inc (2019b), "Gartner identifies the top 10 strategic technology trends for 2020", available at: www.gartner.com/en/newsroom/press-releases/2019-10-21-gartner-identifies-the-top-10-strategic-technology-trends-for-2020

Smith, T. (2020), "Disruptive technology", available at: www.investopedia.com/terms/d/disruptive-technology.asp