

## Digital History in Canterbury and New Zealand



Digital History – the use of computational methods to analyze, understand and disseminate knowledge about the past – has been evolving since the 1960s, slowly developing scholarly standards and accumulating a range of accepted technical methods.<sup>1</sup> In its modern guise it is related to Public History, but it has applications across all the sub-disciplines.<sup>2</sup> Public historians can use it to publish historical writing on the world wide web, or create archives of historical sources using increasingly easy-to-use software. Economic historians can analyze vast datasets that are being made openly available online, medievalists can view delicate manuscripts from anywhere in the world, and there are emerging techniques in 3D visualization, geo-spatial mapping, and natural language processing that offer exciting new opportunities to understand the past. All of this translates into new pedagogical opportunities and imperatives. We have never been in a position to make History more engaging for students and the general public or to open up more new vistas of knowledge, but there are few people capable of teaching the new skills – and the technologies come with a cost. While it is fair to say there is no turning back now, there are also significant challenges ahead.

We find ourselves at a difficult juncture: on the one hand we have a range of freely available tools and methods anyone is encouraged to experiment with, and on the other we are faced with a fast-developing sub-discipline that demands not only an awareness of its central tools, methods and critical debates, but an understanding of technical concepts and the ability to write computer code. It is becoming clear, moreover, that digital historians have a responsibility to help build next-generation eResearch infrastructures, which are being developed on a grand scale in the United States, United Kingdom and Australia but have not yet been seriously considered in New Zealand. We also have a responsibility to develop assessment standards that can be applied to student and staff projects. At the moment, while good intentions abound and the promise of present and future technologies is exciting, it is difficult to develop digital history projects without making up quality assessment procedures as you go, and it is very difficult to find qualified internal or external reviewers.<sup>3</sup> While New Zealand historians have been well served by our colleagues in the digital cultural heritage sector in Wellington, we are behind the rest of the world in developing capacity in our universities.

Digital history is by no means a new entrant to the historical tradition, but it has always had difficulty gaining traction. As early as 1967 Vern L. Bullough lamented, ‘Historians have been somewhat slower than members of other disciplines to realize the implications of computer technology in their study and research’,<sup>4</sup> and as late as 1994 Roy Rozenweig felt it necessary to point out the possibilities inherent in CD-ROM publishing to a skeptical audience.<sup>5</sup> The situation wasn’t helped by the resistance to cliometrics and quantitative history that began in the 1970s. This was symbolized most forcefully in the furore surrounding Robert Fogel and Stanley Engerman’s *Time on the Cross: The Economics of American Negro Slavery*, which used computers to argue (amongst other things) that black American slaves weren’t treated as badly as previously thought, and that the economic foundations of slavery were sustainable.<sup>6</sup> The resulting debate cast doubt on Fogel and Engerman’s methods, and indicated that raw computation was an inappropriate approach for History as a discipline.<sup>7</sup>

The appearance of the Netscape browser and development of the world wide web after 1994 did little to increase uptake, leading instead to sometimes vigorous criticisms of new (but limited) resources like the *Fordham Internet History Sourcebooks* that aimed to use web technologies to increase access to historical documents.<sup>8</sup> The appearance of innovative websites like *The Valley of the Shadow*,<sup>9</sup> produced by the University of Virginia, were more than offset by corridor conversations about the horrors of Wikipedia, followed soon afterwards by laments about the comical yet devastating effects Twitter was going to have on the consciousness and writing ability of students and the general population. It’s fair to say that historians have tended to look askance at the digital world. In many ways this is understandable: digital technologies, and the world wide web in particular, remain immature tools.

It is only very recently indeed, prompted by the growing dominance of digital culture in our daily lives, that criticism has become muted and people are speaking positively about a ‘computational turn’ setting in across the humanities as a whole.<sup>10</sup> The newly minted ‘digital humanities’ movement, itself a direct outgrowth of the post-World War Two humanities computing tradition, is making headlines in publications as varied as the *New York Times*,<sup>11</sup> *Ars Technica*<sup>12</sup> and the *Chronicle of Higher Education*.<sup>13</sup> The voices of (ill-informed) literary critics like Stanley Fish,<sup>14</sup> Anthony Daniels<sup>15</sup> and Stephen Marche<sup>16</sup> have attempted to mount a rear-guard action on behalf of their discipline, but little criticism has been heard in the historical profession. On the contrary, in 2012 the American Historical Association simply proclaimed: ‘The Future is Here.’<sup>17</sup> This renewed interest is occurring at the same time, of course, as we experience a new spike in the ongoing ‘crisis

in the humanities': post-industrial culture, economic disintermediation, new media culture, the commodification of education, and the corporatization of universities are bearing down on an embattled academic community already tired after decades of restructuring and loss of influence.<sup>18</sup>

At this point, then, after decades of arguing for the benefits of digital history, it is crucial that historians get it right. We've seen this before. Manfred Thaller has observed spikes in interest in digital humanities in nearly every decade since the 1960s, resulting in a flurry of breathless articles and experimentation, and equally hard crashes when impossible promises weren't fulfilled.<sup>19</sup> Each time, newcomers move off to other pursuits, leaving serious scholars at their mainframes and desktops to get on with the very difficult job of building a strong tradition. With every cycle the technology gets better and the Promised Land seems closer, but when we sit back and look at the technology – the hard-drive platters, bits and code – we still find significant hurdles. As easy as it is now to use digital technologies, it remains difficult to use them in a robust and critical manner in keeping with History as a discipline. The challenge for the current generation of historians lies in robust digital methods, high-quality digital outputs and the development of measures that can adequately assess those outputs. It's a field that welcomes experimentation, play and newcomers, but increasingly requires a broad understanding of technical best practice and current scholarly discourse. There's little point, and significant reputational risk, in producing graduates who think they can do 'digital history' without knowing the basics of best practice. The best digital historians are being hired to lead major cultural heritage initiatives; increasing numbers of postdoctoral and faculty positions require expertise in digital tools and methods; and graduates from overseas universities are finding work in a variety of organizations (academic and otherwise). Despite the efforts of Sydney Shep in Wellington, who has been raising awareness of what digital history is and providing forums for learning and knowledge exchange, academia remains behind in terms of maturity, understanding of best practice, and engagement with the international scholarly conversation.

We have a lot to work with, of course. Excellent work has been done in the government sector, through the National Library and the Ministry for Culture and Heritage in particular. The National Digital Forum provides both a forum and a very good national conference, and libraries, galleries and museums have been improving their infrastructure and organizational capabilities for many years now. *Te Ara: The Encyclopedia of New Zealand*<sup>20</sup> provides a world-class benchmark for digital publishing and *New Zealand History Online* is an essential resource.<sup>21</sup> *Papers Past*<sup>22</sup> and *AtoJs Online*<sup>23</sup>

are just two examples of a growing body of primary source material made available through the National Library's digital units, and DigitalNZ<sup>24</sup> leads the world in cultural heritage metadata aggregation. The Government Digital Archive Programme<sup>25</sup> appears well positioned to lead us into the next decade of digital archiving. Most historians are unaware that projects like these provide a lot more than source material, however. In providing access to digital sources, they not only enable traditional 'analogue' modes of history, but offer to open up a whole new world of historical method (ideally) enabled by Application Programming Interfaces (APIs) and based on computation, archiving and preservation, visualization, remixing and quantitative analysis. As well as producing scholarly texts like *Te Ara*, electronic journals, blogs and Twitter feeds,<sup>26</sup> and working with software teams to develop archival resources, digital historians are heavily involved in topic modelling and natural language processing, image analysis, archive development, data visualization, metadata standards definition, tool building, linked open data and the semantic web, Geographic Information Systems (GIS), desktop fabrication (3D printing), open access publishing, next-generation peer review systems, and programming and database development using a broad variety of technologies. These practices, moreover, occur within a developing critical and methodological conversation informed by History as a discipline as well as the broader digital humanities community.<sup>27</sup>

Before the Canterbury earthquakes, the University of Canterbury was perhaps typical in terms of the growth of the digital humanities and digital history. Individual staff members across the College of Arts, increasingly convinced by the usefulness of digital tools and methods, began experimenting with digital outputs entirely independently, leading most famously to the creation of *Arts and Letters Daily* in 1998 by Denis Dutton of Canterbury's Philosophy Department<sup>28</sup>. The Canterbury History Department produced an electronic bibliography for local history, and some years later I produced a moderately successful website called *University History* (2006),<sup>29</sup> which aggregated high quality digital sources. This was at basically the same time as the now world-leading Roy Rosenzweig Center for History and New Media (RR-CHNM)<sup>30</sup> was being established at George Mason University in the United States. Although the tempo slowed for some time, work continued at Canterbury over the following years, often in conjunction with the university Web Team and the Canterbury Museum.

The recent earthquakes in Canterbury, however, have stimulated a significant growth in activity around digital history, prompted in large part by the development of the UC CEISMIC Canterbury Earthquake Digital Archive,<sup>31</sup> and the establishment of a senior lectureship in Digital

Humanities. UC CEISMIC has been led by Paul Millar (also a key figure in the development of the New Zealand Electronic Text Centre).<sup>32</sup> I was hired as project manager, responsible for the technical design and build and for handing the completed system to an operational team. After the archive was delivered into production I was assigned the task of developing an Honours programme in Digital Humanities. The archive was inspired by the 9/11 archive,<sup>33</sup> built by RR-CHNM to store digital content associated with the attacks in New York and Washington DC in 2001. Although it might seem strange that historians would get involved in such work, on reflection it makes perfect sense: the historical community is acutely aware of how vulnerable born-digital materials are to loss. Although new technologies make it easier than ever to record significant events, they make it equally easy for people to delete valuable content from their mobile phones or computers after life returns to normal. Similarly, although services like Google are excellent for locating recent content, as time goes by less popular content gets relegated further back in search results until it becomes very difficult to find. So little content is produced in analogue format now that future researchers will be severely restricted in the range of their sources if efforts aren't made to preserve as much digital content as possible, and to do so as soon as possible.

The only responses to these issues are, of course, digital in turn. This requires investment in system development and deployment, the use of standards that comply with international archival expectations, use of appropriate research ethics, attention to licensing and copyright issues, and operational logistics related to staff and programme management. Sustainability – that perennial bugbear of digital projects – remains an ongoing challenge. Done correctly, though, digital sources can be secured with a reasonable level of assurance, and access can be provided to the general public and researchers through a variety of channels. The opportunity exists to enable radically new modes of public engagement at the same time as researchers are offered the chance to interact with large collections of data either manually or – significantly more interestingly – programmatically.

The UC CEISMIC programme has (in some ways unintentionally) resulted in a significantly broader vision than even this, however, involving a consortium of ten national cultural heritage agencies and a growing list of individual, commercial, local government and non-governmental organizations that provide content. Our team works closely with a range of national agencies who work to high standards of digital cultural heritage, including the Ministry for Culture and Heritage, the National Library, the National Digital Heritage Archive, DigitalNZ, Te Papa, Christchurch City Libraries, Archives New Zealand, the New Zealand Film Archive, NZ On

Screen, the New Zealand Historic Places Trust, the Canterbury Museum and the Natural Hazards Platform. The programme has subsidiary relationships with two software vendors and the UC Human Interface Technology Laboratory (HIT Lab NZ), and an advisory board that includes Tom Scheinfeldt, until mid-2013 a Director of RR-CHNM.

At the time of writing the system is fully operational. A team of five focuses on maintenance and development of both *ceismic.org.nz* and UC *QuakeStudies*,<sup>34</sup> the major university archive in the federation. The goal is to collect 100,000 items each year for the foreseeable future, documenting not only the immediate aftermath of the earthquakes, but also the rebuild. The project won the category for Best Project for Public Audiences in the inaugural International Digital Humanities Award in 2012, beating projects from the University of Buckingham, Trinity College Dublin, University of Munich and University College London. A mobile web application built by one of the main software vendors for the project won the Microsoft Humanizing Data competition the same year. UC CEISMIC is a major project, built to international cultural heritage standards, and representative of current thinking in international digital humanities and digital history. New Zealand universities may well be behind the United States, United Kingdom and Australia in the development of humanities eResearch infrastructure and digital history, but UC CEISMIC shows that given funding and support we can produce world-class outputs.

A number of other digital history projects have been developed at the University of Canterbury in recent years, some of which are related to UC CEISMIC and some of which are quite independent. *Humanities Machine*,<sup>35</sup> hosted by the National eScience Infrastructure (NeSI) at the University of Auckland, aims to provide a portal into New Zealand's broader digital humanities world, including but not limited to digital history; *Academic AMIs*<sup>36</sup> provides virtual infrastructure in the form of Amazon machine images that can be used to quickly create digital history websites and archives (including GIS-enabled ones); the Macmillan Brown Library has a basic (soon to be upgraded) Digital Library and has produced a series of websites showcasing their digital collections, including a joint project with Archives New Zealand;<sup>37</sup> and Chris Jones has collaborated with Bronwyn Matthews, UC Library's Special Collections librarian, and the Canterbury Museum to produce sites showcasing significant library 'treasures'.<sup>38</sup> David Monger, Katie Pickles (History) and Erin Kimber (UC Library) supervised student Gregory Hynes to produce the Imperial Legacies site.<sup>39</sup> Pickles has, in addition, been a Section Editor for Australasia and the Pacific for the electronic journal *History Compass* for some years.<sup>40</sup> The *Rutherford Journal*<sup>41</sup> and

*A Priori*<sup>42</sup> were both developed and run from the Philosophy department. Jack Copeland continues to maintain and develop the *Turing Archive for the History of Computing*<sup>43</sup> in collaboration with his overseas partners. A number of other projects are either well under way or close to completion, including *UC Scholarly Editions*<sup>44</sup> (Paul Millar and Chris Thomson), which provides digital texts marked up with the scholarly standard TEI XML,<sup>45</sup> and *Komako*<sup>46</sup> (Chris Thomson), which will provide an online TEI version of Bridget Underhill's PhD bibliography of Māori writing. *UC Scholarly Editions* is being used as the basis for a contribution to the Ministry of Culture and Heritage's WW100 project, in conjunction with a BA internship supervised by Chris Thomson and David Monger. The *Otago Goldfields App*, a mobile application inspired by PhD student Lloyd Carpenter and built by the HIT Lab NZ, will enable 3D exploration of Otago goldfields sites. As well as these independent undertakings, UC CEISMIC has helped fund, provided services to, or consulted on a variety of other projects, including the New Zealand Historic Places Trust commemoration of the High Street Precinct *High Street Stories*,<sup>47</sup> the development of the Canterbury Museum's new digital archive, digitization of over 1800 slides of important Canterbury buildings owned by the Art History department, a solar image analysis of Google Street View by Lincoln University Applied Computing, and additional development of the HIT Lab NZ's award-winning virtual reality mobile heritage application, CityView AR.<sup>48</sup> A Masters in Human Interface technology (MHIT) student has worked on a 3D map-based search tool for the archive under the supervision of the HIT Lab NZ.

The roll-out of New Zealand's first Digital Humanities teaching programme is important in this context. The programme, including two core courses (DIGI 401: Introduction to Digital Humanities and DIGI 402: The Digital Modern: Humanities and New Media) were approved by CUAP<sup>49</sup> in December 2012, and will be offered for the first time in 2014, with the option of a long research essay. All initiation documents, including course guides, course outlines and administrative documents, are freely available online.<sup>50</sup> The programme has been reviewed by leading international digital humanists in the UK, US and Australia and is being incubated in the School of Humanities, with a view to increasing capability in DH across both the School and the College of Arts of which it is a part. To this end, several undergraduate 'DH Pathway' courses have been identified across the College (with History courses featuring prominently) and efforts will be made to increase students' exposure to the field over time. A course in Digital Literary Studies will be offered in 2014, and Katie Pickles and Chris Jones both have courses that engage with digital history (HIST 294/394 Recovering

Christchurch 1850–2010, HIST 133: From Rome to the Black Death and HIST 423: Special Topic in Medieval History). A dedicated Digital History course would be a logical addition in years to come. DH programme staff have supervised two Summer of Engineering eResearch projects, funded by NeSI: one that built a plug-in for the Omeka archive web application,<sup>51</sup> and another that explored text analysis on the 10 million books available through the Hathi Trust digital library.<sup>52</sup> Both of these projects involved computer science students (one from Canterbury, another from Dartmouth College) and overseas teams (one at George Mason University's Omeka project, the other at the Hathi Trust). The Omeka project was jointly supervised with Sydney Shep at Victoria University, indicating the exciting opportunities that exist for cross-campus collaboration in the field. In many ways, because of the dearth of expertise in the subject, this emphasis on collaboration is an approach worth pursuing.

Although still only an emergent undertaking, the organizational, critical and pedagogical maturity of digital history in the Canterbury region is developing well. One day, if we focus on producing History graduates who have the skills necessary to work as independent digital historians, we could see local counterparts to Dan Cohen, from RR-CHNM, recently appointed as Executive Director of the Digital Public Library of America, or historian Tim Sherratt from Australia, recently appointed to manage the National Library of Australia's massive collection of digitized newspapers. But this won't happen until academics engage with the growing international digital history community and commit to developing expertise. Simply making websites and blogs and claiming expertise as a digital historian is no longer acceptable – or won't be for much longer. Just as with any area of History, it is necessary to indicate an engagement with the theoretical and methodological issues driving the field, and a willingness to put them into practice. This is especially important for students of digital history, who need to be exposed to a broad range of tools and methods alongside the developing critical discourse, so they can decide where they want to specialize. We need to ensure that if overseas experts are asked to review our courses they will recognize them as self-conscious, engaged and serious additions to the scholarly community: provincialism won't wash in this most global and distributed of new fields.<sup>53</sup>

There is a broader issue here that needs attention. Taking UC CEISMIC out of the equation, it's likely that Canterbury mirrors many other centres in the slow but steady development of digital history. Indeed, the one startling feature of New Zealand's landscape, especially considering the head start offered by *Te Ara* and the growth in digital history internationally over the last decade, is the lack of critical engagement with it in New Zealand. The growth



of digital media, accelerated by the development of wireless networks and mobile computing technologies, and building from existing television and radio channels, has increased the visibility of History in the public domain. Wikipedia is but one example of ‘citizen scholarship’, but it sits beside numerous blogs by amateur historians, professional websites produced by commercial entities like the History Channel, and video games driven by strong historical narratives. Whatever the issues of quality control, the last decade has been positive for History as a discipline, enabled and delivered over the internet. *Te Ara* has been a proud part of this – and additional motivation must surely be present in the success of Peter Jackson’s Weta Workshop, which has shown that New Zealand can excel in the development of digital media. Despite this, there has not been a conference devoted to digital history, Honours programmes teaching historical method don’t tend to include digital history next to postcolonial or feminist history (so our graduates don’t understand what different techniques it offers, the range of outputs it implies, or the technical skills and attitudes required to produce internationally well-regarded outputs). Historians aren’t publishing on the world wide web to any great degree, or contributing to the international community of scholars interested in the field, and workshops offering technical skills are only just starting to be offered. The open access principles that underpin the field mean that information and innovative approaches are exceptionally easy to find. There are exciting times ahead for historians interested in making the most of opportunities on offer (easy online publishing, free tools for digital publishing, free tools for 3D modelling, computer programming, video, and image editing, accessible Application Programming Interfaces, Infrastructure On Demand services, online webinars and tutorials offered by overseas digital history experts, free ‘learn to code’ courses etc).

It could well be, however, that resource constraints mean academic departments are being careful about getting into what remains an experimental and emergent field or the technical requirements for participation are simply too daunting. It’s pointless (and contrary to the lessons our discipline offers) to lapse into grandiose statements about ever-increasing digitization and the benefits it will bring to humanity. It’s equally misleading to suggest that future (if not present) generations of students will have insight and control over digital technologies their teachers can never hope to attain. But it is relevant to note that our culture is likely to continue to be transferred into digital formats and made available online, and that future generations of students will view digital products as both a natural and an expected part of their historical experience. Historians have a responsibility to ensure that the process happens in a scholarly, culturally appropriate, and intellectually

robust manner. This requires a commitment to developing the understanding and skills necessary to help with that work.

Perhaps the biggest barrier at the moment is the unwillingness of historians to view the computers they use for work as anything more than typewriters that can connect to the internet, rather than the incredibly powerful computing machines they are. A single iPad 2 contains as much raw computing power as a 1985 Cray 2 supercomputer, and would have remained on the list of the world's fastest computers until 1994.<sup>54</sup> There is an extraordinary amount of wasted computing power in the desktop machines used by historians, which are capable not only of publishing to vast audiences with a minimum of effort, but also of analyzing enormous quantities of data, creating 3D models and games, performing complex spatial analysis of events, and mining the internet for historical sources. Many of the tools and applications needed to perform this work are freely available under open source licenses, and although the learning curve can be steep, it isn't difficult to learn enough to be able to work with collaborators in command of more extensive skill sets.

Another issue is the high degree of collaboration required for large digital projects. While digital historians can do many things on their own, large projects require teams with broad skill sets, ranging from project management and requirements analysis, to front- and back-end development.<sup>55</sup> Management of such teams, including coordination of the technical aspects, represents a knowledge domain of its own and can have more of an impact on the success or failure of a project than any purely scholarly concerns. Bringing together people with varied backgrounds and sometimes divergent interests, adding funding and time pressure, and demanding high quality scholarly outputs, can be a recipe for disaster. This is the reason experienced digital humanities teams have adopted a range of project management methods suited to scholarly projects, picking and choosing models from the commercial and open source worlds, and adding elements that factor in student involvement, along with the need to embrace experimentation and the value of failure in academic contexts.<sup>56</sup> Attribution guidelines are also appearing, often taking the 'movie credit' approach, where everyone involved – academic and general staff as well as external vendors – gains credit for their work.<sup>57</sup> In this sense digital history is part of a broader move within the digital humanities to break down barriers within and outside the ivory towers, a process that offers a variety of benefits: it encourages more engagement with the community, offers university staff new perspectives, provides vocational experiences for students, and ensures the hybrid teams required for large digital history projects can function well. While digital history projects range from sole-author, through small and mid-range projects, to the expansive, all of

them challenge historians to step outside their comfort zones towards new technologies, new learning curves and new people.

It is possible that a generational change will occur, and future historians will naturally embrace the potential offered by digital culture, but that is by no means a certainty. Powerful cultural and economic forces are resulting in the development of digital products that lock users into a specific range of functions, and content channels that present a highly commoditized view of the past. More worryingly, there are indications that technology companies are moving away from the production of universal computing machines, like the one sitting on your desk, towards devices designed for narrower uses and with far greater control over the content delivered on them.<sup>58</sup> This isn't conducive to the development of a generation of young historians eager to find new ways to use their computers for the benefit of the discipline; it's a situation conducive to the domination of our cultural memory by corporate interests.

There is ample evidence that the next generation of historians is going to need to help in the development of digital research services that will be needed to manage the growing corpus of digitized resources, both here and overseas.<sup>59</sup> This means that we need to develop the scholarly and technical ability to take part in the design and build processes of these sometimes enormous projects. This has been happening for some time overseas, prompted in large part by the *American Report of the American Council of Learned Societies Commission on Cyber-infrastructure for the Humanities and Social Sciences (2006)*<sup>60</sup> and developed out of units like the Office for Digital Humanities at the US National Endowment for the Humanities (NEH)<sup>61</sup> and the UK's Joint Information Systems Committee (JISC).<sup>62</sup> Australia has recently started work on a major project to aggregate its humanities and cultural datasets and provide networked infrastructure (HUNI).<sup>63</sup> All three countries collaborated on Project Bamboo,<sup>64</sup> a (failed) platform for the provision of humanities-focused tools and infrastructure funded by the Andrew W. Mellon Foundation. Historians were actively involved in all of those initiatives, as well as being integral to the development of national policies on topics like open access publishing.

The situation is by no means irremediable but New Zealand academics have some catching up to do – partly because we have relied on central government to provide us with digital assets without contributing ourselves and partly because the government hasn't developed a strategic approach towards eResearch capable of identifying the requirements for next-generation Humanities research. As of now we are in an immature state when it comes to tools, pedagogy and skills development, and (perhaps of more fundamental

importance) data management. In the United Kingdom, '[r]esearch data have in recent years become regarded as a valuable institutional resource and their appropriate collection, curation, publication and preservation as essential. This has been driven by a number of internal and external forces, and all UK Research Councils now require it as a condition of funding.'<sup>65</sup> The same is the case in the United States. This highlights a fundamental gap between the expectations placed on local and overseas scholars engaging in digital research. The situation could be remedied relatively quickly with concerted action across government, universities and professional organizations; the biggest issue is finding people capable of understanding the full range of issues at play.

Dan Cohen provided one of the best arguments for the growth of digital history when he noted that where scholars of the Johnson administration have 40,000 typed memos to understand before they can claim to have a solid understanding of the historical ground, scholars of the Clinton administration have 40 million emails to deal with.<sup>66</sup> There is simply no way to manage such a deluge of electronic information without the kind of skills that digital historians take for granted. Technologies like .sql, .xml, .rdf and GIS are becoming crucial to the development of historical understanding, with programming languages like Python and Ruby needed for scripting and general-purpose development, general architectural principles required for contribution to infrastructure projects, and .php, .html, .css and JQuery needed for publishing. Future historians will need a set of skills earlier generations of historians simply didn't require. This isn't to suggest that all historians need to develop expertise in all of these computer science-based tools and methods, but that we need some historians to gain some understanding to help us move forward as a community. Getting the balance right is crucial. The goal is to enhance and enable historical scholarship in the digital age, not to replace historical scholarship with computer science. The assumption is that those with an interest in digital history will support and collaborate with those whose interests are more traditional – and, crucially for the development of this new capability, vice versa.

JAMES SMITHIES

*University of Canterbury*

## NOTES

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