Institution: King's College London		
Unit of Assessment: 34 Communication, Cultural and Media Studies, Library and Information Management		
Title of case study: Sustaining and Opening-Up a World of Cultural Heritage: Building Digital Capacity for Cross-Sector Cultural Collaboration		
Period when the underpinning research was undertaken: 2004–2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Tobias Blanke	Professor in Social and Cultural Informatics	From 09/01/2006
Arianna Ciula	King's Digital Lab Deputy Director & Senior Research Software Analyst	From 06/02/2017
Marilyn Deegan	Professor of Digital Humanities and Honorary Research Fellow	From 01/10/2013
Mark Hedges	Reader in Cultural Informatics	From 28/02/2005
James Smithies	Director of King's Digital Lab and Reader & Deputy Director eResearch	From 01/12/2015
Simon Tanner	Professor of Digital Cultural Heritage	From 01/09/2003
Period when the claimed impact occurred: 2014–2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact

King's research has made a direct contribution to the preservation of global cultural heritage assets and has facilitated massive increases in free public access to digital collections of artworks and artefacts in galleries, libraries, archives and museums around the world. King's Digital Humanities research has underpinned and enabled vital digital capacity-building work in different African contexts, facilitating the local construction of digital collections for endangered material. King's Digital Lab has developed exemplary digital and human infrastructures for sustainably delivering digital collections for public engagement and scholarly use. King's research has also produced a model of impact assessment enabling cultural heritage practitioners worldwide to measure and evidence the benefits of their digital collections for their communities. The COVID-19 pandemic has further highlighted the importance of King's contribution to enabling public, open digital access to collections whose doors have (physically) closed.

2. Underpinning research

Collaborative and practice-based research in King's Department of Digital Humanities (DDH) and King's Digital Lab (KDL) has produced models of best practice for sustainable digital asset management, research software engineering and impact assessment in cultural heritage sectors. There are four interlocking and mutually reinforcing research agendas that underpin King's impacts on cultural heritage institutions: (i) research on how digital collections of artworks and artefacts in galleries, libraries, archives and museums can be sustainably opened up for free public access and use (OpenGLAM); (ii) research on how digital collections for endangered cultural heritage assets can be locally constructed in diverse global settings through knowledge transfer and collaboration; (iii) research on how sustainable digital and human infrastructures can deliver digital collections and facilitate scholarly engagement with them; and (iv) research on impact assessment that enables cultural heritage practitioners worldwide to measure and evidence the benefits and value to their communities of their digital collections.

King's OpenGLAM research has demonstrated that the cost of maintaining payment structures in cultural heritage collections almost always outweighs actual revenue

This research [1] underpinned the REF2014 Impact Case Study ('Changing economic thinking', https://impact.ref.ac.uk/casestudies/CaseStudy.aspx?Id=41317) and has continued to be cited as the catalyst for a change in policy towards open access collections. Based upon the original research, further collaborative investigations have occurred in the current REF cycle to research and develop evidence-based strategies for the opening of the digital collections of the US National Gallery of Art and the Smithsonian [2,7].

King's research on digital archiving and the preservation of endangered collections has investigated and developed models of best practice that are transferable to diverse and operationally challenging global settings

King's has established and influenced international standards of best practice and sustainability in the digital archiving of cultural heritage through research on transferable infrastructure models that allow archivists to transform their 'raw materials' into usable and shareable digital collections [3]. King's research has shown what can be done with digital sources after they have been captured in a high-quality form using robust standards and methods and also what can be done to sustain and make available these materials for long term use [4]. Beyond technical considerations of digitisation, this research demonstrates the importance of holistic consideration of the many complex economic, legal and political factors that underpin the sustainability of archiving projects in diverse global settings.

Deep collaborations with cross-sector practitioners have been developed through the application of research on sustainable technical and human infrastructures for digital collections

King's research has shed light on the cyber-infrastructures that inform research, the software-intensive methods that are producing new knowledge and the ethical issues implicit in the production of digital humanities tools and methods [5]. This has subsequently led to the articulation of KDL's world-leading Research Software Engineering model [6]. KDL was established as an independent outgrowth from DDH in 2015 and its creation was informed by this research on technical developments that unite practical and critical activity.

King's research has investigated mechanisms of effective impact assessment for cultural institutions' digital collections and has produced the highly influential and widely used Balanced Value Impact Model (BVIM)

This research constructed a synthesis of social impact and economic methodologies and techniques and resolved these through a unique set of value lenses as modes of digital cultural value [7]. Collaborative research with highly influential international cultural institutions has led to the development of BVIM version 2.0. This provides a compelling mechanism for the measurement of the impact of digital resources in cultural heritage contexts, allowing practitioners to gather evidence on how communities benefit.

3. References to the research

1. Tanner, S. (2004). *Reproduction Charging Models and Rights Policy for Digital Images in American Art Museums: A Mellon Foundation Funded Study*. Online: King's College London.

2. Tanner, S. (2016). Open GLAM: The Rewards (and Some Risks) of Digital Sharing for the Public Good. In A. Wallace and R. Deazley (Eds.), *Display At Your Own Risk: An Experimental Exhibition of Digital Cultural Heritage.* Online: Displayatyourownrisk.org.

3. Blanke, T. and Hedges, M. (2013). Scholarly primitives: building institutional infrastructure for humanities e-Science. *Future Generation Computer Systems*, 29(2), 654–661. doi:10.1016/j.future.2011.06.006.

4. Deegan, M. (2016). A World of Possibilities: Digitisation and the Humanities. In M. Hayler and G. Griffin (Eds.), *Research Methods for Creating and Curating Data in the Digital Humanities*. Edinburgh: University of Edinburgh Press.

5. Smithies, J. (2017). *The Digital Humanities and the Digital Modern*. London: Palgrave Macmillan. doi:10.1057/978-1-137-49944-8.

6. Smithies, J. and Ciula, A. (2020). Humans in the Loop: Epistemology and Method in King's Digital Lab. In K. Schuster and S. Dunn (Eds.), *Routledge International Handbook of Research Methods in Digital Humanities (*pp.155–172). Abingdon: Routledge.

7. Tanner, S. (2020). *Delivering Impact with Digital Resources: Planning Strategy in the Attention Economy.* London: Facet Publishing.

4. Details of the impact

The four areas of King's research described above are interlinked in their theory-meets-practice facilitation of massive and sustainable global openings of cultural heritage material to new audiences in diverse global settings. King's research has changed practices of building sustainable and accessible digital collections worldwide, benefiting heritage practitioners and the many different publics they serve. It has done so through developing lasting collaborations with museum professionals and policy makers in Europe, North America and sub-Saharan Africa. These impacts on digital collection practice have ensured the future of priceless (and, in some cases, endangered) collections and have radically expanded the range of people who can enjoy and make unrestricted use of them. King's research has also strengthened practitioners' abilities to systematically and comprehensively measure the benefits of accessible digital collections to their communities. This, in turn, further advances the case for continuing the wider OpenGLAM agenda, which King's research has long pioneered.

King's research has directly contributed to massive growth in openly accessible and re-usable collections of digitised arts and cultural heritage material in the galleries, libraries, archives and museums (GLAM) sector

Tanner's research on the costs of managing digital assets has influenced a shift in the sector towards open access of collections of artworks and artefacts. For example, in 2017, New York's Metropolitan Museum of Art made all images of public domain works in its collection openly available under a Creative Commons Zero (CC0) licence. This allows anyone to freely build upon, enhance and reuse these digital assets for any purpose without restriction under copyright or database law. The Project Lead of the initiative confirms King's direct impact on the *"transformative effort"* of opening up 400,000 images: *"[Tanner] generously contributed to change the course of art history and made possible an even more accessible panhuman experience of art across culture, space and time as embodied in The Metropolitan Museum of Art's collection"* [A]. Further, the research and continuing collaboration was instrumental in facilitating the National Archives and National Library of Sweden's move to provide open access to their newspaper collection with over 1,200 titles (some 3 million pages) made freely accessible since 2019 [A].

In February 2020, the Smithsonian released 3 million 2D and 3D images and directly attributed the influence of King's research on their decision to do so and the process of achieving this. Noting challenges relating to the size of their institution, the Director of the Smithsonian's Digitization Office states that *"the move toward open access collections was a monumental undertaking that involved working through bureaucratic, cultural, and infrastructure barriers. Our ability to do so can be credited, in no small measure, to the work that Professor Tanner has done in this field for well over a decade"* [A]. The research evidence that informed and spurred the Smithsonian's open access initiative relates to revenue generation from in-house rights and the intangible value of open access collections, namely increased goodwill and trust from the public [A].

This research also led to further collaborations with the US National Gallery of Art (NGA), the development of their digital strategy, the instigation of an Innovation Lab and moves to full CC0 licences for their collections [B]. Digital assets that are made available on CC0 licences by museums and galleries spread even further into the public domain by virtue of their new accessibility to other online platforms that have greater reach than the original institutions' collections. Events of 2020 have highlighted the importance of the public digital accessibility of cultural material. Between March and November 2020 (through the height of the global COVID-19 pandemic), the 50 most viewed NGA images received a total of 39,967 views on the institution's website. However, the same images – which the NGA could now donate to Wikimedia – received over 39 million views on those platforms [B]. Were it not for the impact of King's research on the NGA's decision to move to CC0 licences, this massive and unrestricted public access to cultural heritage material would not have been possible.

King's research on techniques and best practices of digital archiving has been applied globally by the researchers to preserve internationally-important and endangered cultural heritage and historical collections

The reputation of King's research on globally transferable models of digital archiving infrastructure prompted Sudanese stakeholders to reach out to King's to provide support to their National

Cultural Heritage Digitization Team. Prompted by the 2013 destruction of libraries and manuscripts in Mali by Jihadist militants, the Sudanese Ministry of Information, the Sudanese Association for the Archiving of Knowledge, along with museums, libraries and archives throughout the country, recognised the urgent need to preserve endangered cultural material. King's Sudan Memory project (led by Deegan) played a central role in this endeavour, creating a collaborative infrastructure to integrate resources and facilitate use. King's research on the economic, legal and political factors that influence the sustainability of digital archiving projects has enabled this work to continue through the difficult conditions of the revolution and accompanying instability in 2019.

King's Sudan Memory project has resulted in the digitisation of 100,000 endangered cultural artefacts from 10 institutions [C] and has fulfilled Sudanese stakeholders' explicit objectives to safeguard the full wealth of Sudan's cultural heritage for both local and global audiences. The Country Director of the British Council in Sudan states that *"the main impact has been the realisation in Sudan ministries, press and academic circles that the Sudanese cultural material can, and is being, captured and preserved for future generations. Without [Sudan Memory], many priceless Sudanese cultural records and artefacts would be forever lost to the ravages of the desert storms, or to the fading memories of those who had no investment or professional expertise to capture and preserve them"* [C]. The work has imparted new skills and technical capacity to Sudanese partner institutions to sustain the preservation agenda. 148 Sudanese colleagues were trained in digital skills to preserve and document cultural heritage. The Sudanese Association for Archiving Knowledge [C] stated that *"one of the key successes of the project was building consensus and a national community; and that training young people and having them work with older people who have cultural knowledge has empowered them both".*

Elsewhere in Africa, King's researchers (Hedges) have applied their work on transferable knowledge architectures and infrastructure to undertake projects to digitally archive collections of great contemporary and historical importance, for instance archives relating to Rwanda's post-genocide Gacaca Courts. The Executive Director of Aegis Trust (with which King's collaborated) states that *"the application of King's research in this context has facilitated the creation of [an archive which] digitally safeguards approximately 48 million records/digital assets relating to the Gacaca Courts. The records are a primary and reliable source of information about the Genocide, which was otherwise at severe risk of being lost, and is key for the fight against Genocide denial and revisionism, and for reconciliation among the people of Rwanda"* [C].

King's research underpins the work of King's Digital Lab: an exemplary hub for research software engineering that has directly informed the design of next-generation infrastructure for humanities labs and arts and cultural heritage sectors around the world

133 websites hosted by KDL gained a total of almost 243 million hits between August 2013 and September 2020. Of those sites, 14 together contain 1,485,229 digital assets [D]. The ability to build and manage sustainable infrastructure for digital collections on this huge scale has made King's an international point of reference. The Director of The Sussex Humanities Lab notes that KDL has *"created an exemplar of best practice, for how we collectively support inherited web resources"* [D].

Ensuring that national memory institutions can undertake their traditional functions in a new digital environment is a challenge that KDL's development of a Research Software Engineering (RSE) model has successfully responded to. Developed through King's research, this is a holistic model that has enabled university-based RSE teams to deliver public impact and provides a level of operational maturity that makes collaboration with community organisations and commercial technology partners more effective. Navigating relationships and knowledge transfer between the private sector, the public sector and HE, *"KDL has brought all these stakeholders onto the same page, in a way that no other centre has been able to do"* [D]. The RSE model has influenced university and cultural heritage teams globally, informing the design of next-generation infrastructure for the Sussex Humanities Lab, the Centre for Digital History Aarhus, Rice University, Jordan's cultural heritage sector and Australia's arts and humanities sector [D]. Aspects of the RSE model have also influenced the Royal Archives and the Bodleian Library [D].

King's research has enabled cultural heritage practitioners to measure the social, cultural and economic benefits of the resources they make available to their communities

The Balanced Value Impact Model (BVIM) has been applied by cultural heritage practitioners all over the world as a mechanism to demonstrate to decision-makers the value of their digital

resources and collections. This has led to better management of content, more closely aligned to the needs of communities served. The impact of the BVIM on international 'impact practice' is evidenced through its extensive and wide-ranging use across the cultural heritage sector. Implementations or adaptations of the BVIM include: The Wellcome Library digitisation programme; The People's Collection Wales with the National Museum Wales; Nectar Virtual Laboratories; and Jisc's training and guidance on 'making digital collections easier to discover' [E].

A significant application of King's BVIM is in the work of Europeana, the foundation tasked by the European Commission to develop a digital cultural heritage platform. Europeana provides access to over 58 million digital objects from more than 3,500 institutions. Its Senior Policy Advisor states that *"our approach to collecting and analysing the [impact-related] data rested heavily on using five of the BVI Model's value drivers"* [F]. The Europeana Impact Playbook (2017) is the culmination of this strategy and the Senior Policy Advisor notes that the BVIM *"lies at the heart of the Playbook and has helped us frame and debate each step we have taken"* [F]. The Impact Playbook has been downloaded over 2,900 times by cultural heritage professionals [F] and is now used across Europe in institutions such as the Rijksmuseum and Denmark's State Museum for Art (SMK). A Curator and Senior Advisor at SMK states that Tanner's research *"has been instrumental in introducing a strategic awareness of the importance of impact assessment in all aspects of the organisation"* [F].

SMK has tested the Impact Playbook in its assessment of the benefits of activities it runs with open access cultural materials. For example, a 2018 'Taboo' workshop allowed young people to create visual expressions of emotions related to mental/physical disorders through discussing, clipping and remixing artworks from the Museum's collection. The Impact Playbook assessment allowed the Museum to increase their *"understanding of how playful participation and engaging creative practices can help bring art and museums at eye level with young people, making them feel empowered to explore and learn about different cultures and ways of life."* [F] This demonstrates how King's research has enabled institutions to evidence the benefits of opening public access to digital collections.

Overall, King's strengthening of practitioners' capacity to evidence the value of digital collections for their communities allows them to further advance the case for making even more cultural heritage material freely available digitally under CC0 licences. This feeds back into the original research agenda of OpenGLAM promotion of massive and sustainable digital openings and the global preservation of invaluable cultural heritage and historical assets.

5. Sources to corroborate the impact

A. GLAM Sector Testimonials: Content Partnerships Program Manager, Metropolitan Museum of Art; Project Leader, National Archives and National Library of Sweden; Director of Digitization Office, Smithsonian Institution.

B. Sources from US National Gallery of Art: testimonial letter from Chief of Open Access and Digital Strategy; report on views of NGA-donated images on Wikimedia Platforms.

C. Sources illustrating the impact of King's research on digital archiving in Sudan and Rwanda: testimonial letter from Country Director of the British Council in Sudan; evaluation report on King's Sudan Memory project prepared for the British Council by independent consultant (S. Fort, January 2020, p.35); testimonial letter from the Executive Director of Aegis Trust, Rwanda.

D. Sources demonstrating impact of KDL's Research Software Engineering model: testimonial letters from institutions including: Sussex Humanities Lab; Centre for Digital History Aarhus; Rice University; Hashemite University; Monash eResearch Centre; the Royal Archives; the Bodleian Library; KDL data and report on methodology for website metrics.

E. Online reports evidencing the implementation of the BVIM: the Wellcome Library; People's Collection Wales; Nectar Virtual Laboratories; Jisc.

F. Sources evidencing the application of the BVIM in the work of Europeana: quote from Europeana Senior Policy Advisor in Tanner (2020, p.156); Europeana 'Design Your Impact' webpage; testimonial letter from Curator and Senior Advisor at Denmark's State Museum for Art (SMK); Europeana Impact Case Study Report.