

<b>Institution:</b> Aberystwyth University		
<b>Unit of Assessment:</b> 28: History		
<b>Title of case study:</b> <i>Imprint</i> : Medieval history informing science and heritage		
<b>Period when the underpinning research was undertaken:</b> 2016–2020		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
Dr Elizabeth New	Senior Lecturer in History	1 October 2015–present
<b>Period when the claimed impact occurred:</b> 2016–2020		
<b>Is this case study continued from a case study submitted in 2014?</b> No		
<b>1. Summary of the impact</b> (indicative maximum 100 words)		
<p>The AHRC-funded <i>Imprint</i> project used innovative scientific techniques and historical research to bring the past alive in new ways, and to contribute to key developments in forensic investigation. It led to new discoveries about the practice of sealing and its implications for ideas of personal identity, and it expanded heritage preservation and interpretation by informing practices in archives and conservation. Its pioneering analysis of medieval finger and hand prints has also contributed to the development of cutting-edge forensic equipment and furthered forensic science practice.</p>		
<b>2. Underpinning research</b> (indicative maximum 500 words)		
<p>Impressions of seal matrices in disks of wax, deliberately preserved with their parent documents as part of the legal process of authentication, survive in great numbers in British archives. Since, by the thirteenth century, institutions and individuals across society owned and used seals, their motifs and text provide invaluable evidence about identity and representation. The back of the wax on which such seal impressions are found often retains handprints (finger, thumb or palm) but these have previously been neglected as a source of information. The <i>Imprint</i> AHRC project [3.6] analysed 1000 images of such prints and discovered that assumptions made about the links between seals and the identities of matrix owners – that an individual needed to impress their own matrix into the wax which they also held – were only part of the picture. Instead, a third party sometimes held the wax into which they or the seal owner impressed their matrix. This also suggests that the authentication and the performance of the exchange itself was becoming separated in terms of sealing. Other important findings relate to the physical practice of sealing and its role as a form of public display; the use of different seal motifs in different social groups and geographical areas; the practice of sealing by women; and the composition and origin of medieval wax.</p> <p>Before <i>Imprint</i>, we had no way to investigate handprint evidence on wax seals. The need for combining specialist forensic, art historical and palaeographical skills made them a closed book not just to the general public, but even to specialists. To remedy this situation, the project produced a database of approximately 1000 seals, including high quality images of the handprints on the wax made with cutting-edge forensic equipment and colour photographs of both the matrix impressions and the documents. These were all connected through a relational database which provides information about the parties and contents of the documents, the wording and motifs on the seals, and the nature and quality of the handprints [3.1]. It also links impressions of the same matrix and of the same handprints, drawing on forensic techniques for the latter. Research which was once impossible can now be completed in a matter of minutes. Unlocking the information in this pioneering way has allowed the project team to carry out the research detailed above, democratising the use of seals in all their elements for everyone interested in medieval history.</p>		

*Imprint* emerged from a pilot project in 2013, considering 200 seals in Hereford Cathedral Library, and drew upon the earlier *Seals in Medieval Wales* and *Exploring Outreach Through Medieval Seals* AHRC projects [3.7, 3.8], and the research and publications of the Investigators, comprised of a team based at Aberystwyth University and the University of Lincoln. Forensic analysis was provided by Dr Karen Stow and Luke McGarr of Forensic Focus Ltd, and the project worked with five heritage partners (The National Library of Wales, Hereford Cathedral Archives, Exeter Cathedral Library and Archives, Westminster Abbey and the Lincoln Cathedral Archives). The technical and web work was undertaken by the University of Sheffield's Humanities Research Institute. Research findings included unexpected evidence about who physically was involved in sealing [3.4]; the direct involvement of married women in authenticating documents [3.1]; further information about the social range and diversity of seal owners [3.1]; fresh insights into non-elite access to and engagement with technologies and trade [3.1, 3.3, 3.4]; and new evidence about the persistence of prints in wax and the ways they can be analysed for forensic investigations [3.5].

### 3. References to the research (indicative maximum of six references)

3.1 The key research output is the database found at [www.imprintseals.org](http://www.imprintseals.org). This hosts the database of seals, associated documents and hand prints, including over 6,000 images

#### **Academic publications**

3.2 Phillipp R. Schofield and Elizabeth A. New (eds.), *Seals and Society: Medieval Wales, the Welsh Marches and their English Border Region*, (University of Wales Press, 2016) [Submitted to REF2]

3.3 Elizabeth A. New, 'Reconsidering the Silent Majority: Non-heraldic personal seals, identity and cultural meaning', in Laura Whatley (ed.), *A Companion to Seals in the Middle Ages*, (Brill, 2019) [Submitted to REF2]

3.4 Elizabeth A. New and Philippa M. Hoskin, 'By the impression of my seal'. Medieval identity and bureaucracy: A case-study', *Antiquaries Journal*, vol. 100, (2020). The article was moved into the centenary volume due to its significance and awarded gold open access status by the publisher because of its appeal to non-specialists. [Submitted to REF2]

#### **Professional publications**

3.5 Luke McGarr, Karen Stow, Philippa Hoskin and Elizabeth New, 'A preliminary study of fingerprint ridge detail on medieval seals from Hereford Cathedral', *Fingerprint Whorld: The International Journal of the Fingerprint Society*, vol. 41, (2016)

#### **Research grants**

3.6 2016–2018, AHRC Standard Research Grant, *Imprint: A forensic and historical analysis of fingerprints on medieval seals*, GBP 626,679 (Co-Investigator). Grant awarded to Philippa M. Hoskin, University of Lincoln, as Principal Investigator

3.7 2009–2012, AHRC Standard Research Grant, *Seals in Medieval Wales*, GBP 491,770, awarded to Phillipp R. Schofield, Aberystwyth University

*Imprint* was also informed by the following:

3.8 2013–2014, AHRC Follow-on award, *Exploring Outreach through Medieval Seals*, GBP 91,559

### 4. Details of the impact (indicative maximum 750 words)

*Imprint* demonstrated how medieval history can play a crucial role in furthering both a scientific and heritage agenda. Its analysis of medieval hand and finger prints led to a more nuanced understanding of medieval society, expanded heritage conservation and informed current

developments in fingerprint analysis. More specifically, the impact of the research has been twofold:

***In influencing the development of forensic equipment and of forensic science practice***

Whilst working with scientists to examine the handprints on the back of medieval wax seals, *Imprint* had an impact upon forensic science practice and on the development of forensic equipment. As a result of the research, the forensic partners on the *Imprint* project, Forensic Focus, discovered new information about the way in which fingerprints survive, and can be identified, upon wax mixed with different chemical components. One of the company's objectives had been to see:

*'if there was any learning to be gained regarding distortion in the seal impressions. It became clear that after assessing the first batches of impressions ... that distortion of the impressions was not really a factor. The reason [being] that the wax proved to be a good medium for recording palm (or finger) friction ridge detail, so distortion was not an issue' [5.1]*

The company also noted how *Imprint* had furthered forensic knowledge of palm prints and how it had been '*one of the largest studies of palm impressions ever conducted*' [5.1].

Furthermore, *Imprint's* use of the multispectral Crime-lite Imager (CLI) – designed for crime-scene analysis – in unusual circumstances allowed the equipment's creators, Foster & Freeman Ltd, to discover more about the way the equipment worked in different environments, and enabled them to make significant improvements to both the hardware and software of the CLI. The company noted how the project had '*highlighted ... issues that we could not have foreseen from our own in-house tests. The resultant modifications have been implemented and will help improve the usability and stability of the system*' [5.2]. The project's use of the CLI also furthered forensic science practice:

*'Without doubt the most significant factor potentially affecting current Forensic Science was the use for the first time of the Crime Lite Imager .... Up until this point finger marks specialists had struggled to obtain images of whole marks across curved surfaces in a single image relying on digital technology by taking several images at various locations and then stitching them together thus producing an approximate image rather than an accurate one. The digital imager enables a single image to be taken of the mark because of the advanced lighting function of the system. This practical use of technology ... was an extremely useful tool which led to its wider distribution for Forensic Imagery' [5.1].*

***In expanding heritage preservation and interpretation by informing practices in archives and conservation and in enriching public understanding***

*Imprint* worked with its partner heritage institutions to expand professional knowledge of their collections and help develop outreach utilising the historical significance of seals. New ran a series of knowledge-transfer and training workshops for heritage professionals (some of which were open to the general public) during the course of the project and also in 2019, including events supported by the Archives and Records Association (ARA), Museums Wales and the Portable Antiquities Scheme (PAS). Feedback from the events evidence New's impact on professional practice and ways of working with medieval seals. At a session for archivists held at Shropshire Archives in November 2019, all attendees agreed that the event had changed their approach to conserving sealed documents [5.3]. The Secretary of ARA West Midlands reflected on how '*we will use the information to help us to better catalogue any seals we come across in the future*' [5.4]. A session held in Yorkshire in September 2019 evoked similar responses, with all attendees agreeing that it had led them to think differently about medieval seals and that they would subsequently change their approach to seals in their care. One participant remarked how they had '*learned new practical ways of handling and caring for seals and will look at them in a totally new way*' [5.5]. Comparable feedback was also gleaned from a workshop in North Wales

(November 2019), with all those who attended agreeing that New's ideas had led them to think differently about their ways of working with seals [5.6].

Further workshops delivered by New in Oxford (May 2019, September 2019) also attest to her impact on archival practice. The archivist at Lincoln College, Oxford, noted how, on the basis of one of New's presentations, she had '*begun to develop ... procedures for cataloguing the seals in Lincoln's collections ... based on the information in the Imprint database*'. She also added that New's advice on the method for the preparation of sealing wax had inspired a series of workshops for primary schools where pupils were tasked with producing their own seal. '*It is inspiring*', she stated, '*to see cutting-edge technology shed new light on some of the oldest and most mysterious items surviving in our collections*' [5.7]. The Archivist at Magdalen College, Oxford, also observed how New's research had '*impacted positively on my work as an Archivist*'. Previously the archivist at Hereford Cathedral, she also noted how New had led her to '*to review Hereford's own system of housing seals and to recommend changes better in line with best practice*' [5.8].

*Imprint's* involvement with Exeter Cathedral Library and Archives also further demonstrated the project's impact on heritage preservation:

*'The Imprint project has improved in-house knowledge of the sealed documents in the L&A [Library and Archives], which will remain as a permanent legacy .... New information was revealed about many which ... lead to catalogue improvements and influenced conservation decisions. Prior to the project a number of documents did not even have the presence of seals included in the original catalogue. Seals are now formally recognised for their importance in complement to the written text of a document. The conservation implications of involvement with Imprint have been large and entirely positive'* [5.9].

New's own work with both Exeter and Hereford Cathedrals also led to impact on heritage preservation in another important way. During *Imprint*, the CLI was used to uncover new information about significant cultural items including the Exeter Book (which has UNESCO Memory of the World status), the Exon Domesday (one of the most informative surviving documents of the Domesday Inquest), and the Hereford Gospels (the oldest surviving manuscript produced in Wales), enabling a recalibration of key archival material and '*otherwise obscured text*' to be revealed [5.9].

Both prior to and within *Imprint*, New also worked with The National Archives (TNA) at Kew, which has also greatly expanded heritage conservation, informing TNA practices relating to their wax seal collections:

*'The research work of Elizabeth New ... has provided a rich resource that we have continuously turned to for information regarding the material make-up and relevance of our wax seal collections, as well as for guidance in decision-making around their care and access. Elizabeth's work on wax seals is of significant value for the heritage conservation community in understanding the materials, methods, and practices used in creating these objects in the past, with a view to finding the most appropriate methods for their preservation today'* [5.10].

New has also engaged with broader audiences through public talks and media (broadcast and print). She ran lectures at the project's partner institutions, including at Exeter and Hereford Cathedrals (2016 and 2018) and at the Society of Antiquaries (April 2017, available on YouTube). New's research has also reached new audiences through popular publications, including *BBC History Magazine* (January 2016) and *New Scientist* (December 2016), and podcasts including for *BBC History* [5.11], all of which have drawn important attention to the fact that *Imprint* provided free access on its website to a hitherto inaccessible area of medieval life and work.

**5. Sources to corroborate the impact** (indicative maximum of 10 references)

- 5.1 Letter of corroboration from Consultant Director, Forensic Focus Limited, 3 February 2021
- 5.2 Letter of corroboration from Foster & Freeman Limited, 27 October 2017
- 5.3 Questionnaire feedback from ARA West Midlands Shropshire Archives event, 18 November 2019
- 5.4 Email from ARA West Midlands Secretary, 3 December 2019
- 5.5 Questionnaire feedback from Wakefield workshop, 20 September 2019
- 5.6 Questionnaire feedback from Wrexham County Borough Museum and Archives event, 7 November 2019
- 5.7 Letter of corroboration from the Archivist, Lincoln College, Oxford, 14 February 2020
- 5.8 Letter of corroboration from Magdalen College Archivist, 6 November 2020
- 5.9 Letter of corroboration from Exeter Cathedral Archivist, 28 January 2021
- 5.10 Letter of corroboration from Head of Conservation Research and Audience Development, The National Archives, Kew, 1 February 2021
- 5.11 'CSI history: experts analyse finger-prints to crack medieval mysteries', *BBC History Magazine*, January 2016, (<https://reader.exacteditions.com/issues/47931/page/11>); 'Medieval wax seals are giving up fresh historical secrets', *New Scientist*, 14 December 2016 (<https://institutions.newscientist.com/article/mg23231040-900-medieval-wax-seals-are-giving-up-fresh-historical-secrets/>); 'Medieval CSI', *BBC History Extra* podcast, 14 January 2016 (<https://www.historyextra.com/period/medieval/postwar-germany-and-medieval-csi/>)