Looking beyond the written word

Until relatively recently, much of the history of the Western World was written on parchment and then more predominantly paper. Developed without longevity in mind, these objects inevitably get damaged and degrade. So what can be done to ensure the information they hold is not lost forever?

A multidisciplinary approach to answer this question has been taken by researchers at the Cardiff Schools of Optometry and Computer Science & Informatics who are working to find new ways of determining how these documents should be stored as well as developing novel ways to read the written words without physically unrolling the fragile scrolls.

Working with collaborators from the National Archives and the Diamond Light Source, a scientific facility in Oxfordshire, researchers are using the Diamond machine, which is the size of five football pitches and accelerates electrons at close to the speed of light, to generate powerful X-ray beams. These beams allow them to probe the nanostructure of materials and examine the way in which parchment documents turn slowly from collagen to gelatine. In doing so Professor Tim Wess from the School of Optometry and Vision Sciences has been able to develop a test to determine the proportion of gelatine in a historical sample and in turn establish at what risk it is of deterioration.

Professor Wess said: "The ultimate fate of parchment documents is to turn slowly from dried skin collagen into gelatine. We know gelatine does not have the same tough, durable and insoluble properties that skin has even after extensive treatment to make it a suitable flat and white media for writing on.

"Our studies have shown that the conversion of skin to parchment increases the amount of gelatine present and sets the damage processes on their way. By measuring the levels of gelatine in each parchment we are able to determine what level of priority must be given to its curation and in what conditions it would be best preserved."

A fire-damaged scroll donated by the Norfolk Archives from two different view points. The scroll can not be unrolled without permanently damaging the parchment, therefore researchers are working to scan the scroll and virtually unroll it.

Parchment document deterioration also poses the problem of the gelatine effectively gluing pages of a book or layers of a scroll together, or making pages themselves to brittle to unfold.

Professor Wess has been working with researchers from Queen Mary's University London, to develop new techniques to virtually unroll the documents allowing them to be read without causing further damage.

The project is funded by a £1.1M Engineering and Physical Sciences Research Council grant which will allow researchers to build equipment needed for general application which could significantly develop the way in which items are archived.

Professor Wess added: "Thanks to the work of colleagues in the School of Computer Science & Informatics, led by Dr Paul Rosin, we have been able to work with the three dimensional virtual images of parchment scrolls to flatten out the pages and reveal the writing.

"This research has already formed the basis for understanding much more about the nature of important historical objects such as the Dead Sea Scrolls and the Domesday Book and has significant scope to recover documents that could otherwise be lost forever"