A Cultural Heritage Forum Celebrating Technological Innovation at Station X

Conference or Workshop Item

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Abstract

We aim to encourage and support public participation in heritage through the development of Cultural Heritage Forums, a kind of cultural web portal that enables active participation of communities of interest in a way that complements rather than replaces visits to physical cultural institutions. The cultural heritage forum described here (Station X) is concerned with promoting an understanding of technology innovation in the areas of computing and cryptography. We propose a number of scenarios concerning how the forum can be designed, drawing on our earlier work in using knowledge modelling and text analysis to support the exploration of digital resources.

1. Introduction

'Station X' was the cover name given to Bletchley Park, a Victorian Mansion used during the Second World War as a base for the UK Government Code and Cipher School. During the period of the Second World War Bletchley Park developed a number of technical innovations that have had a direct influence in the technology of today. As such, the place and the innovations it produced, are of national and international interest.

Until recently the role of Station X was held secret and it has only been open to the public as a national heritage park during the last nine years. As part of 'CIPHER' a two and a half year project, funded by the European Commission's IST Programme 'Heritage for All,' a cultural heritage forum is being developed to support the activities of the park and extend the experience for visitors and other interested communities.

This paper gives a brief introduction to the aims and objectives of the CIPHER project, a summary of the activities of Bletchley Park, and an explanation of the role cultural heritage forums are seen to play in supporting heritage centers. This paper concludes with some initial suggestions for the design and use of a cultural heritage forum for Bletchley Park.

2. The CIPHER Project

CIPHER is a project acronym standing for 'Enabling Communities of Interest to Promote Heritage of European Regions'. Six project partners are involved; The Open University in the UK, the Dublin Institute of Technology and The Discovery Programme, both based in Ireland, the University of Art and Design Helsinki in Finland, the Czech Technical University, and Regionales Information System (RiS) GmbH in Austria.

The overall aim of the project is to develop innovative technologies and methodologies that enable the celebration and exploration of regional heritage. This will be realized through the development of the methodology and technology required to establish sustainable cultural heritage forums that empower communities of interest to explore, research and build content.

The philosophy adopted by the project is to support, augment and encourage visits to regional heritage centers, the forums being developed are in no way intended to replace visits. Further information on the progress of the CIPHER project is available on the project web page: http://www.cipherweb.org

3. Bletchley Park

Station X was the tenth of a large number of sites acquired by MI6 (the UK intelligence organisation) for its wartime operations. In late August 1938, members of the Government Code and Cipher School came to the country house at Bletchley Park under the guise of 'Captain Ridley's Shooting Party'. During the course of the Second World War up to 12,000 people worked at Bletchley Park receiving as many as 3,000 codes a day.

The Enigma machine was a wartime cipher machine used by the German forces. The odds of cracking the code were 150,000,000,000,000,000,000 to 1. An example of a captured Enigma machine is on show at Bletchley Park along with explanations of how it works and why it was so difficult to decipher. The 'Turing Bombe' was an electro-mechanical code breaker devised by Cambridge mathematician Alan Turing. Although at least 200 Bombes were being used during the war to crack the Enigma codes, none of them survive today. A new Bombe

machine is currently being built and will soon be added to the park's Bombe exhibit.

The Lorenz cipher machine was developed for the German Army High Command and was a significantly more complex machine than the Enigma. To crack the Lorenz cipher, Max Newman proposed that a computing machine described in a pre-war thesis by Turing should be developed. The result was a machine called 'Robinson' that used two streams of paper tape. Although this was a partial success the paper tape used was unreliable. 'Colossus,' an electronic machine (see figure 1), was then developed for the task, by a post office engineer Tommy Flowers. The Colossus is now recognized as the world's first programmable computer. After the success of the first Colossus machine, a further ten were produced. Although destroyed after the war a recent project to rebuild a Colossus is underway with the help of the original engineer.

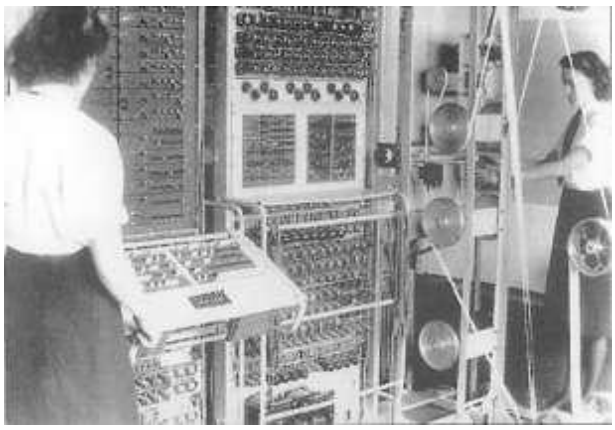

Figure 1. Colossus the first programmable computer.

At the end of the war the cryptanalysis staff was demobilized from Bletchley Park and the technology developed there was destroyed. In the years since the war, Bletchley Park has been used as a teacher training center, a training center for Government Communications Head Quarters, a Government Post Office training school, and an Air Traffic Control training school. In 1991 the site was empty and due to be demolished for housing development. In May 1991 the Bletchley Archaeological and Historical Society formed a small committee to bring together as many former codebreakers as could be traced, for a farewell 'thank you' before the site was destroyed. On 21st October 1991, the farewell party was held in the grounds. Over 400 codebreakers attended. As a result of the stories they told, it was decided to attempt to save the site.

Bletchley Park Trust was formed on 13th February 1992, three days after Milton Keynes Borough Council declared most of the Park a conservation area. The Trust first opened the site to visitors in 1993 and, with the help of many volunteers and enthusiasts, maintain a collection of independent and Trust exhibitions for the general public to enjoy. HRH The Duke of Kent became Chief Patron, officially opening the Museum in July 1994.

The continuing work of the Bletchley Park Trust is focused on celebrating the development and impact of the intelligence work, computing and cryptography carried out there.

4. A Bletchley Park Forum

As noted previously, the aim of the CIPHER project is to develop the methodology and technology required to establish sustainable cultural heritage forums that empower communities of interest to explore, research and build content. This is seen by the Bletchley Park Trust as an approach that will promote the Park, allowing people to actively explore the early days of computing and its impact on modern life.

Stories are increasingly recognized as an essential part of how we think [1, 2, 3, 4]. The approach being adopted in the CIPHER project is to recognize and exploit the pervasiveness of stories, our use of them and our ability to generate them.

In terms of the project methodology, sustainable forums require the continued engagement and participation of the communities they support. To achieve this the evolutionary nature of the community must be recognized, and an appropriate social and technical infrastructure provided. For example, as new members join they may need support and encouragement to participate in the activities of the group, to establish an identity and adopt a role within the community.

Previous research suggests that the following factors encourage people's participation:

- Visible communities that people are able to join
- Designs that encourage curiosity and clearly portray the purpose of the community
- Local champions involved in promoting the work of the community
- Friendly and immediate access to training and guidance as problems arise
- Integration with other institutions or mechanisms such as a National Curriculum for Schools, or the European Computing Driving Licence

In the case of Bletchley Park we will be seeking to establish local champions on the management board for the Trust, in the staff employed at the park, and in the active network of volunteers. Some technical infratructure already exists at the site, as the Park was previously involved in a project supporting Computer Literacy Through the Use of Community History (further

information on the CLUTCH project is available on the web at http://clutch.open.ac.uk). The Bletchley Park website already provides information on the activities of the park, this will be extended through the course of the project. In addition, further content for the cultural heritage forum is available from the brochures and documents published by the Trust, and the wealth of knowledge held by the network of volunteers involved in running the park.

5. Related Work

Related work in museum exhibition design has undergone a change from presenting the authorized story, structured according to an official taxonomy, with the objective of instructing the public, towards a more engaging role in which the visitors construct their own story based on the artefacts presented and in so doing learn through creatively exploring the content of the museum.

Visiting a museum, involves the visitor in a dialogue with the objects they view [5]. Viewing is described as an active interpretation process as opposed to passive absorption. Exhibits should present their artefacts and the contexts in which they were produced, showing the issues which influenced their creation and use. Similarly, the processes involved in producing artefacts should be revealed rather than hidden. Both the context and process are important parts of an artefact's story.

Research on collecting recognizes collections as a form of narrative, stories are told through the arrangement of a selected set of objects, with a meaning intended by the collector and a meaning interpreted by the viewer [6]. The actual process of collecting, that is, exploring the relations between objects and arranging them to convey a message, is seen as an engaging opportunity for creative learning.

An ever present tension in museums exists between the goals of educating and entertaining visitors. Clearly, achieving both goals is the objective, yet finding the optimal balance for each visitor is a non-trivial task.

6. Proposed Scenarios

Within the context of educating whilst entertaining, the Bletchley Park forum will provide the viewer with tools to browse a given collection of objects and generate their own collections based around a guiding theme or objective. Three opportunities arise for using the forum; before a visit, during a visit, and after a visit. The visitors' needs will alter at each stage, and therefore, so should the forum presentation. This section presents a set of proposed user scenarios and suggests some of the tools that may be developed in the course of the project.

The technology envisaged for supporting the activities outlined below comes from previous work in the area of knowledge management and computer supported collaborative work. Two key approaches are drawn from this background: knowledge modeling and text analysis.

In the case of knowledge modeling, ontologies are used to describe what is known about the objects of interest. These models can then be used to reason about the possible relationships between objects and produce useful examples or observations based on the models. A number of tools developed on previous projects are available for supporting the task of creating an effective knowledge model. These include OCML [7], a knowledge modelling language and the Apollo environment [8]. A snapshot of Apollo is shown in figure 2. The left hand frames provide a hierarchical display of ontologies and classes and instances. The larger area to the right supports the definition of concepts using a spreadsheet style interface. The interface can be customised to support its use by those with little prior experience of the knowledge modelling approach.

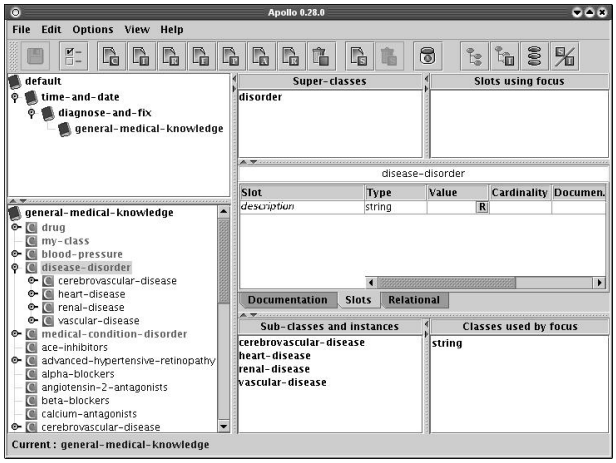

Figure 2. The Apollo knowledge modelling environment

Techniques based on text analysis can be used to support the development of a knowledge model, or in some cases replace the knowledge model. In user scenarios where higher level reasoning about the relationships between objects is not required, text analysis techniques may suffice for classifying and retrieving objects of interest [9]. An example of a tool that relies solely on text analysis techniques is the Similarity Browsing Tool (see figure 2). The larger frame on the left displays the web page being viewed by the reader. The smaller frame to the right contains a list of pages similar to the one being viewed. Similarity is calculated according to a Term Frequency by Inverse Document Frequency (TFIDF) algorithm. This can be used to traverse web

resources in ways not supported by the hypertext structure, essentially combining browsing and searching.

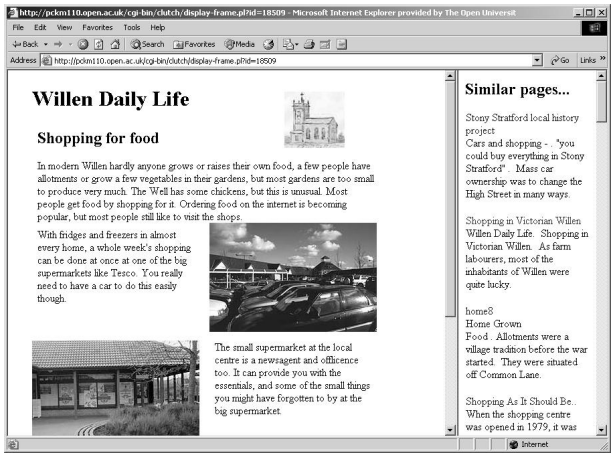

Figure 3. The similarity browsing tool

The remainder of this section describes an initial proposal for the Bletchley Park forum, structured according to the five influences in heritage collections described in Mulholland and Collins [10].

6.1 Support Viewing as Active Interpretation

As argued in [11] learning cannot be designed, it can only be designed for, that is, facilitated or frustrated ([11], page 229). Learning occurs through the active interpretation of objects and events with respect to what is already known. Facilitating active interpretation is a key role of the design of cultural heritage forums in the CIPHER project.

Providing access to all of the objects belonging to a museum is generally not physically possible within the limited space available. Such a physical limitation does not exist in the virtual space of an online forum. However, it is not the physical constraints of the museum space that should limit the size of a display but the cognitive and social attributes of its interpretation. As noted in [12], museum exhibit designers currently attempt to tell a story where showing a small number of objects that say a lot is better than showing many objects and having the message superficial.

Collections of objects selected to illustrate a specified or unspecified theme can be displayed in the forum. The viewer will examine the objects presented, and either, interpret them with respect to the given theme, or construct a theme from the relationships they perceive between the displayed objects. Presenting interesting objects that are on display in the museum will provide a further incentive to see the real thing. Presenting objects not on display in the museum will provide additional value to the visitor's experience. In both cases the aim is to present objects that tell a story.

An example of how this approach may be implemented for the Bletchley Park forum would be to present annotated images of the code breakers and the machines they helped create, arranged such that influence would be represented by location. Similarly the story of how Bletchley Park changed during the war years could be made apparent through the display of maps, or pictures of the buildings, that changed during that time.

Schank [2] describes participating in a conversation as 'reminding oneself of a good story to tell' ([2], page 26). Another person's story reminds oneself of a good story to tell. What makes a good story is determined by the goal of the conversation. In a similar fashion it is proposed that when presenting objects to tell a story in a forum, further good stories can be selected by the visitor, according to their conversational goal, that is, their purpose for accessing the forum.

6.2 Represent Objects in Context to Reveal Reactions

Representing an object in the context in which it was produced reveals the issues that the object was produced in reaction to. In the case of Bletchley Park, the intelligence work, computing and cryptography, was carried out in the context of the Second World War, influenced as always by the social, economic and political issues of the time. An example scenario would be a presentation of the Enigma machine showing the importance of private mobile communications, including previous ciphers and their failings.

6.3 Reveal the Domain as a Dynamic Process

Presenting any specific domain as a dynamic process is a useful way of illustrating the causality of events. Clearly, work in the domain of computing was not happenstance, it was influenced by the work done by mathematicians, physicists, engineers and cryptanalysts. The machines that were produced at Bletchley Park provide a useful root into the domains of expertise that produced them.

6.4 Support Collecting as a Creative and Learning Process

Providing support for visitors to select items of interest, either prior to attending a museum, while there, or after returning home, is just one way of monitoring which exhibits generate interest and motivate curiosity.

Selecting items of interest prior to a visit could be used to recommend a route through the exhibits, along with an

appropriately tailored map or guide. Identifying objects of interest while at the museum could be used to produce a visitor specific memento of their time there, or to create a set of further recommendations for future visits. Thirdly, selecting items of interest after a visit could be used to tailor further information of interest to the visitor that builds on the knowledge they gathered through their visit to the museum.

In addition to the direct technical innovations that could be provided, collecting is seen as a powerful motivational activity for encouraging directed creative learning. Personal collections made around a given, or self selected, theme could be used to focus the visitors attention. This can also be one way in which the visitor could participate in the broader community of visitors by sharing their collections and exploring the collections of others.

6.5 Meeting the Challenge to be Entertaining and Educational

In presenting entertaining exhibits that both recognize the contribution of the work done there and its influence on modern information communication technology, the Trust is not 'dumbing-down' the work carried out, but rather, enabling more people to access and appreciate it. Museums are obliged to educate their visitors and therefore maintain their motivation and interest.

One method through which this objective may be achieved is to provide visitor specific tasks and activities. As museums are currently providing educational resources for school visits, activities on online forums can be produced to cater for the needs of school groups, family groups, pairs and individual visitors.

7. Summary

This paper has given a proposed outline for a cultural heritage forum for Station X, the World War Two codebreaking center at Bletchley Park. The objective of the CIPHER project, to develop the methodology and technology required to produce sustainable cultural heritage forums, is not yet achieved but the direction of this work is described here. Drawn from related work in museum exhibition design and on forming collections, the design of the Bletchley Park forum intends to support the active interpretation of artefacts, as well as the context and the process that produced them. The goal of empowering communities of interest to explore, research and build content will continue to focus the work carried out in this project.

Acknowledgements

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