Digital Transformations

Tackling crucial issues for a digital age, such as intellectual property, cultural memory and identity, and communication and creativity

Accessing implicit knowledge of textiles and design – a smart, living archive for a heritage industry

Professor Dorothy Williams
Professor Susan Craw
Suzanne Martin
Dr Simon Burnett
Dr Nirmalie Wiratunga
Katie Morrison
Ben Horsburgh

Executive Summary

Traditional textile archives are physical collections where access often involves scrabbling in boxes. Digital archives not only enable more flexible, interactive and collaborative user engagements, but offer the capability to capture implicit knowledge of curated assets and how users interact with them, with potential to be introspective and self-adaptive.

A smart, living archive was developed as a proof of concept demonstrator. STAR (Scottish Textile Archive) contains items selected by stakeholders from our textile company partner to represent the culture and heritage of their business. STAR provides searching, browsing and 'favouriting' facilities using similarity-based recommendations. But STAR is also 'smart'; it learns from usage, capturing implicit knowledge that dynamically refines recommendation.

A user evaluation identified important findings. STAR has not simply transformed physical assets to digital knowledge. Digital transformation affects working practices: interaction with STAR influences designers' choices; engagement by users shapes the knowledge base of STAR; and combining implicit knowledge from stakeholders and users reflects priorities of the wider community. STAR transforms the culture and heritage of the textile industry into suggestions, recommendations - even inspiration and innovation - for its users. But its users close the loop between curation and practice by refining the engagement with STAR.

Researchers and Project Partners

Professor Dorothy Williams, IMaGeS Research Institute, Robert Gordon University
Professor Susan Craw, IDEAS Research Institute, Robert Gordon University
Suzanne Martin, School of Textiles and Design, Heriot-Watt University
Dr Simon Burnett, IMaGeS Research Institute, Robert Gordon University
Dr Nirmalie Wiratunga, IDEAS Research Institute, Robert Gordon University
Katie Morrison, IMaGeS Research Institute, Robert Gordon University
Ben Horsburgh, IDEAS Research Institute, Robert Gordon University

Scottish Academy of Fashion (SAF)
Johnstons of Elgin

Summary report

- **Please provide details of the collaborations that have developed during the project, whether planned or serendipitous**

The project itself was a multidisciplinary collaboration between information scientists and digital technologists at Robert Gordon University and a designer at Heriot-Watt University. The official industrial partner was Johnstons of Elgin. Further input in the form of completed questionnaires and/or interviews related to the demonstrator of the smart, living archive was provided by additional industry professionals (including Dovecot Studios, Macnaughton Holdings, Natasha Marshall and Tait & Style), representatives from academia (recent graduates and staff from Heriot-Watt University and Robert Gordon University) and a non-governmental organisation (Scottish Enterprise). These contacts were identified through input from SAF (the Scottish Academy of Fashion).

- **Please describe how the project has evolved over the period of funding. How has the project developed within one of the three main topics of interest or how has it gone beyond these?**

The project set out to assess the feasibility and potential impact of a smart, living archive (Scottish Textile Archive - STAR) to support implicit knowledge access and sharing within the diverse textile design community. In addressing the theme of Translating Knowledge the evolution and development of the content of the smart, living archive from physical artefacts to visual representations to virtual representations describes a move from traditional physical to digital environments. Prior to the development of the system, communities of users across the textiles industry have traditionally engaged with physical artefacts in archives, such as material and pattern samples. For content providers and users of this system, the demonstrator has represented a challenge to these traditional notions of the nature of an archive itself and the form of its contents. Critically, perspectives on the nature of assets themselves affect how they are accessed, used and their concomitant benefits. The key areas of project evolution are as follows:

Evolution of terminology: The term 'knowledge assets' was adopted in the course of the project to replace the term 'knowledge objects' as used in the proposal. 'Knowledge assets' as a term was chosen to acknowledge that the archive content has a value to providers and users. In addition, 'knowledge assets' as a term was employed to avoid confusion with the phrase 'knowledge objects' used in object oriented programming.

Selection and mapping of knowledge assets within Johnstons of Elgin: Staff from Johnstons participated in two knowledge sharing workshops. Prior to the workshops, stakeholders were invited to contribute what they considered to be relevant knowledge assets (150 assets were selected) representing the implicit knowledge of the company. The knowledge assets were selected from the contemporary and historical collections of the partner company. These were used to identify a sample of relevant content (described as knowledge assets within the project context) for the demonstrator, and to map the connections and relationships between these assets. Through a series of participatory

exercises conducted with four groups of employees from various departments, the workshops allowed the stakeholders to describe a set of knowledge assets selected by themselves, and to ascribe descriptors or metadata to each asset. Knowledge assets were categorised as primary (of highest significance to Johnstons) or secondary (of lesser significance). Participants then worked with visual archive cards and prompts to create a map of the final 50 assets and their relationships (see Figure 1).

Workshop 1 – Focused on descriptions, connections and the process of organising knowledge assets which accurately reflected the Johnstons of Elgin archive and story from the perspective of the stakeholders through:

- Exploration of the narrative of each asset

- Expansion on the potential value of each asset to the archive

- Development of the implicit knowledge hierarchy

Workshop 2 – Tested the links and associated knowledge of the assets through:

- Four mapping exercises created a potential framework for the assets (See Figures 2-3).

- Development and testing of the connections between assets

Development of the demonstrator: An interactive demonstrator of a smart, living archive was designed to provide a variety of interactions with the collection of knowledge assets: query-based retrieving; intelligent browsing; and serendipitous recommending. The self-organising demonstrator was developed using the content and metadata already in the collection, and the patterns of usage of the knowledge assets acquired during searches and browsing (See Figure 4). The selected knowledge assets were reviewed by two senior staff at Johnstons of Elgin to identify any potential IP issues and decide on measures to protect IP (e.g. watermarks) where required.

The demonstrator was piloted at The Scottish Borders Design and Technology Showcase, a gathering of textile industry and academics. Subsequent refinements to the demonstrator were made based on user feedback. Further invitations to participate in the testing of the demonstrator were sent out to a cross-section of users (identified above). Data collated as a result of these engagements was used as a basis for a comparative analysis with the data gathered from the workshops.

- **What lessons have been learnt around working within the theme? Have you gone beyond your original sense of what Digital Transformations is?**

Through an analysis of the findings of stakeholder workshops and participants' engagement with the demonstrator, some key issues have been identified:

The Nature of Transformation and Engagement

The way that the stakeholders engaged with the notion of archives and the way that users navigated the archive system of the demonstrator has flagged up a series of questions about the nature of digital transformation itself. The initial focus of the project was strongly driven by the potential for new forms of engagement with implicit knowledge through the transformation of assets from a physical to a virtual format. However, as the project unfolded it became apparent that the real focus of the transformative nature of the work related to a) the transformation of working practices through engagement with, and organisation of, the knowledge assets; b) shaping the knowledge base in response to the interests of its user community; c) combining the priorities of stakeholders and the end users to accurately reflect the priorities of the wider community.

Differing Stakeholder and End User Priorities

Evidence from the use of the demonstrator indicated significant divergence between the interests of the content providers and the end-users. Some secondary assets were more important to the online users than the primary assets selected by the content providers, and conversely some primary assets were never accessed by users, e.g. the Johnston of Elgin logo and lambs wool (identified as critical assets by the stakeholders within the workshops). This illustrates the fact that in any open archive development there will be different priorities and perceptions of the value of assets between different groups of providers and end-users. A critical methodological finding of the project is represented through this discrepancy identified above between content providers and the broader community perspectives. By necessity in a short project, methodological considerations were largely pragmatic and a potentially more beneficial approach would be to adopt a decentralised approach more accurately capturing the variety of interests of the community as a whole. For example, the use of focus groups at the beginning and end of the project may have elicited a greater understanding of asset and archive value across the textiles industry.

Learning from Connections

Over time as the demonstrator was used, it 'learned' what text/image/features were important to each knowledge asset. The ways in which workshop attendees and online users engaged with this content varied considerably. By understanding the significant characteristics of each knowledge asset, the demonstrator made more meaningful links between the assets, thus improving the browsing experience, and understanding the connectivity of the assets within the archive. The demonstrator regulated the relationships between the knowledge assets, and so more accurately reflected the concepts of importance to the users. In addition, changes in the relationships between assets presented a method of capturing from usage the implicit knowledge inherent in the way users engaged with the content of the demonstrator.

Differing modes of engagement

The evaluation consisted of comparing and contrasting the data from the demonstrator usage logs with questionnaire responses to identify key differences, similarities and anomalies. The archive presented users with three modes of engagement: browsing; searching; and 'favouriting'. Of the three modes, browsing was the dominant method by which users sought and retrieved relevant content (73% of engagement activity). Queries accounted for only 10% of activity, and 'favouriting' 17% of activity. These findings directly

contradict the views expressed in the questionnaires which highlighted the importance of key word searching to identify relevant knowledge assets for virtually all users. The wider significance of this finding is the importance of tracking use which is a key component of a digital system.

Impact and Benefits

Interviews at Johnstons of Elgin identified key factors relating to the experience and process of archive development: a) the value of the internal sharing of knowledge and realisation of the richness and variety of knowledge assets identified; b) the individuality of selection and descriptions of assets and implications for assigning responsibility for such processes within a company; c) protection of IP where needed. User feedback identified a range of potential benefits for industry and education as well as challenges in relation to traditional notions of an archive.

- **What future plans have developed out of the research?**

In line with the lessons learned from the project (identified in the previous section) the following areas for future research have been identified. Relevant funding opportunities will be sought to ensure the continuance of the work already conducted in this project.

The Nature of Transformation and Engagement

Understanding how engagement with content transforms practice, e.g. does it affect the design process? Closing the loop between how people use the implicit knowledge, how it transforms their practice and how that change of practice in turn transforms how the knowledge can be accessed. This work would have implications for the development of models of information seeking, information literacy and knowledge creation.

Differing Stakeholder and End User Priorities

Understanding the differing influences of the providers and users of the implicit knowledge to provide a wider community perspective for future browsing and searching experiences. This work would have implications for the development of archival systems, models of information retrieval and online systems architecture.

Learning from Connections

Exploring the potential for development of archival systems which offer tailored recommendations to different user groups through alternative weightings learned from usage by different stakeholders within the community. This work would have implications for the development and/or revision of models of online content recommendation.

Differing modes of engagement

Further development of methods, piloted in this short project, to enable visualisation of trends of engagement with implicit knowledge, with potential for a) tracking the developments and changes in knowledge over time in any context; b) exploiting the dynamic between usage and improvements in retrieval accuracy to develop more enhanced exploration of the exploration space. This work would have implications for the development of research methods and information retrieval.

Impact and Benefits

Investigating the processes of archive creation and use within a wider range of companies and knowledge assets to a) examine IP issues and applicability of IP protection measures more widely; b) develop procedures to assist companies to engage in the digital transformation of knowledge assets; c) assess more widely the impacts and benefits for knowledge sharing. A further textile design company has already expressed interest in collaborating.

- **Please describe the methods of dissemination and outreach you have used during your project.**

The project has taken advantage of a number of dissemination opportunities, in both physical and virtual environments. A project website (http://www.rgu.ac.uk/4158D7A0-B94C-11E1-A5B4000D609CAA9F) was established as a promotional platform for the project for the broader textiles community in Scotland, to highlight the members of the research team and also the approaches used within the project.

The demonstrator was presented to a wide range of industry members and academics at The Scottish Borders Design and Technology Showcase. Attendees at the showcase had the opportunity to test the demonstrator and offer feedback on its structure and content.

Web-based testing of the demonstrator was conducted by recent graduates and industry professionals, with feedback collected via face to face interviews or an electronic questionnaire.
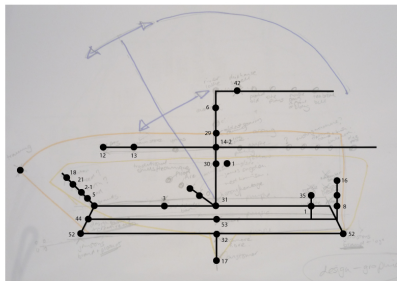
In addition, a variety of meetings were conducted with industry representatives from Scottish Textiles and Scottish Enterprise.

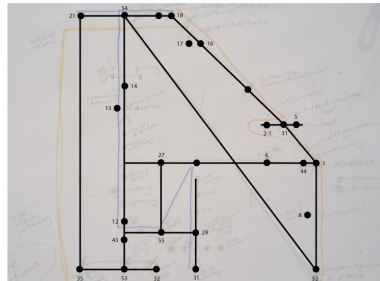Figure 1: Stakeholder workshops

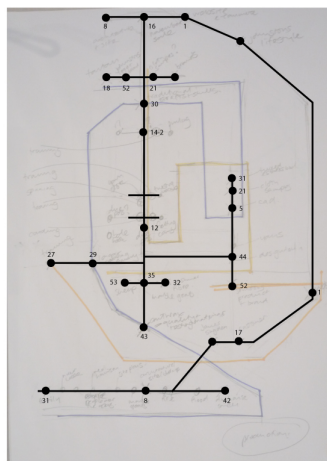Figure 2: Mappings of selected assets from different workshops
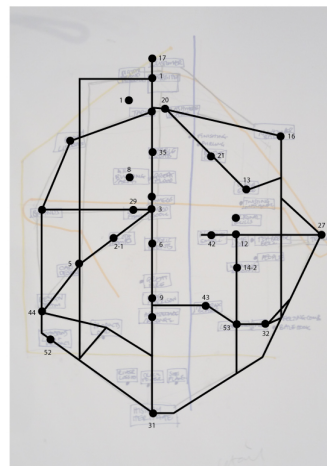
a) Design

b) HR + Finance

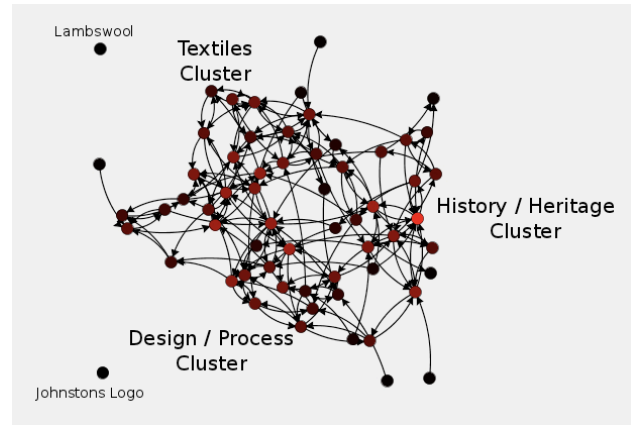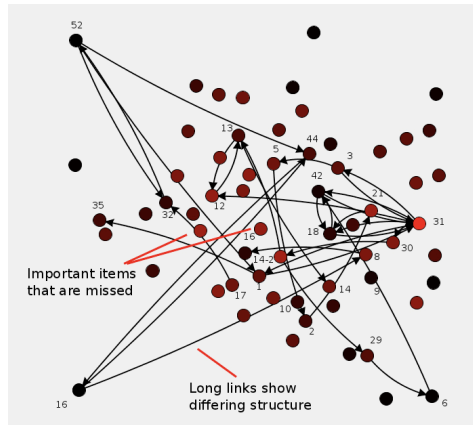

c) Production

d) Retail

Figure 3: Graph from Design mapping   Figure 4: Graph from User Evaluation

References and external links

Scottish Academy of Fashion Project Webpage:

http://scottishacademyoffashion.com/projects/scottish-textile-archive

Robert Gordon University AHRC - STA(r) Project webpages:

http://www.rgu.ac.uk/4158D7A0-B94C-11E1-A5B4000D609CAA9F

Digital Transformations

Arts & Humanitie
Research Council

Digital Transformations is one of the AHRC's Strategic Themes, which were
Identified through the Future Directions for Arts and Humanities Research
Consultation in 2009. The themes provide a funding focus for emerging areas
of interest to arts and humanities researchers. Professor Andrew Prescott, AHRC
Digital Transformations Theme Leadership Fellow, has said:

*"The AHRC Digital Transformations theme is about more than the creation
of online editions or the digitisation of books, manuscripts or pictures. It is
about fostering completely new methods of scholarly research and discourse.
It will encourage arts and humanities researchers to work with scientists in
developing new concepts for digital technologies to explore our artistic and
cultural heritage. It will show how the theoretical insights generated by the
arts and humanities enable us to better understand the profound changes
currently occurring in identity, culture and society. Researchers in the arts
and humanities will create new relationships with creative and cultural
businesses, memory institutions and technology producers. The digital
has already profoundly transformed the arts and humanities; the AHRC
Digital Transformations theme will show how the arts and humanities
can transform digital cultures."*

Further details about the theme can be found on the AHRC's Digital Transformations
web pages at:

http://www.ahrc.ac.uk/FundingOpportunities/Pages/digitaltransformations.aspx