Narratives in the History of Computing: Constructing the Information Age Gallery at the Science Museum

Tilly Blyth

Narratives in the History of Computing: Constructing the *Information Age* Gallery at the Science Museum

Tilly Blyth
Keeper of Technology and Engineering, Science Museum, UK
Tilly.Blyth@sciencemuseum.ac.uk

Abstract: One of the challenges of exhibiting the complex, and mostly intangible, world of computing in a museum context is how you bring together the technology with the people involved and the information shared. The history of computing is not just a neat history of devices. Analogue, digital, mini, personal and supercomputers all reflect the material culture of information and communication technologies, but the story of information machines is a much more complex story of the interrelationship between networks of people, societal and cultural influences. This paper reflects on approaches to the display of the history of computing and suggests that a shift to narrative and users, rather than chronology and technological progress, invites a more engaging experience for the majority of visitors. It also suggests that there is an inherent value in the display of computing artefacts that goes far beyond that of working machines. Some machines can work on a profound level, not just a utilitarian one. The paper discusses the approach taken in the Science Museum's Information Age gallery, opening in September 2014.

Keywords: Museums, displays, history of computing

1 Displaying the History of Computing

Texts on the history of computing tend to follow a standard sequential narrative - from calculating aids to mechanical, digital, and then electronic devices - the expected approach to history favours an understanding that is technologically driven. Exhibition displays of the history of computing have also tended to reflect as technocentric, chronological approach. Timelines offer a clear way in for the visitor, providing a strong structure and a clear sense of the development of a technology.

A beautiful historical example is IBM's exhibition *A Computer Perspective*, which opened in 1973 at their Corporate Exhibit Center in New York (Eames, 1973). Developed by the designers Charles and Ray Eames, the exhibit explored the history of computing though key objects in the centre of the space and a "History Wall" along the back that acted as a multi-layered timeline (1890-1950) documenting key events in the development of the computer.

Despite following a strictly linear structure that placed the technology at the heart, the "History Wall" played with ideas and people, alongside the technology, through its dense layering of labels and facts. Following an approach that can be best described as visual hypertext, the display created connections through the careful placing of imagery, text and objects, to show a network of ideas, people and events that led to the development of calculation, automation, computation and artificial intelligence.

The Science Museum's own computing gallery, *Computing Then and Now*, which opened just a few years later in 1975, is another interesting example of how contemporary ideas about computing were mapped onto a gallery space.

Figure 1: Science Museum's gallery *Computing Then and Now*, 1975, showing the computer terminal that allowed visitors to interact with the Imperial College computer.

The gallery had analogue representations of computing on the North side and Digital on the South. It provided a progression from early aids to calculation, to a 1930s punched card office, to the development of electronic digital machines, elements of a contemporary computer (input/outputs, storage and processors), ending in state-of-the-art minicomputers. Although thematic as well as chronological, the gallery clearly provides a sequence through which visitors can build their understanding of the development of computing.

Despite the obvious benefits for audiences in terms of clarity about where they are in their gallery experience, critics of a chronological approach argue that such displays provide an interpretation of history that presents the past as an inevitable progression towards the present. This Whig historiography leads to technological determinism, where the development of technology follows a predictable and predestined path, rather than reflecting and developing according to our social structures and cultural values. Technology is thought to have an effect on society, rather than being part of a network of actors working together to create meaning and use through technological development. Clearly, if we subscribe to a social constructivist approach (Bijker, Hughes and Pinch, 1987) to the history of technology,

we need to present a display with a more nuanced historical understanding, which places people and their context alongside the development of technology. We need to show how many of the routes of technological change were not pre-determined, but the result of parallel developments, or social, cultural and economic forces.

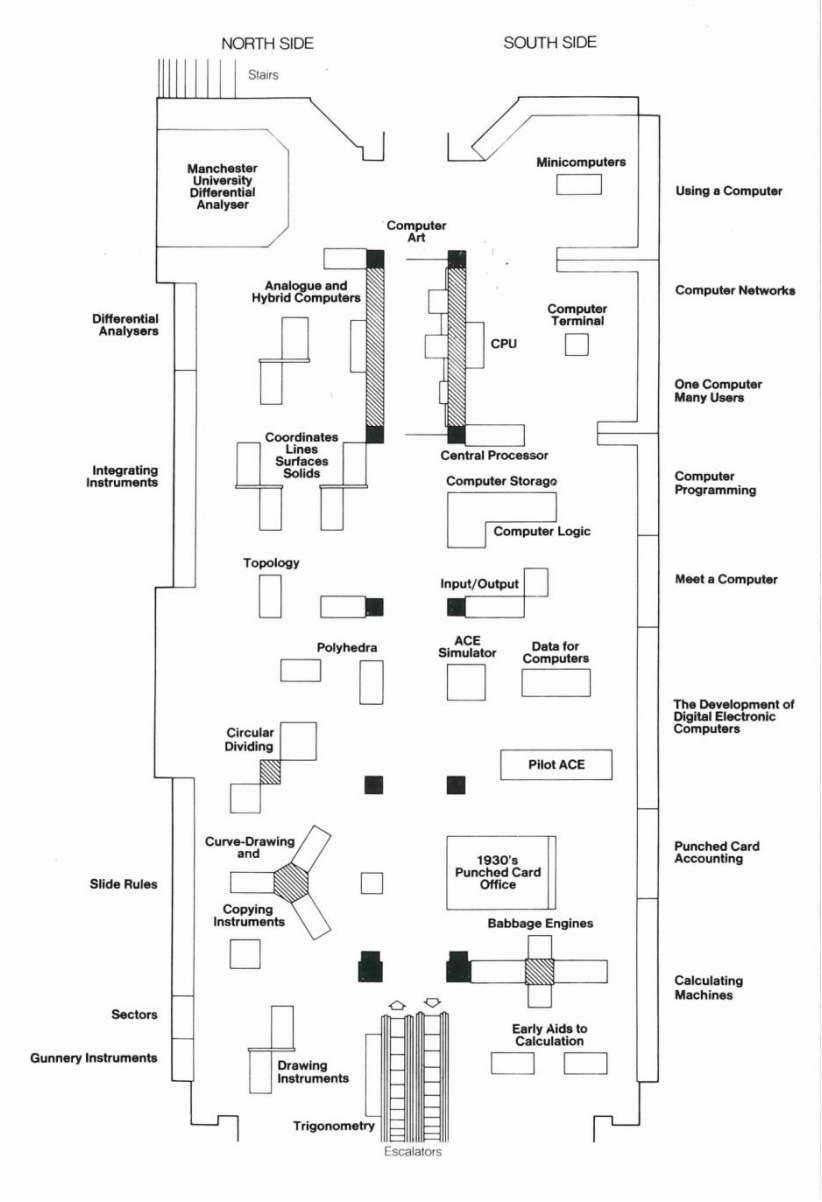

Figure 2: Map of the Science Museum's gallery *Computing Then and Now*, 1975.

This potentially shifts the display from a predictable and linear history, to view the development of computing in terms of ideas, personal motivations, or broader social

and economic forces. It invites a more active relationship to our past, asking audiences to consider the social structure and knowledge frameworks in which our ancestors existed, and to consider individuals as actors in the history of technology that go far beyond the initial inventors and innovators, to those that used, developed and gave meaning to 'new' technologies .

Importantly, it also begins to bring the history of computing closer to a history of information, breaking the linear development of technology to invite visitors to see people, ideas and technology as relating and interlinking with each other. It suggests that linear and chronological displays limit the complexity of ideas we can present and limit the connections that visitors themselves may make.

2 Narratives in the History of Computing

In his book *Beyond the Glass Case* (2000) Nick Merriman suggests that people consume the past in two ways: through a personal past (a sense of the past experienced in personal terms) and through impersonal heritage (e.g. regional, national, international histories). This implies that museum curators not only have a responsibility to present the history of computing in a more dynamic and personal way because of a sense of 'good' historiography, but because of their public purpose to enthuse people in their own sense of heritage. Purely appealing to an impersonal heritage, such as the development of computing as an innovation driven story of monocausal progression, may do wonders for those who are already interested in the technology or the importance of changes in the computing industry, but it is unlikely to enthuse those who perceive themselves to have no immediate personal link to the development of computing (even though they may 'use' computers every day).

Rather than presenting the history of information as an inevitable consequence of past developments, museums can provide audiences with the tools for questioning the role and form of information technology in society. By viewing technology as a historical and cultural form, disseminated and appropriated by different users in different ways at different times, audiences are invited to orientate themselves within a broad history of information technology. In this way museums can become "enablers where people can harness their creative energies to construct a meaningful past of their own" (Merriman, 2000, p.95). Most importantly, it invites audiences to think, make leaps of imagination or comparisons with their ancestors, rather than read and learn.

So what techniques are open to museums in order to do this in an engaging way? Story telling is a common language for all of us from a young age. Through books, television and radio we have all enjoyed stories, but it is a form that has been relatively neglected in museology, particular science and technology museums. A few academics have highlighted the importance of storytelling for engaging people with science (Linett, 2013) and developing enthusiasm for technical subjects such as computer science (Impagliazzo, 2012). The museum professional Leslie Bedford (2001) noted that 'Stories are the most fundamental way we learn. They have a beginning, a middle, and an end. They teach without preaching, encouraging both personal reflection and public discussion. Stories inspire wonder and awe; they allow

a listener to imagine another time and place, to find the universal in the particular, and to feel empathy for others. They preserve individual and collective memory and speak to both the adult and the child' (p.33).

A strong story provides a great way of connecting visitors, enabling them to imagine the motivations of individuals and the constraints they were under. Each story has a linear structure, so the visitor is clear where they are in the story and how much longer they are required to focus. Importantly, if it is effective it can connect the visitor to history at an emotional level, so that they might invest more time to build a framework for understand broader historical events or connect with a scientific understanding. If the development of technology shifts from being an impersonal act that follows a predetermined route, to multiple stories that are defined by human values and beliefs, then visitors are more able to project their own thoughts, feelings and memories onto the story.

3 Shifting Technological History to the User

As historians and sociologists of technology and media began to question the role of the user as agents for social change in the 1980s and 90s (Bijker, Hughes and Pinch, 1987; Cowan, 1987; Silverstone, Hirsch and Morley, 1992), they illustrated the need to breakdown the linear model of technological innovation and diffusion, to show that users of technology are not passive consumers, but actively involved in the creation and domestication of technology. More recently Oudshoorn and Pinch (2003) stressed the importance of the representation of users in the co-construction of technology, whilst the historian David Edgerton (2006) suggested that we should refocus the history of technology on apparently 'old' technologies that are commonly used, as the majority of our world is reliant on the technologies we utilize, rediscover and redevelop, rather than on discoveries made at key moments of invention.

Such approaches invite technology, and in particular computing curators, to refocus the stories they tell in museums, and place users rather than innovators at the heart of the story. But what does this mean for visitors, who expect to hear about the firsts, the Eureka moment, lone engineer who invented a new approach?

I would argue that if done well, such an exhibition can be more engaging, telling stories of users as active co-producer, showing how the technology of computing is enmeshed in the culture through which it was produced and used. Rather than one significant individual, we begin to learn about teams of people working together to define a technology. The marketing materials that illuminate how the user and the non-user of new technologies were defined become vital, rather than relegated to the depths of 'trade literature'. And oral histories, that present an unofficial and often undocumented history – a 'history from below' – give a voice to many of those developers and users whose tales of technology are otherwise unheard. These can provide a rich resource for a deeper, more personal connection with technological histories and in particular with specific objects whose relevance and use might be lost.

Of course there are negative implications to a story telling approach. By their very nature, stories aren't always true and can often heighten the sense of adventure, tragedy or comedy in order to play on the audiences' emotional engagement. A story

telling approach suggests a shift away from museums presenting 'factually correct' history, to the presentation of history that plays on audience feelings, presenting real historical figures as merely characters in a plot. It also presents the question; if a museum is about stories, can it also be about ideas? If the craft of a curator is to play with the experience of visitors, orchestrating moments of calm and reflection with moments of excitement and emotion, can it still invite visitors to make connections between objects and absorb ideas?

4 The Role of Objects

It is often said that for information technology, working machines are key to a museum display. Many believe that there is nothing less interesting than a dead computer, as the information and the interface are all lost from the machine. Some visitors want to look at a machine and understand 'how it works', others want to hear the noise and see how the machine was run. But technological objects can offer different types of museum experience to audiences. An object (even an apparently historically banal object) can have a power for visitors just in themselves. To focus on working machines only is to disregard the different type of experiences that an object can provide. It also disregards the craft of the curator in layering and texturing the experiences across the gallery.

In his essay 'Resonance and Wonder', the literary historian Stephen Greenblatt analyses the museum experience in terms of two types of audience response. "Resonance" is "*the power of the displayed object to reach out beyond its formal boundaries to a larger world, to evoke in the viewer the complex, dynamic cultural forces from which it has emerged"*. For Greenblatt this is essentially the knowledge and understanding provided by that object, if viewed through a cultural or historical lens. This could be the object as a working machine, or it could be the object with merely a label, inviting it to be considered in its wider context. It is about understanding the uses and instances which have created a meaningful frame for the historical artefact. In Greenblatt's words, it is "the power of the displayed object to reach out beyond its formal boundaries to a larger world".

In contrast Greenblatt's term "Wonder" refers to the object's aesthetic and poetic dimension, the power of the object "*to stop the viewer in his or her tracks, to convey an arresting sense of uniqueness, to evoke an exalted attention"*. Greenblatt was originally referring to the arts and visual artefacts and some struggle to see how this sense of "Wonder" applies to scientific and technological artefacts. But computer and other information technologies have the power to command visitors' attention, even when their meaning or use is not commonly understood. The scale of a supercomputer computer, such as the Cray 1 from 1976, can provide visitors with a sense of awe from the bold theatrical design, or the magic of seeing "the real thing", achieved by icons such as the Apple 1 from 1976, can give visitors and exceptional sense of history. Icons such as Charles Babbage's Difference Engine 1, with its intricate cogs and wheels, bring amazement that one individual could make such a leap of imagination.

It is the curator's role to amplify the experience of "Resonance and Wonder" through the stories that they choose to tell, the objects they display and the way the gallery is designed. Some significant objects might be presented as "design pieces" without any context or story, but purely to invite audiences to relish in the real or the beauty of the object. Others might be part of a narrative that engages the visitor emotionally in a story. A working object might focus the experience on to one type of understanding, "what did it do and how?", whereas carefully crafted locations of objects can allow visitors to make serendipitous connections, inviting the audience to think for themselves and construct their own meaning between objects.

5 Narrative in the Information Age Gallery

Opening in autumn 2014, Information Age will be based on the second floor of the museum, in what was the old shipping gallery, which is a vast 2500m^2. The gallery tells the story of the transformations that have taken place in human communication in the last 200 years. Blending historic, iconic objects with up-to-the-minute technology and interactive media, it will expose, examine and celebrate the technology that has changed the way we share information and connect with one another.

Starting with the development of the electric telegraph in the 1830s, the gallery will tell stories through the eyes of those that invented, operated, and were affected by each new wave of technology. It is not a uniquely technological story, but a social story of the successes and failures, the brave new ideas and ambitious schemes, and of human nature and our universal need to connect with each other.

The gallery is constructed around six zones that reflect networks of people, technology and organisations: The Cable, looks at telegraphy, The Broadcast looks at radio and television; The Exchange focuses on telephony, The Constellation looks at Satellite communications, The Web looks at computing networks, and The Cell focuses on cellular mobile networks.

Each zone, or network, highlights 3 or 4 "transforming events" that are significant stories that enable visitors to experience a key moment of change through technology. A total of 21 transforming events across the gallery place the stories of users equally with those of the inventors of technology. Some present a key innovation e.g. Alexander Graham Bell's development of the telephone, but in this case the story of invention is contrasted with Bell's love story and through his competition with Elisha Gray.

In the section on computer networks, The Web, there are four stories. One story looks at the development of the world's first computer for commercial applications, the Lyons Electronic Office (LEO 1) in 1951. This doesn't just focus on the story of those who created the machine, but will highlight the importance of research and influences from a range of actors across Britain and America as knowledge about digital electronic machines is shared and developed. The teashop manageresses will also play a central role, showing how they became as much part of the 'information system' by calling in their weekly orders, as the LEO computer itself.

The other stories look at the Birth of Computer Networks: How the world's first international computer network – ARPANET – developed out of Cold War tensions in 1969; A Global Information Space: The creation of a new age by Tim Berners-Lee in 1990, where anyone can find and access information through the World Wide Web; and Computers for Users: The transformation of computers into intuitive and affordable devices in 1983 through the development of the Graphic User Interface and the launch of the Apple Lisa computer. In each story the users are actively involved in defining the meaning of the technology and the way it fits into existing social structures.

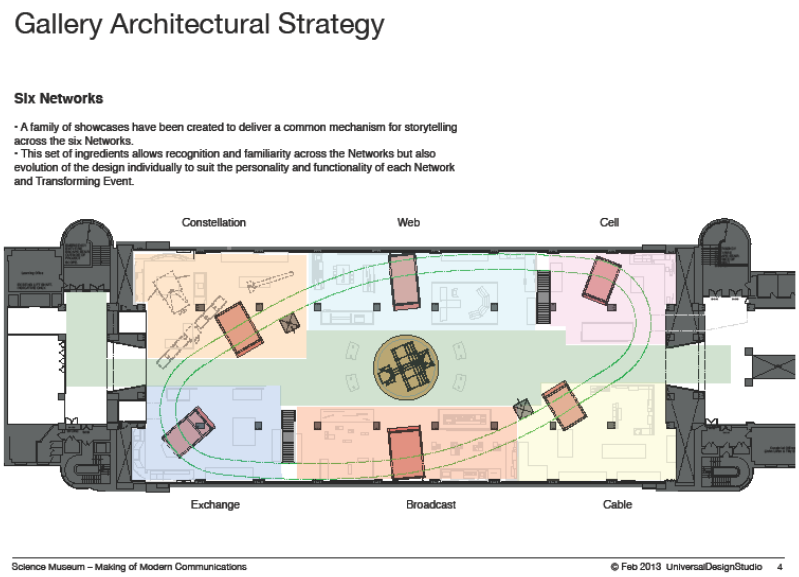

Figure 3: Universal Design Studio (the gallery designer's) representation of the network structure across the *Information Age* gallery, 2013

Figure 4: Representation from *Universal Design Studio* of one part of the Lyons Electronic Office (LEO 1) story on the *Information Age* gallery, 2013.

We hope that this type of story and user-centric approach will create personal links for visitors and enable a dialogue with a broader audience than those already engaged with the history of computing. It should enable visitors to reflect on what the technology meant to our predecessors, and how these meanings are not given and defined by the technology, but are co-constructed with users in the way that they are consumed, marketed, used and re-appropriated.

The approach has radically altered the way the team is working on this project. It has meant that oral history and in some cases video, has become both a central tool for the research process. These multiple types of interpretation will form a very important part of the engagement of visitors on gallery, giving personality and historical context to the story, and in the longer term much of the material we collect will become a long-term digital asset within the museum's collections.

We also aim to play with Greeblatt's concepts of resonance and wonder through significant gateway objects. We have chosen particular objects for the awe and spectacle they provide to visitors. These will not be heavily interpreted through the stories, but we believe they will give a meaningful context, provide a visual pleasure and a historical anchor that can only be achieved by museum artefacts.

An example of this is the vast Russian supercomputer that will be placed in dialogue with a comparable machine from the USA, the CDC 6600. Although we only have space to display the main operating console, the scale of this machine and surprise of seeing the only Russian supercomputer from the Cold War in a Western museum collection should provide visitors with a real sense of astonishment.

6 Conclusion

The craft of the curator is in layering and texturing different types of experience across the gallery. Scientific and technical museums have tended to focus on one

approach to history - chronological accounts that tell familiar technical stories of invention and progress. These appeal to a core audience who are already engaged with the history of computing, but provide few ways in to those who do not think computer history has relevance or interest for them.

The display of the history of computing, and more specifically the history of information machines, as a series of narratives that focus on the use of the machines, as much as the invention, provides museums with a real opportunity to broaden the audience for the history of computing. A people-centric approach, that sees the history of computing as a lens on society and humanity, helps to connect visitors with this technical history at a more personal level.

But where does this leave the artefacts of computing; the historical evidence of the material culture of information processing and storage? Working machines can play an important role in helping visitors to understand the experience and environments of computing, but they should not only be considered as working tools. Greenblatt's appeal to the Resonance and Wonder of objects can be equally true for scientific and technological artefacts. If given the platform to perform, objects not only enable us to reflect on social and cultural forces, but to see the poetic and aesthetic dimensions of the machine and its design. All of these devices – our stories, users and objects – are the tools we are working with in the development of *Information Age* gallery.

Bibliography

Leslie Bedford, 2001, "Storytelling: The Real Work of Museums", *Curator,* 44(1), 27-34.

Wiebe Bijker, Thomas Hughes, and Trevor Pinch, 1987, eds. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.

Ruth Schwartz Cowan, 1987, "The Consumption Junction: A proposal for research strategies in the sociology of technology." In *The Social Construction of Technological Systems*, eds. Bijker et al. MIT.

Charles Eames and Ray Eames, 1973, *A Computer Perspective*, Harvard University Press.

David Edgerton, 2006, *The Shock of the Old: Technology in Global History Since 1900*, Profile Books.

Stephen Greenblatt, 1991, "Resonance and Wonder", Chapter 3 in *Exhibition Cultures: The Poetics and Politics of Museum Display*, eds. Ivan Karp and Steven Lavine, p.42

John Impagliazzo, 2012, "My Fascination with Computing History", in A. Tatnall (ed.), Reflections on the History of Computing, IFIP AICT 387, pp.385-395, 2012.

Peter Linett, 2013, "Interview: Ben Lillie on Science and the Storytelling Revival" In Curator: The Museum Journal, 56(1), 15–19.

Nick Merriman, 2000, *Beyond the Glass Case: The Past, the Heritage and the Public*, UCL Institute of Archaeology.

Nelly Oudshoorn and Trevor Pinch, 2003, “Introduction: How Users and Non-Users Matter.” In *How Users Matter: The CoConstruction of Users and Technology*, ed. Nelly Oudshoorn and Trevor Pinch, 1–25.

Roger Silverstone, Eric Hirsch and David Morley, 1992, “Information and communication technologies and the moral economy of the household.” In *Consuming Technologies*, ed. Silverstone and Hirsch, Routledge.