# Introduction: The Generative Web


## David Bearman and Jennifer Trant, Archives & Museum Informatics, Toronto, Canada


The occasion was recent enough and the impact sufficient that many of us can still recall the moment ten to twelve years ago that we first encountered the World Wide Web and the lightweight, stateless http protocol, and presentation-bound html content, that it carried. But twelve years is long enough that it is harder to recall today whether we perceived at that time that it would sweep the Internet and transform our methods of communication and computation, or if we were depressed to see yet another dubious entrant in a universe temporarily crowded with Archie, Gopher, Veronica, Jughead and other quasi-functional and non-intuitive means of on-line data interchange.

Whichever it was, it was not long before we began to see the glimmerings of something new and powerful. Initially, the most impressive thing was the technology. Network-based hypertext was startling in itself. Mosaic gave us a nearly magical marriage of text, image and even sound (if not quite on one screen at one time for bandwidth reasons), when complex proprietary applications were required for interactive multimedia. Nevertheless, early content was rarely impressive. Little of what we saw initially was deep or interactive, though the Library of Congress Vatican exhibit in January 1993 woke most of us up to the possibility that something radically new was realizable (the earliest version of the site preserved at the Internet Archive dates from 4/12/96; see http://Web.archive.org/Web/20000302023548/lcWeb.loc.gov/exhibits/vatican/toc.html). Images weren't in-line yet, and downloading them at baud rates that averaged 14.4kbs was often excruciating, but it was easy to appreciate that this had potential. Shortly after, the French Ministry of Culture used the Web to make available images that "opened" the long-closed caves at Lescaux for public viewing (http://www.culture.gouv.fr/culture/arcnat/lascaux/fr/index.html). The power of seeing these images, previously known only to a handful of archaeologists, on the public Web made a case for access that enticed many museums on-line.

Within the first two years after the release of the Mosaic browser, the Web was host to hundreds of museum 'brochures', quite a few databases, and a few more adventurous efforts, including exhibitions. This aggregation already comprised a resource that was unmatched in print by the time of the first Museums and the Web conference in March 1997. There were collaborative spaces, experiments in radical personalization and dynamic label generation, and 3-D walkthroughs created in both academic research and museum settings. Yet in retrospect, the most striking aspect of even the most visionary presentations at MW97 was how they failed to foresee the revolutionary character of the developments of the Web. Eleanor Fink's MW97 opening plenary envisioned a range of Web cultural resources in 2005 that was quite prescient in many respects, but the mechanisms that she assumed were required to create that world – standards based, top down, international collaborative undertakings with massive new levels of funding and coordination – turned out to be unnecessary. In their place, progress came from the dynamic evolution of Web applications and from the energy of open source.

We find ourselves in 2006 in a state we would have had trouble conceiving in 1997; in addition to a Web accumulating the digitized heritage of mankind as a cultural resource for public consumption, which we dreamt of in 1997, we have a Web that is the culture cauldron of the present. This is not something other than, or beside, contemporary culture, nor even some


***Museums and the Web 2006: Selected Papers from an International Conference.***
J. Trant and D. Bearman (eds.). Toronto: Archives & Museum Informatics, 2006, p. 3

means for accessing past culture as an object of study; it is the generative source of contemporary culture. It is no accident that the language of Web applications seems to borrow from the rawness of the street, inventing 'mashups' to describe what staid engineers would call interoperable applications. The generative Web is a mosh pit of culture, making our visions of ten years ago seem a choreographed marionette show.

## The Once and Future Web

The first two authors in this volume have taken a short step back to get their footing, looked about and described their surroundings as they see them now, and bravely imagined what will come next. For Jemima Rellie, the situation of museums in the UK provides a bit of framing, enabling her to depict museums on the Web in the past decade with confident strokes as elements in a national dialogue with new technologies and Labor party policies. This policy context of 'inclusion' coincides with the emergence of new social technologies.

The Web is still a sideshow for museums, which have underfunded it and failed to integrate it solidly into their business, though it is central to their missions (A&MI, 2005). The dark elements of Eleanor Fink's 1997 vision are still in shadow – copyright and digital preservation lurk as unresolved threats, cross institutional search and the full social potential of community building remain to be fully realized. Rellie calls for greater collaboration, agreement on standards, and frameworks for integration. But for Rellie the glass is more than half full – the universal adoption of some Web presence, the full embrace of the goal of making collections accessible on-line, and the exceptional model of the 24 hour museum provide grounding for future dreams. Rellie asserts that these will be realized without the de-institutionalization of the museum or requiring the object to take second place; indeed she asserts that the museum's identity and the depth of meaning in the object itself will ensure that the virtual remains a hand servant of the real.

Kevin Sumption shares this concern about the position of artefacts. Situating the introduction of multimedia within museum interpretation as a gradual evolution from the 1940's, Sumption paints the Web as a less radical departure for museums than for many other institutions. Remote access has potential to segregate communities based on exposure to the representation versus exposure to the object. With less government funding, Australian museums followed a similar course to their UK counterparts, from e-brochures, to e-tours and finally e-communities, and encountered the same tensions between investing in the virtual and wanting to accentuate the physical. Unlike museums in the UK, the Australian Museums and Galleries On-line site, AMOL, has not yet made the collective leap from a portal to a Web 2.0 platform which can potentially further de-situate the object. Finding the balance "when all you've got is the real thing" (Trant, 1997) continues to be a challenge a decade on.

## The Accessible Web

Making content available on-line, providing access, and making content accessible are different, and in a sense represent a continuum of requirements. After a decade of making a growing proportion of our collections (and increasingly deep interpretation) available on-line, there is concern that we have not yet quite made the content accessible. Although considerable investments have been made to ensure that Web content is 'barrier free' and accessible, how usable have we been able to make it? In what ways are current trends on the Web aiding or detracting from accessibility for all? And how far have our imaginations taken us in building new affordances for virtual encounters with traditional cultural objects?

The first step towards solving accessibility problems is understanding them. Reich and her colleagues at the Museum of Science, Boston conducted a detailed analysis of the needs of sixteen people with a variety of different handicaps. It exposes the limitations of both generic solutions and the easy categorization of barriers to accessibility as experienced by individuals. With their painstaking attention to how Web sites can frustrate usability, they illustrate how complex it is to ensure accessibility and how rewarding some small changes can be. Their study is a model of the situated analysis of actual interactions needed to identify factors that make what is available, accessible.

Brown and Gerrard pursue a different strategy, with equally useful results. Taking two sites that won design awards at Museums and the Web in 2005, they explore how the functionality which gave these sites their edge impacts usability for individuals with hypothetical handicaps. Since accessibility is never going to be the only criterion for a successful cultural site, understanding the nature of the trade-offs designers encounter is crucial to planning a future site. We are not surprised to discover that many attractive multimedia interactive features present barriers to access for some handicapped people. These same barriers are, to a lesser but real degree, impediments for many people who would not consider themselves in any way physically handicapped. Indeed, as the authors make clear, broadband multimedia delivery of Web content involves a lot of cultural knowledge of virtual forms and how to manipulate them.

The National Gallery (Washington DC) pursued a multi-pronged approach to assessing the usability of its Web site in advance of a major extension and design. Hecht reports how and why users were surveyed, interviewed and observed, using the Web to study the use of the Web. Findings were incorporated into new visions, prototypes and wireframes. Old models were re-examined and new ones critiqued. All these layers of inter-related critical review and assessment were designed to inform a new product. It all looks like a classic report on well engineered user studies, but underlying it is the exploitation of capabilities to 'view the viewer' that reveal the Web as a constantly self-referential environment.

The Franklin Institute examined how to present printed works on-line, touring the Web for the best practices. As Elinich and Sparks illustrate, the advantage of this approach is that all these models are clearly realizable within existing technical constraints; the disadvantage is that the present mental models are fairly well preserved in what is identified as a solution. Historical genres of knowledge production and presentation carry expectations about behaviours that constrain their on-line re-presentation; the challenges we face are both to extend our methods and to create equally stable and satisfying new forms for today's media.

## The Sociable Web

The Web was conceived as a social environment; a means for work groups to exchange data and ideas and to collaborate in an active two-way dialogue. But its early implementations outside of the scientific community were as a publishing, indeed a broadcasting, medium. The "narrowcasting" potential of the Web was realized quickly, but the full social potential of inter-connectedness was much slower to evolve. In part this reflected the way that most people were actually communicating on-line – slowly, and attached by wires. But the signs of a sociable revolution were always present. The "killer app" of the Internet was e-mail; chatrooms took off on the Web in a way that transformed social life for a generation of teens; and gaming on the Web grew into an industry larger than Hollywood without most adults even knowing what it was. These applications, however, employed "traditional" ar-

chitectures: they took place in and through application software running on a remote server with local clients that could easily have been dumb terminals. The latest generation of social applications is different.

Peter Samis and Stephanie Pau report how the San Francisco Museum of Modern Art first imagined podcasting as a sort of voice broadcasting channel that they could use, along with other Web channels, to deliver a relatively traditional tour of their exhibits. This discussion of how podcasts turned out to be different from audio tours is useful for anyone following their path, but the subtext, that podcasting is as much a means for social communication within a community beyond and outside the control of the museum, is likely to prove more interesting over time. Podcasting is most powerful as a guerrilla dialogue, initiated and maintained external to the power structure of the museum, rather than as a museum sponsored or authored monologue. So the museum is driven to syndicate podcasts, link to those provided by others, and enable a multiplicity of voices to speak for it, in order to take full advantage of the genre.

The steve participants self-consciously seek language that does not belong to the museum in order to make the museum more accessible to the general public. They look to folksonomy not just to rescue us from our professional jargon, or the way that experts parse disciplinary knowledge, but also to record an experiential level of interaction. The revolution embodied in social tagging is not acquiring more words, different words, or even words that have meanings in other contexts, languages, cultures and communities; it is giving the power to make museum meaning to the visitors rather than retaining a museum monopoly on all meaning making. Social tagging works of art could be just plain having fun; if in doing things that satisfy them users help to make the contents of the museum more readily accessible to future on-line (and possibly even in person) visitors, this will be a further benefit.

One lesson we could draw from the successful botany blog Daniel Mosquin edits is that people simply enjoy taking part in something that brings delight every day. In a world in which reading the daily paper is a depressing obligation and opening the daily mail likely to be a bore, knowing that something fresh, intriguing and possibly beautiful will come your way is enough to attract many to regular readership. This is a simple lesson, but one that museums with their extraordinary treasures are exceptionally well positioned to exploit. Add to that the opportunity for those with green thumbs, environmental politics or aesthetic sensibilities to engage in discussions with others unknown to them but equally engaged, and the botanical garden found a winning formula. Would that most blogs were equally inspiring!

Marthe de Vet and her colleagues hoped that their irreverent art game would also draw people to the museum. How, they asked, can a museum use the social character of the Web to promote itself? Outrageous ploys have created mass buzz elsewhere, but in Den Haag you can't really invite the public to opening night nude, as the Saatchi Gallery did in London in April 2003; still, you can give prizes for participation in an on-line game requiring careful inspection of works of art from your collections and recruitment of friends, as the Mauritshuis did. Their brave initial foray into viral marketing should inspire other museums. What is crucial is that the Web as a social space encourages and enables the building of "buzz". Next steps could allow virtual visitors to hide their own variants in the paintings of the museum, creating a two-way scavenger hunt and challenging the museum experts to find the follies.

## The Learning Web

Despite its social potential, learning on the Web can be a very abstract experience. Facts are often presented with the authority and disembodied voice of the anonymous author, just as

we all too frequently present them in the museum, leaving those who struggle to read them feeling alienated rather than informed. Avatars, or virtual characters as Leon and Fisher describe them, can help embody the voice, and when they are historical characters known by reputation to the learner, and relevant to the teaching that is taking place, they can 'speak' directly to the learner about 'their' experiences and convey a social veracity to the information being conveyed. Thus we should not be too surprised that a few brief personal narratives from an Abraham Lincoln comprised solely of pixels and manifest only on the computer screen can give young learners a richer sense of the complex causes of the civil war than an analytic essay by a scholarly historian. Learning is not just constructivist: it is empathetic. It is very difficult for people to understand a situation that they cannot "put themselves in"; since we empathize with other people, virtual characters help us understand human situations and the choices that shape history.

We've known for a long time that simply being able to visualize a situation, however realistically, does not help with learning. The more realism we introduce, the more noise there is to sort through. Photographs with arrows, statistical analyses in graphs and charts, and simple line drawings that abstract significant features are often needed to guide our learning precisely because complexity can be confusing. Serious evaluation of 3D representations of cultural worlds used as educational experiences has been needed. In the *Learning@Europe* and *Stori@Lombardia* projects, the blended experiences of highly-structured classroom and virtual activities, along with teamwork, competition, game playing and other pedagogic techniques, are evaluated. This is exactly the kind of analysis required to create a learning Web; it is encouraging to see that "virtual presence" forms a part of successful experiences, though much more needs to be done before we understand why and in what ways.

The learning Web is not just a technological environment that students stumble into. It needs to be built, and sustained, through collaboration between institutions and people. Nadia Arbach's analysis of the difficulties of sustaining such collaborations in order to support social interactions between remote classrooms is a useful reminder that the social dimensions of learning are sustained through organizational politics.

Alan Lishness, and Norm Lownds and Carrie Heeter, in two separate case studies of field trips enlivened and extended by virtual interactions, illustrate what can be gained if we make it work: excited kids. Before they attend school, and sometimes in the summer, kids are excited by the world. Their curiosity releases noisy engagement, and quiet wonderment. But we rarely generate excitement in school activities. So the Gulf of Maine Research Institute and the 4H Children's Gardens – with their LabVenture Stations and WonderWalls – give us useful insight into what excites, not just kids, but anyone.

The unknown.

A team of friends with whom to explore the unknown.

A guide who can help explain the mysteries.

A goal. A sense of control.

On-going involvement, yielding progressive results.

The reward of comprehension.

These are all things we knew about, but to integrate them into a series of virtual encounters over a lengthy period of time with many kids of various ages, and to keep them involved and excited, is an achievement. Again, it is the social element – the dialogue with a scientist, the friendly competition between groups and the opportunity to work in teams – that makes it succeed.

## The Extensible Web

If all the data on the Web needs to be authored 'by hand', architected, maintained, and managed discretely, the city of knowledge will take forever to build and will consist of a rats nest of back alleys. Franca Garzotto and her colleagues envision an alternative, with tools that can be used by content experts, a technical framework that integrates content from numerous sites, and methods applicable to larger domains of economic activity being applied to the "cultural tourism" sector. The enterprise architecture that MEDINA employed in the Mediterranean could be extended to the world, but the socio-political overheads and requirements for long-term agreements required may make that unrealistic.

Jon Pratty proposes an alternative vision of how to transition to integrated content by turning the museum inside-out. Instead of concentrating on good engineering and the fit between modules of code, Pratty suggests simple, dumb, item-level metadata, fixed urls and open-content. And then? Let a thousand crawlers bloom. Competitive value-added services will build the integrated knowledge platform on which we can then provide universal access to cultural heritage resources.

Kevin von Appen and his colleagues emphasize the social software associated with Web 2.0 over search engines as the path to integration. They give numerous interesting and fun examples of the effects that sociable technologies are having on museum interpretation, showing how people power connects previously disparate communities, and how new instances of "mashups" harvesting significant databases and presenting them in novel visualizations are emerging weekly. But it is still hard to envision just how Web 2.0 technologies in themselves will provide the levels of integration we desire. It seems the 'third way' here must be one that combines aspects of collective agreement as illustrated in MEDINA, the crude semantic links enabled by turning museums 'inside-out,' and the teases provided by clever mashups of open APIs and open data stores.

Indeed, Michael Knapp and Ellis Neder provide a case study of how some open source tools for collaborative social spaces can be used to create communities and enable them to build cultural sites with reach. Museums can readily customize existing open source code to achieve applications that only a few years ago would have required significant development, almost certainly with outsourced assistance. Contemporary artists could use these tools with minor modifications both to build out a site that met their needs within their own community and to convey their creations to the broader Web audience. Each such case is a building block of the future we are striving to construct.

## Reflections

The Proceedings of MW97 were a hefty volume replete with academic research that we hoped would be taken up in museum contexts. By contrast, this volume consists largely of case studies of museum applications that have incorporated the insights of the cutting edge information

technology research of 1997, and are racing to bring recent Web innovations to bear. Museums and the Web are a vibrant pair of institutions, not simply a juxtaposition.

We expect surprises in the coming decade, and anticipate a cybercultural sphere with novel features. We hope that we will also see the acceptance of some norms for museums on-line that would bolster the impact of heritage on-line. The first challenge is to open our sites and our underlying data to reuse, and thereby to engagement with popular culture. The model that the Creative Commons license has provided for the construction of text, and more recently video, libraries of out-of-copyright heritage should inspire museums to make representations of their collections available on-line as accessible micro-content for non-commercial re-use with proper attribution. If we can do this, we will enable the universal museum. The next challenge is to ensure the resources we create on-line have the fixed identifiers that enable others to integrate them in new cultural products and value-added services and accept our obligation to preserve content on the Web as we have accepted the mission of preserving the original. We need to trust that one value of these services will always be to bring people back to the museum, to the object, and to their experience with the real thing, Finally, we need to allow the public to create meaning, to share meaning, and to build collective meanings from the heritage entrusted to museums, even when they challenge our own. Web contributions don't just document or interpret culture. In the generative Web, culture lived is culture re-created.

## References

Archives & Museum Informatics, Survey of Museum Web Implementations, 2005, available at http://www.archimuse.com/research/mwbenchmarks/index.html

Trant, Jennifer, "When All You've Got Is 'The Real Thing'": Museums and Authenticity in the Networked world," presented at the Annual Meeting of the Documentation Committee of ICOM/CIDOC, Nuremburg, 1997, and *Archives and Museum Informatics: the cultural Heritage Informatics Quarterly*, Vol. 12, no. 2, 1998. Presentation available at www.archimuse.com/papers/jt.cidoc.97/index.htm

 