After the Web Page: The World as Matrix for Meaning

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> *"And then came the grandest idea of all! We actually made a map of the country, on the scale of a mile to the mile!"*
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> *"Have you used it much?" I enquired.*
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> *"It has never been spread out, yet," said Mein Herr: "the farmers objected: they said it would cover the whole country, and shut out the sunlight! So we now use the country itself, as its own map, and I assure you it does nearly as well.*
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> *Lewis Carroll, Sylvie and Bruno Concluded (1893).*

I. Museum Applications

For the first decade, it was all pretty clear. Museums published Web pages and on-line visitors read them. Sure, the medium allowed them to choose their own navigation paths, and they demonstrated an alarming amount of independence. All too often they "entered and left" by the window rather than the front door, didn't progress nicely through our tours, or did our "post-visit" activity before they came (and never came at all), but still we were digital publishers for readers sitting at their computer screens at home or in school. Yes, there was a bit of audio and video, and some inventive interfaces, but the museum was re-presenting itself on-line as an exhibit, a magazine, or an encyclopedia, an adventure story, or even as a "virtual museum," and people came to see what the museum had to say. New media was not that different from old media, which it imitated. And we were sure that in time we'd get enough content on-line, and make it easy enough to navigate, and interesting enough to encounter, that our visitors would be engaged, stay longer, come back more often, and visit in person.

We struggled with markup that separated presentation from content, with systems to manage digital assets that represented the same objects in our collections in different ways, and with rapidly changing public perceptions of what constituted a useful resource. We implemented new media and Web publishing committees and organized staff throughout the museum to contribute content to this new communications stream. We overcame the Siren of commerce and dedicated ourselves to education. And after a decade of the Web, we began to feel confident and able to deliver content to new and much bigger audiences. Over the past several years, we've extended ourselves to new devices. Then we pondered what "Web 2.0" meant for the museum, and tried our hands at blogging

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and podcasting. It was so exciting we hardly noticed the Web "page" disappearing from the Web.

Where did the Web page go? First, museums concentrated on adopting standards that would let them pour their own content into less handcrafted (automatically generated) pages so that more data could be delivered, and it would be updated as their databases were. Then they explored how syndicated content could make their Web sites richer and more timely still. And museums integrated their Web offerings with the gallery, and the gallery with devices their visitors brought to the museum, and the whole experience with further activities for the pre- and post- visit. In place of reading, browsing or even navigating the Web page are a plethora of other modes of interacting, listening, talking back, playing that enable learning, teaching others, and escaping into other worlds. All of this activity begins, ends and takes place in information spaces that look and feel less and less like "pages".

Have we finally broken free of the technology of the past and started to find a truly new medium? If this isn't Kansas, where are we?

Some museums, it seems, have found themselves in Second Life. This isn't just a(nother) virtual place where we can create a(nother) representation of the museum galleries; the residents of this world are avatars of the people who might visit galleries or come to the Web site of the museum to explore its collections, or they might create their own cultural or educational space. They don't need, or want, to behave as they do in the "real world". To explore optical illusions created by looking at things upside down, they prefer to float upside down rather than turning the object 180 degrees. Second Life isn't a world without material culture, but a world with a new "immaterial culture". Cultural heritage is being constructed here rather than being re-enacted.

Yet, as Paul Doherty and Rob Rothfarb report here, this is a world whose properties make some things easier for museums. It enables a class of unimaginable things, to be not just imagined, but experienced. The museum becomes an enabler, not a just venue. When an avatar created a model of Brownian motion, the Exploratorium staff saw an educational opportunity. Knowing most people lack any real understanding of how "Brownian motion" works, they suggested people might appreciate it better if they "rode" on a dust particle for a while and encountered other particles in their journey! In this world such an abstract concept is hard to conceive, even when we strain our imaginations; in Second Life, it's no more complicated to create a Brownian motion simulator than to make a roller coaster ride, and the new pastime could prove more attractive to avatars. The simulator wasn't created by the museum. In Second Life, avatars share their experiences, their insights, and their creations; because museum staff are watching, they are educating the museum. Is this where museums are going on the Web? This 'page' is a 'world'.

Alternate worlds are also good for exploring things that aren't scientific theories. Entering someone else's world is one way to master the past. As Dick van Dijk illustrates, the most mundane human historical records can provide the foundation for an alternative reality, where rules of other times and places prevail. The Web can bring people together to explore the concrete past. In Operation Sigismund, interpenetrating physical and information spaces, bridged by intelligent objects created to aid the children in their investigations, enable modern youngsters in the guise of historical sleuths to learn first hand about the past, and to learn to read its documents.

Enabled by interpersonal communication on their PDA's, children in the Provincial Gallo-Roman Museum in Belgium are taking the technology that seemed to limit exploration of Web pages and using it in a collaborative gaming experience that re-enacts social roles in 9th century European society. Contemporary school children engage in teamwork and play while developing understanding of and empathy with the actors in a rapidly changing society a millennium ago. Will we find that the way to teach how trading in salt and iron led to social stratification is to have 21st century kids relive it? If so, what sort of museology is it that operates without objects to collect, conserve or interpret?

Technology-enabled collaboration among educators and students in the Bay Area Science Learning Collaboratory, helps teachers and parents identify educational sites and activities that would enhance understanding of scientific concepts, relate them to educational standards and objectives through concrete activities, and introduce new experiences into learning. Ted Kahn suggests that virtual collaboratories and associated wikis can be successful at connecting the informal educational opportunities offered in museums to the more structured demands of schools, with outcomes measured in genuine learning. The Web here is both a net to capture contributions by teachers, parents and students throughout the community, and a matrix through which those same users make connections between abstract concepts and the concrete activities that give them meaning. But the Web is not a metaphor; it is the interconnectivity, not the 'page' that makes this project work.

Opportunities for learning based on extended experiences of the museum need not be limited to children. Nancy Proctor examines how, through the nearly ubiquitous cell phone, museums are enabling adults to receive on-demand delivery of something akin to, but more expansive than, the traditional in-gallery audio tour. It seems that people who never took audio tours before might do so when 'left to their own devices'; and that if taken, tours do enhance museum-goers' experiences. Newer phones enable delivery of more mixed media resources, and with GPS and near-field technologies (RFID/iButtons etc.) used outdoors as well as inside, phone tours allow the museum to move out, to penetrate "real world" space. The Web turns the literary paradox of a one-to-one scale map, favored by Jorge Luis Borges and Lewis Carroll, into a perfectly reasonable approach to cultural heritage immersion. Ubiquitous annotation means the map has more detail than reality.

Will our visitors get it? Do they find our multiple efforts to reach them useful? How successful are our multi-layered interpretive strategies – involving rentable mobile devices, cell phones, downloadable podcasts, interactive LCD screens, in-gallery wall labels, video, brochures, printed catalogues, books and docents – at reaching our intended audience? Peter Samis asks whether the buffet appeals equally to all, puts everyone off, or serves different groups in identifiably different ways. SFMOMA looked closely at interpretive media use within a single exhibition. Can their findings guide our future use of the Web as a part of our interpretive strategy? Probably, but not until we all have learned much more about the public we wish to reach, and the outcomes we seek.

II. Our Publics

The public isn't passively taking what we give them. We know that even if they are engaged with 'our' subject matter, our audiences can – and do – create their own alternate realities and educational spaces; they make a choice to come to ours. We're aware that if they do

come, they pick and choose – at the museum, on the Web or even in an audio tour. And so we are giving our publics the tools to do more with our content. We are seeing them actively remaking it, re-labeling it, remixing it, and forcing us to respect who they are and what they want from a museum experience. Disappointing evidence suggests that with tools to bookmark our content, they don't bother to mark it to come back to on their own time. But given opportunities to make it theirs, searching increases. Encouragingly, we are beginning to study our publics and their behavior more closely, so that our efforts and their needs and interests are more likely to co-incide.

For several decades, museums have been urged to make their collections searchable on-line. Once the novelty wore off, it didn't take long to realize that object descriptions without images were accessible only to experts. But even when we add images, do we know if users find what they are looking for? Or even if they are looking for anything in particular?

Browsing enables serendipity. Sebastian Chan, at the Powerhouse Museum, has augmented serendipity, inviting user tagging and then using user-tags to support different kinds of searching. When tags and a record of past user search behavior work in tandem, a recommender-system emerges. User tagging and search histories enable further development of our understanding of how users (fans, enthusiasts, and collectors) relate to museum collections and help us build bridges between formal taxonomies and informal folksonomies. Our future on the Web could be one of architecting subtle information retrieval systems to enable different groups of users to explore our holdings unassisted.

Or, if our public is to construct meanings, are we to provide the facilities and tools for their expressions, guiding the making of new media narratives so that the stories they tell cohere? If so, will we be handmaidens to participatory re-enactment or just raw expression? And does it matter? Is expression to be encouraged as art? In the Night Kitchen the monsters are all as fun as they are fantastical, and remixing museum content is a playful art form for Mathew Fisher and Beth Twiss-Garrity. The tension of telling stories that are factually grounded engages both the museum educators and the students with whom they are working in the Philadelphia museum re-mix experiments. Evaluation suggests that success was achieved not only in conveying knowledge but in building empathy with an historic figure.

Allowing the public to tag our collections and re-mix our content still seems dangerous and heretical to many museum curators and educators. But less intrusive means of giving the public power in their re-presentation of the museum may not work. Since David Allison and his colleagues successfully introduced bar-code based user tracking and personalized bookmarking into the Smithsonian National Museum of American History exhibit on the history of computers in 1990 (Allison and Gwaltney 1991), most other large scale experiments in giving visitors, on-line or in person, tools to select and return to content have found that people don't often come back. Do they find none of our content interesting or compelling? Or is "bookmarking" not a social practice that makes sense to them, or a technology that works? Or is the shared exploration of a museum exhibition different from other research activities? In light of the uptake of del.icio.us and other tagging services, it would seem we can no longer argue that bookmarking simply

isn't something people want to do. It is timely for Bowen and Filippini-Fantoni to systematically review the situation, and try to establish why the public has resisted bookmarking in museum exhibits and on museum Web sites.

If we could change our exhibit labels, could we make them more appropriate to the person reading them, and hence interesting and better used? This question has confronted us since the interactive display became a possibility and has inspired considerable academic investigation, including a paper at the first Museums and the Web (Hitzeman, Mellish, and Oberlander 1997). Two areas have attracted attention: personalization of the content of the signage and streamlining the technology of display. Parry et al. report developments on both fronts using inexpensive, wireless, label display devices on the one hand, and testing three strategies for content – personalizing curatorial voices, updating with a news stream, and integrating visitor voices – on the other. Since only 20% of the visitors read the labels at all, and few of those noticed any change, we need to look at labeling within the context of the Samis interpretive smorgasbord.

Perhaps the in-gallery label would be more effective if it were truly personalized? Experiments with personalization in on-line museum search environments might help us here. At the Rijksmuseeum, personalization is being attempted by linking works of interest through correlations in a number of external thesauri; links are made on concepts associated with works a user ranks and other 'interesting' works suggested. Exploiting the semantics in controlled vocabularies was also used to pre-populate the Powerhouse's recommender; maybe there's a generalizable tool here? Evaluations suggest this is working. Could it be translated into more effective communication with gallery visitors as well?

When on-site visitors can record their own paths through exhibits and share items of interest, they seem to have a greater engagement in the process than was shown with bookmarking for themselves. Where the task of making a mark or "collecting" an object, whether taking a picture or "phoning in" a sighted object [or bird], involves a fun activity and provides immediate feedback, then personalization becomes a bit of a game as well. In experiments at Kew Gardens, Kevin Walker reports putting a number of these elements together to allow groups of kids and adults to construct tours; they could directly enter their own interpretive audio with mobile phone technologies, and created satisfying experiences that reinforced learning and made a record of the visit. Is this closer to what the public wants from (and after) a day out at the museum?

III. What Do They Want?

We've made many assumptions about our publics. Not that we haven't studied them, because we have, but because we have studied those who use existing museums in the way that the museums expect to be used. And we've studied them in artificial circumstances more often than in the wild. Could we study them any other ways? In the papers in the final section of this book it seems the answer is yes – we can and must stretch our methods in ways that give us different and useful answers. Only then will we be able to imagine our potential publics in new, less "museum-like" contexts.

It might help us to think of these people as other than an audience; that is far too passive. Perhaps we should stop thinking of them as visitors or guests; it limits us to programming for those who come to the building or enter the Web site by a known door. In some sense it is better if we adopt the view that they are users, since we can then see the museum as something that must work for them, and that they will take away and exploit. Whatever term we use for our publics, we know that to satisfy them, we have to figure out who they are and what they want.

The methods for learning about these elusive users are as varied as the subjects. Sherry Hsi and the Exporatorium evaluators try to match their methods of assessment with the philosophy of the museum and its style of visitor interactions. In an environment that promotes interactions, critical assessment and visitor contribution, making the evaluation experience just another interaction – a contribution by the visitor and an opportunity for critical assessment – is one way to fly it under the radar, cheaply, quickly and iteratively. Even if they can't be completely unobtrusive, the evaluators "went native" and made their interventions feel like just another Exploratorium experience. Rapid prototyping and on-the-floor kiosk placement of some in-development Web interactive elements served the same function, though it did limit the answers that could be obtained about how the same content would appeal to these users if they were at home on the Web. We should all remember there are visitors in our museums we can coral, and ask for an opinion. One way of increasing use is intensifying the use of our existing community.

We have similar difficulties getting a better understanding of the cell phone in the museum context. Of course we can study cell phone use outside museums, and we can see that capturing photos, texting, and sharing music and video are growing applications. We know that a large portion of our visitors could use their phone in the gallery if we gave them programming that worked that way, and that many could also access the Web on the same device. We know that users like to vote on things, to state their opinions, to save images of their experiences, and to take home richer details than they might remember otherwise. The cell phone could be used to capture visitor feedback and tagging. In her meta-analysis of museum cell phone use studies, Kate Haley-Goldman explores psycho-social and technological barriers in a way that might support redesigning the use of this technology in the future.

Redesign through studying users is powerful idea whose time has come. At SFMOMA researchers studied their current Web users, using on-line surveys and in-depth interviews to obtain a better understanding of who they are, what they want and how they hope to get it on sfmoma.org. The fact that these studies revealed a significantly different user base than the museum had previously imagined – and clearly expressed goals of the Web user community, with actionable definitions of success – surprised this museum though it has been a leader in on-line technology from the first. Clear design goals emerged from these studies, and the results will be traceable in concrete ways. Ultimately, the effect will be measurable and we'll find out whether paying attention to what users want makes SFMOMA on the Web better. We're looking forward to seeing user studies on-line and in-gallery contributing to a multi-faceted view of museum visitors.

Another in-depth user study of the eBird citizen science project, reported by Thompson and Bonney, shows how a number of different evaluation methods can be used to create a richer understanding of users' needs and motives. They also show us how to measure the impact of our actions through changes in user behaviour. This complex application draws committed users already knowledgeable about the subject domain. But the evaluation showed that there is still a role for the institution in presenting and interpreting complex data. While observation is straight-forward, analysis is more complex, and we can help.

Interviewing the patrons through on-line surveys or chasing them down at home may get them where they actually use the Web, but it is not our only option for catching them "in the wild". Since so many of our programs are designed to be delivered in and to schools, another natural habitat for observing users is the classroom. Of course the classroom is a pretty complex place, and it isn't designed for evaluative observation, so these methods require thought and testing. As Arbach, Bazley and Boyd report, however, the results can be well worth it.

Some museum educators might be challenged by the findings. As the authors put it in summarizing the final results from the major NSF funded study of learning styles and interactives, "One size does not fit all". Learning theory tells us that different individuals have different styles of learning; it doesn't help us deal with that diversity and all its implications. The good news may be that there are clusters: 2/3 of children age 10-13 have active (practical or social learning) styles, and 1/3 fall into the abstract (intellectual/creative) approach. It may also be helpful to realise that perceived play value is more important than learning style for children when they assessed an activity. The bad news is that adult learning styles are more nearly distributed across the four preferences, and correlations between activity preferences and learning styles are stronger for adults. Alas, the study of our publics does not yield magic bullets, but it suggests that it might be instructive to combine a study of learning styles such as this with the study of preferences for mediated activities performed by Peter Samis and the other study of audiences at SFMOMA in order to forge more strategic approaches to target groups.

Thinking about our potential and actual users in terms of learning styles can help in understanding why certain approaches to teaching work better than others (and why multiple approaches may be required to satisfy the various ways that different people learn). Understanding user motivations can help us design the kinds of things users want from the museum visit or Web interaction, which may, or may not, include learning. Beginning by asking how our mental models of audience, visitor, customer or user help us and where they obscure our view, Brownbill and Peacock carry these paradigms to the Web and suggest that they prevent museums from segmenting our potential market in ways that we could better exploit. Proposing a new model that could drive both research and museum implementations, they suggest different evaluative strategies to give us partial understanding of some user-segments and some behaviors, provoking us to critically assess our assessments.

Conclusions

If a museum has ever asked itself simply – "what kinds of information should we put on our Web page?" – it certainly has no excuse for asking that any longer. The Web page is disap-

pearing. In its place is our growing appreciation of the Web as a two-way, multi-sensory communications environment. A communications- rather than publishing-driven paradigm reveals the limitations of traditional genres: brochures, catalogues, or databases serve specific, static needs rather than support dynamic social interaction. It also helps us to begin to understand the attraction – and the role – of Web 2.0 technologies in museum interpretive strategies.

The task of bringing the museum to the Web is liberating not limiting. There are no objectives of museums – be they building understanding, strengthening local communities, encouraging engagement with culture and ideas, or promoting individual creativity – that cannot be enhanced in conjunction with active Web programming. When we realize the "Web" is not a collection of pages but a fusion of networked functions, social actors, and multi-dimensional content, we glimpse its potential. In 2005 museums realized they could mash-up content, creating new meaning in combination. Now we see that the functionality that supports Web 2.0 should not be the focus of museums' attention, though its use will serve the complex ends we seek.

The Web we want is an extended dimension linked to the real world. It supports and enhances our understanding and appreciation of reality in its many dimensions. We could build a map of greater than 1:1 scale, that exceeds in usefulness the world that it covers, virtually. But we're not modelling reality, we're interpreting it, re-presenting it in ways that develop and support understanding.

> *In that empire, the art of cartography attained such perfection that the map of a single province occupied the entirety of a city, and the map of the empire, the entirety of a province. In time, those unconscionable maps no longer satisfied, and the cartographers' guilds struck a map of the empire whose size was that of the empire, and which coincided point for point with it. The following generations, who were not so fond of the study of cartography as their forebears had been, saw that that vast map was useless, and not without some pitilessness was it, that they delivered it up to the inclemencies of sun and winters. In the deserts of the west, there are tattered ruins of that map, inhabited by animals and beggars, in all the land there is no other relic of the disciplines of geography.*
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> *Suarez Miranda, Viajes de varones prudentes, Libro IV, Cap. XLV, Lerida, 1658*
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> *From Jorge Luis Borges, "On Exactitude in Science." (1954?), in Collected Fictions (New York: Viking Penguin, 1998), p. 325. Translated by Andrew Hurley.*

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