The Why, What, and How of a Custom Authoring and Publishing System: The Creation of Pachyderm

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History of the Project

The name *Pachyderm* came from a Thai restaurant called *Arawan* in Sausalito, California. Using that as the code name for our authoring and publishing tool was the result of thirty minutes of debate, and while that decision was perhaps made with haste, the desire to build a custom tool came from five years of multimedia development experience at the museum.

The San Francisco Museum of Modern Art opened its current building in 1995 with initial instantiations of three multimedia programs: the *Bay Area Art Finder*, *Voices and Images of California Art*, and *Making Sense of Modern Art*.[1] All have been expanded and enhanced since their debut in 1995, but it was when the museum received significant funding[2] to work on *Making Sense of Modern Art* that we were able to begin to envision, and ultimately to create, Pachyderm.

Making Sense of Modern Art[3] uses SFMOMA's permanent collection to explore the art and ideas of the 20th century. Our content-development approach has been based on notions of storytelling with multiple voices, layered interpretation and content-driven interaction design.[4] As we explored our approach to storytelling we felt that Macromedia Flash™ would be the right presentation tool. It gave us the range of interactivity we wanted and also allowed us a high degree of control of fonts, graphics, and layout. Given that this was 1999, near the height of the dot.com boom in the Bay Area, we knew it would not be cost effective to rely on hiring Flash programmers on a regular basis. We became more convinced than ever that to reach our long-term production goals of continually adding content to *Making Sense* as the collection grew and resources allowed we would need an authoring and publishing tool that we could maintain ourselves.

The basic requirements for our technology solution as expressed in our RFP were to build a system that would:

- Enable highly interactive screen designs;
- Use a range of multimedia assets (high resolution image files, audio, and Quicktime™ movies);
- Be publishable to the World Wide Web, kiosks in the museum and CD or DVD for distribution to teachers; and
- Be maintainable by museum education staff.

The Model

Our technology partners were programmers at Idea Integration.[5] Based on our requirements they came up with a plan for the authoring and publishing tool that we call Pachyderm. The model was to use our existing FilemakerPro™ media database (already a functional in-house database containing artwork information, digital asset meta-data and rights information) and a custom Web-based content management system. The back-end of the content management system was created in Microsoft SQL Server™. Data about the artworks and their digital assets is imported into the content management system from Filemaker Pro™ and presentation data (images and text chosen to appear on a given screen) is entered via Web-based forms of the new tool. All the data (whether imported from FilemakerPro™ or entered directly in the system) is stored in the SQL content management database.

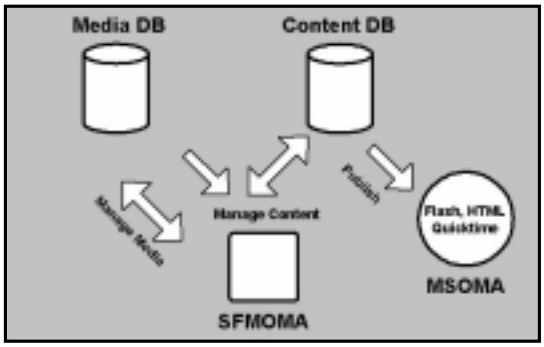

Figure 1. *High-Level View of the System*[7]

Once the data is entered it can be published as text files which call Flash™ shells (pre-set design and layout), and it is the fourteen different Flash™ shells that express the look & feel and interactivity of the program.[6] The system was created such that the data layer is separate from the presentation layer, which is a key aspect for the expansion of the system. For *Making Sense* the data is published into Flash™ shells that contain our current interactive designs, but it could just as easily be published to HTML or XML if we created those shells.

As the final step of publishing the system creates a directory struc-

ture that pulls together the data files, assets, and Flash™ shells. The directory structure can be downloaded and put on CD for kiosk use or distribution. It can also be moved to a Web server for public access.

Pachyderm is composed of ASP files and COM objects, and all authoring and viewing happens through a Web browser. Microsoft® Active Server Pages (ASP) are a server-side scripting environment used to create interactive Web pages. When the server receives a request for an ASP file, it processes server-side scripts contained in the file to build the Web page that is sent to the browser. In addition to server-side scripts, ASP files can contain HTML as well as calls to Component Object Model (COM) objects (software components) that perform a variety of tasks, such as connecting to a database or reading a text file. For example, in the authoring process an ASP file utilizes a COM object to get information about content and Flash™ shells from the MS-SQL Server digital asset database to present as options to the user. Once the presentation decisions have been made, another ASP file calls another COM object to save the authoring decisions as variables, and writes both the content and Flash™ shell data off as published text files. Browser delivery does not use ASP or COM but browses Flash™ files on the file system and/or CD-ROM that is produced in the publishing process.

Figure 2. *Menu of Screen Types*

Figure 3. *Searching for an image.*

Figure 4. *Entering text.*

Working with the Tool

The system lives on a server at SFMOMA. In order for members of out team to author screens and publish presentations the production manager has to do two things.

1. Export FilemakerPro™ data and import it into the SQL tables.
2. Upload media assets to the correct area of the server. Images are batch processed into all the sizes required by the Flash™ shells before they are uploaded. Quicktime™ movies and Shockwave™ audio files are uploaded directly.

With those elements in place on the server individual screens can be authored.

The Authoring Environment

The architecture of the system allowed us to accomplish our first three goals: we are able to publish highly interactive screens to multiple platforms using rich media. The fourth goal of maintaining the system with non-programmer staff was accomplished through the ease of the Web-based interface. While we did not invest many resources in the interface design itself, the fact that the system is based on filling out Web forms makes creating the screens akin to ordering books on amazon.com. The step-by-step process is illustrated by the following screenshots.

Author chooses a shell from the menu of screen types. (see Figure 2). When filling out the form s/he can either query the database for an image or media file or input a text or caption. The choices entered can be previewed in the Flash™ shells.

When it is time to publish, the system creates the data files and moves assets into the directory structure. If content is missing, an error message is recorded and the production team can investigate.

Once the data files have been created and the assets have been moved to the directory a zip is created that contains the entire presentation.

Projects

We have used Pachyderm to build *Making Sense* and two related, spin-off projects for special exhibitions on Ansel Adams and Eva Hesse,[8] which proceeded in a similar fashion to that for *Making Sense*. The editorial content and data was conceptualized to work with the existing *Making Sense* Flash™ shells. Once the content was entered into the system it was possible to preview the screens, but they appeared in the *Making Sense* look & feel. In order to customize the look & feel for an exhibition feature the extra step of creating new Flash™ shells is required. By manually adjusting the Flash™ shells (work that could be performed by our production manager if only simples changes were required, or by a Flash™ programmer for changes to the interactivity) and dropping them into the published presentation's directory structure we could change the look & feel of the program. For Adams and Hesse the participation of a Flash™ programmer was required, but the amount of work was very small compared to what it would be if we had to create exhibition features from the ground up.

What the Pachyderm Does Not Do

In our experience working with Pachyderm there are several issues that have arisen. First and foremost is related to the use of Flash™. Because a published presentation is run as one global Flash™ movie with movies within it, tracking Web traffic is somewhat difficult. We have not yet written a program to parse our Web logs effectively and

currently we aren't doing any automated tracking for our kiosks.

Meta-data standards are not a part of the tool. There are no structural reasons not to use standards-based data and we would like to rectify this in conjunction with work currently being undertaken by the Collections Information and Access group at SFMOMA. It will require changes to the database configuration, but would not impact the architecture of the tool.

There is also the issue of potential customization or responsiveness to visitors. Our requirement to be able to publish the same content to either the World Wide Web or to kiosk was one of the elements that lead Idea to create a content management system with a publishing model. As discussed above when a presentation is published a directory structure is created which can be downloaded and then placed on a Web server or a fixed disk. This means that the Web site is not live. This is acceptable for the current storytelling model of *Making Sense*, but if we were to try to include elements of two-way communication we would need to add those as separate modules.

Figure 5. *Preview mode*

Figure 6. *Publishing log shows that data files have been created for screens*

Figure 7. *End of publishing process*

The Future of the Tool: Other Users and Uses

While the tool was created so that we could maintain *Making Sense* with an in-house team we have begun to experiment with other users. In February 2001 we conducted a teacher study[9] to understand whether high school teachers might be interested in using Pachyderm to create curriculum materials. We found that they were more interested in having their students learn to use the tool to create multimedia reports. They were also interested in a broader range of data and assets than that which the system currently accesses.

SFMOMA is currently building a walk-in education space known as the Learning Lounge. In that context we are going to pilot a program to teach docents how to use the tool to create media-based presentations as part of a new kind of hybrid tour.

Finally, we have also begun to explore options for licensing the tool. While negotiations have yet to be concluded we hope to join forces with a new non-profit to develop the tool and explore its use with a larger number of museums and cultural institutions. This development is exciting because it will allow us to think about scalability of the model. While we have developed a work around discussed above to customize the look & feel for multiple projects we have not explored its scalability in terms of multiple data sets and concurrent presentation development.

If we were to expand the use of the tool our priorities for development would be:

- Redesign of authoring interfaces for content management system
- Further development of data import tool to allow for multiple data sources
- Development of mechanism to allow for customizing shells

Conclusion

The good news is that we have built an authoring and publishing tool that works. We have been able to publish *Making Sense of Modern Art* and related projects with relative ease from the production stand point. While our initial investment in the tool was high (and could not have been accomplished with a huge in-kind donation from our technology partners) by using Pachyderm we have been able to lower our cost on specific exhibition features tremendously. Whether or not the tool is scalable and what that would look like are still be explored. At the very least we hope it can server as a prototype for future authoring and publishing systems as we continue to publish *Making Sense of Modern Art*.

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Susie Wise is Senior Producer and Acting Program Manager for Interactive Educational Technologies (IET) at the San Francisco Museum of Modern Art (SFMOMA). She developed the Web site and CD-ROM programs Making Sense of Modern Art; Art as Experiment, Art as Experience: The Anderson Collection; Ansel Adams at 100; and Eva Hesse. In addition to producing multimedia content, she led the team that created Pachyderm, the museum's browser-based multimedia/Macromedia Flash authoring tool. Most recently she participated in both the development and evaluation of Points of Departure: Connecting with Contemporary Art, a theme-based exhibition of contemporary artwork that featured the use of new technologies as learning tools: IPAQ Gallery Explorer, Smart Tables, and Make Your Own Gallery. Currently Susie teaches "Museums, Interactive Technologies, and Electronic Access" at JFK University Museum Studies Masters. She has spoken at Museums and the Web, Museum Computer Network, American Association of Museums, Teachers College/Columbia University, Sonoma State University and the Compaq Western Regional Research Center as well for public audiences at SFMOMA. Before coming to SFMOMA she has experience developing educational multimedia for McGraw-Hill Home Interactive, Knowledge Universe Interactive Studio, and Morgan Interactive.

[1] Spearheaded by Peter Samis who received a joint appointment as Associate Curator of Education and Program Manager for Interactive Educational Technologies in 1994 and John Weber, The Leanne and George Roberts Curator of Education and Public Programs.

[2] Major support for *Making Sense of Modern Art* provided by the Getty Grant Program, Compaq Computer Corporation in Silicon Valley, The Bernard Osher Foundation and the National Endowment for the Arts. In kind support provided by Idea Integration, San Francisco, Abbott Usability, Perimetre-Flux Studio and the Charles Schwab Corporation Foundation.

[3] Available online at www.sfmoma.org/msoma.

[4] For a discussion of our content-development approach please see Samis, P. and Wise, S. "Making the Punishment Fit the Crime: Content-driven Multimedia Development." In *Proceedings of Museums and the Web 2000*. Pittsburgh: Archives & Museum Informatics, 2000 (CD-ROM). Also available at www.archimuse.com/mw2000/papers/samis/samis.html.

[5] Originally called Red Eye Digital Media. Key project architects were Alon Salant, Director of Engineering; Chad Kassirer, Director of Production; Thomas Chung, Director of Technology; Lars Keffer, Program Manager and Eric Tam, Managing Director.

[6] The Museum has worked with Perimetre-Flux Studio on interface design and art direction.

[7] As shown by Salant, A., Samis, P, Wise, S. "The Modern Art of Flash Content" at Content World, Burlingame, May 2001.

[8] Exhibitions features created using Pachyderm include *Ansel Adams at 100* available at www.sfmoma.org/adams and *Eva Hesse* available at www.sfmoma.org/hesse. Both were presented on kiosks adjacent to the respective exhibitions as well as on the Web site.

[9] Reported on the panel "Give the People What They Want," American Association of Museums Conference, St. Louis, May 2001.