



# The Virtual and the Real

MEDIA IN THE MUSEUM

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## chapter 11

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# Going Electronic: A Case Study of "Ocean Planet" and Its On-line Counterpart

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### Introduction

When it opened in April 1995, "Ocean Planet Online" ([http://seawifs.gsfc.nasa.gov/ocean\\_planet.html](http://seawifs.gsfc.nasa.gov/ocean_planet.html)) became the Smithsonian Institution's first exhibition available through the World Wide Web. Developed as an electronic counterpart to "Ocean Planet," a major traveling exhibition, "Ocean Planet Online" is a translation of exhibition content to the Web. As such, it presents an excellent opportunity to examine issues of content and media in museums.

"Ocean Planet Online" is an adaptation of material designed for presentation in the linear format of a museum gallery. In producing the on-line version, we faced the problems of translating elements designed for the physical experience of visiting a museum, including presenting a coherent storyline in a directionless medium and adapting exhibits that were essentially visual or interactive for the "small screen." We needed to provide navigational aids for users who could enter from anywhere in the exhibition. The fact that we were designing material for an undefined or, at least, a little-known

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audience complicated the job. Finally, we were very interested in giving users an experience that approximated a visit to the physical exhibition.

We found that we were more successful with some of these efforts than others, that some were not even worth attempting, and that, in some instances, we were able to incorporate material that did not fit in the physical show. We also learned a great deal about our audience and Web site design. Our experiences have led us in directions we did not foresee when we began this project.

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### **"Ocean Planet," the Traveling Exhibition**

"Ocean Planet" was the culmination of a four-year effort by the Smithsonian Institution's Environmental Awareness Program to study and understand issues affecting the health of the world's oceans. It was on view at the National Museum of Natural History for one year beginning in April 1995, and then began a three-year national tour.

"Ocean Planet" was concept-driven rather than based upon objects from the National Museum of Natural History's collections. The exhibit team, led by Curator Judith Gradwohl, first defined the issues to be presented, then developed a storyline, and finally collected objects and images to illustrate the concepts. After conducting visitor studies in Washington, D.C., Chicago, and Denver, we determined that the museum-going audience already had some basic familiarity with environmental issues affecting the oceans. Thus, the exhibition was designed to reinforce or validate visitors' general knowledge and help them understand the wide range of issues that affect the health of the oceans. The exhibition had a definitive message: All of our lives rely upon healthy oceans, and our actions on land affect the health of the oceans.

The 6,000-square-foot exhibition comprised an introductory walkway and five major galleries. Traffic flow was unidirectional, and most of the visitors entered through the entrance and left through the exit.

In the first major gallery, "Ocean Science," exhibits featured information on the diversity of life in the oceans, the effect of ocean current on climate, oceanographic research, and conditions in the

deep sea. We intended this gallery to spark excitement about the riches of the seas, provide an introduction to the science underlying decisions about marine environmental policy, and show some of the ways the oceans affect life on land. Exhibits employed video, audio, animation, sculpture, and models, as well as text and photo panels.

In "Sea People," we introduced people whose lives and livelihoods take them to sea, and showed that many people depend directly on the oceans. The focal point of the gallery was a video presentation. Incorporating music and poetry, the video featured a diverse array of seafarers and was complemented by exhibit cases containing objects from a number of seafaring societies. The cases showed that although seafarers are diverse there are many similarities between seafaring cultures—in the tightly knit nature of seafaring societies, in the knowledge people gain as they go to sea, and in the risks they constantly face.

The "Sea Store" gallery showed that even the lives of people who are not seafarers relate to the oceans. Exhibits illustrated ties to the oceans through seafood, products containing marine components, medicines, global economics, and recreation. They also showed how the oceans have intrinsic and aesthetic value. We conveyed these messages through a number of different media including a computer interactive program, specimens, models, photo, and text panels.

"Oceans in Peril" featured large photomurals of beautiful scenes representing various marine ecosystems and large "marker buoys" that displayed examples of four different types of threats to the oceans: pollution, habitat alteration, over-fishing, and global issues of population and development. Each of the 20 faces on the buoys presented a specific environmental issue, showed a case study of its effects, and illustrated ways that the particular threat was being addressed. At the end of the gallery we presented profiles of people who are working to solve marine conservation problems, showing that they look much like the average museum visitor. The message was that not all conservationists are fanatics and that help is valuable at a number of levels.

The final gallery, entitled "Reflections," featured a large, striking sculpture of Earth with the land masses and oceans encrusted with costume jewelry and beads. It emphasized the vast extent



and value of the oceans. We also provided information about how museum visitors could become involved with ocean conservation. And literature and CD-ROM stations gave more detailed information about exhibition-related topics.

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### **Translating the Exhibition to the Web**

The idea for an on-line version of "Ocean Planet" originated with Gene Feldman, an oceanographer and project advisor from the National Aeronautics and Space Administration (NASA). In spring 1994, when he first suggested that we attempt to put the exhibition on-line, project staff had never seen nor heard of the World Wide Web. After plans for the exhibition passed the 50-percent review, we began discussions about what it would require to put the exhibition on-line. It was not until after the 95-percent review in August 1994, when Feldman offered to take on all of the programming and production personally, that we began the project.

The entire cost for "Ocean Planet Online" was \$1,200. These funds went toward a contract for a graphic designer, who helped refine the look of the program one month before it was launched. All of the programming was done on a volunteer basis by Feldman and Norman Kuring at NASA, and many photographers and artists generously allowed their commercial work, on display in "Ocean Planet," to be used in the on-line version without additional charge. This tremendous level of cooperation and volunteerism made it possible to create a complex program over a relatively short period of time and essentially without a budget.

Because we waited to begin developing "Ocean Planet Online" until late in the overall process, the physical exhibition was well under development. At the Smithsonian Institution, the 95-percent review comes after the script is complete, almost all of the visuals and objects are in-hand, and the design and installation blueprints are 95-percent complete. The script could only be changed to correct mistakes, and the entire exhibition and our vision of the visitor experience were well mapped out.

"Ocean Planet Online" was shaped significantly by the decisions made during the planning for "Ocean Planet." The content, design, and script were based on what we knew about audiences in

natural history museums, with an emphasis on the Smithsonian audience. The exhibition had a strong narrative and a linear storyline designed to develop specific themes. The designers had selected colors, typefaces, and materials that reflected the themes in each gallery and shaped our expectations of the look and feel of the exhibition. We wrote the text with a hierarchy of importance in mind: large, concise headlines that provided the main messages, text of 50 words or less that elaborated on the headlines, and focus labels and captions that interpreted objects and graphics. The voice was authoritative but accessible. The format of the graphics conformed with the size and shape of panels, and we designed the illustrations to be silk-screened using a maximum of two or three colors.

We had specific goals for "Ocean Planet Online." The rationale was to make the content of "Ocean Planet" available to people, nationally and internationally, who were unlikely to be able to visit the exhibition at a host museum. We also felt that the on-line presentation would allow us to use some of the research and material that were not available in the exhibition because of space, time, and budget constraints. In designing the on-line experience, we wanted to give users the sense that they were visiting the exhibition at the National Museum of Natural History. Finally, we felt that "Ocean Planet Online" could serve as a resource by providing a conduit to ocean-related information available elsewhere on the World Wide Web, and that it had the potential to excite users about a variety of marine topics and provide multiple options for further study.

Although we jumped into developing "Ocean Planet Online" without much forethought about how well a three-dimensional, experiential exhibition would translate into this new medium, we soon realized that the effort was going to require more than a quick redesign. We began by digitizing all of the "Ocean Planet" resources: the final script, the images, and any exhibition-related graphic materials. This was a tremendous undertaking by the two NASA programmers, and it was done without the aid of Web-authoring software. After we felt we had satisfactorily provided the content and some of the feel of the exhibition, we focused on functionality, user orientation, and ancillary information that could provide greater



content depth. Finally, just before the launch, we hired a designer to help refine the look and redesign some of the exhibition graphics for the on-line medium.

The conflict between aesthetics and load time loomed as a major issue from the start. We tried presenting panels more or less in their entirety and using large (half-screen) formats for the images, many of which were spectacular and presented in very large formats within the physical exhibition. Although the brief text allowed an entire panel to be presented on a single, not-too-intimidating, page, most often we presented only thumbnail-sized photographs and tried to intimate the hierarchy of information by changing type size and leaving spaces between text blocks.

The organization of "Ocean Planet Online" is as linear as the physical exhibition, but this is only evident in the lengthy topic outline that lists all of the main pages in the program. Most Web users prefer to meander through material, so we needed to provide a means of orientation that would allow users to understand where they were within the mass of information available on the site. We wanted users to be able to wander freely down any series of links and yet be able to find their way back to familiar territory.

Ironically, the physical layout of "Ocean Planet" provided a valuable navigation tool for "Ocean Planet Online." We decided to use the floor plan of the physical exhibition as an orientation device because we could not come up with any more logical system and we were already very comfortable with the show's floor plan. The floor plan is more than a simple map of the content. It shows each of the major galleries in "Ocean Planet" and their relationships to each other, and it suggests the relative importance of the topics by highlighting the different sizes of the galleries. The only modification to the floor plan for "Ocean Planet Online" was the addition of "swimming" fish, which show users the entrance, the order of the galleries, and the exit. We repeated the fish symbol at the bottom of each page; if a user finds herself down an unwanted path, a click on the fish will make the floor plan reappear. Studies of "Ocean Planet Online" users have shown that many return several times to the floor plan during a visit, which indicates that people are using it in the manner we intended.

## Elements in "Ocean Planet Online" and Their Origin

Some material translated easily from "Ocean Planet" to "Ocean Planet Online," other components required significant alterations, and still others were unique to the on-line presentation. As might be expected, some elements worked better in the physical exhibition while others were more suitable for the on-line program.

*Direct Translations:* The text, images, and accompanying printed materials from "Ocean Planet" were the easiest to adapt for "Ocean Planet Online." The on-line program contains all of the text from "Ocean Planet," most of which we assembled into pages representing panels and other individual physical exhibit elements. It incorporates 80 percent of the 232 photographs used in the exhibition and, because we did not have a budget for developing "Ocean Planet Online," all of the images are presented courtesy of the rights-owners.

We worked with a variety of photographers to determine an acceptable format for use of the commercial images. NASA programmers developed a "watermark" that they electronically embedded in the image to discourage downloading for print purposes, and we degraded the quality of the photos so that they were all presented with a maximum dimension of 384 pixels. Most of the photographs are presented as thumbnails (75 pixels as maximum dimension), which users can enlarge to the maximum dimension.

We relied heavily on Smithsonian-owned photographs of the "Ocean Planet" installation in the National Museum of Natural History, both to provide the look and feel of the physical exhibition and as an introduction to many galleries. The installation photographs transport users from an aerial floor plan to the point of view of visitors standing in the exhibition.

Ten video presentations are included in "Ocean Planet Online," as short, 10-second segments. We only presented video footage from the public domain (much of which was not in "Ocean Planet") because of the issues we encountered with the still photos. Short audio segments of music and sounds are also available.

Most of the printed matter that accompanied "Ocean Plan-



et" is also available on "Ocean Planet Online." This includes fact sheets, educational materials, and excerpts from accompanying publications. We also linked lesson plans developed for "Ocean Planet" and other curricula that cover related topics to pages within the on-line version so that teachers could take electronic field trips and download work sheets and background information. The availability of teaching material on-line has an added benefit of saving staff time and museum funds that might be spent filling requests for photocopies, because now teachers can download and print anything that interests them.

*Alterations:* Many elements, including exhibit cases and experiential or interactive components, required significant alteration for presentation in "Ocean Planet Online." One of the most popular elements in the physical exhibition was the "product pyramid" in the "Sea Store." Visitors could use an ersatz light pen and "read" bar codes from products available in any supermarket: food, beverages, toiletries, cleaning products, and others. The four-sided display case held 48 different products. A computer monitor displayed the components in the products that came from the oceans. In "Ocean Planet Online," we wanted to preserve the element of surprise and the interactive nature of the exhibit. NASA programmers conceived the idea of using a random-number generator that would present one of the 48 products each time a user clicked on the bar code.

Translating objects in exhibit cases to the Web also presented a challenge. The appeal of artifacts in the physical museum setting is partly due to their three-dimensionality and partly to their being "the real thing." Objects are selected based on their capacity to express exhibition themes and also because they present aesthetic or intriguing groupings. While we were developing "Ocean Planet Online," the technology did not exist to group objects and text on a page without turning the entire page into an excruciatingly slow-loading graphic. We decided to present the objects in groups by creating a collage of their images. We did not display the focus labels with the objects unless a user clicked on a particular object and, at that point, only one object label would be available at a time. Throughout the program, whenever we presented somewhat cryptic information such as graphics without accompanying text, we includ-

ed on the bottom of the same page either a list of options that the graphics could lead to or an outline of the material that the graphics represented.

Most visits to museums are social experiences, while most computer users operate in solitude. To preserve an element of social interactivity and provide a forum for enthusiasts to discuss the oceans, we developed a bulletin board as part of the resource room. This also served as a comment and suggestion book as well as a place for "visitors" to interact. From the exhibit team's perspective, this user-to-user communication also may have stemmed the flow of many e-mail queries to exhibit staff that we were too short-staffed to answer.

The Web site also has links to the Smithsonian Institution museum shops' catalogue offerings. Making purchases directly from "Ocean Planet Online" is not possible, but the shop pages provide a toll-free phone number and catalogue purchasing information. This feature was added because there was a museum shop in the exhibition floor plans and catalogue information that was ready to go on-line. We did not intend it to be a revenue-generating element. However, the on-line shop does get requests from many visitors, similar to the way most people will take a quick look in the museum shops when they visit a physical museum.

*Additions:* The on-line medium can accommodate several levels of information tailored to specific interests, and we took advantage of this feature in developing our on-line presentation. Much of the material that is unique to "Ocean Planet Online" strengthens its value as a resource about ocean science and conservation. In a few cases we included material that was cut from the physical exhibition due to lack of space. Finally, the inclusion of numerous links to other Web sites directed users to other sources of ocean-related information.

Programmers at NASA wrote a code for searches that would allow users to search all of "Ocean Planet Online" for images and text that related to a specific topic. Although searches became more commonly available after "Ocean Planet Online" opened, the searches developed for the program were considered among the site's unique features when the program premiered in spring 1995.



One search engine uses a photo archive and allows users to browse through all of the graphics available in the program. Users also can search by using key words found in related caption material.

We also were interested in showing some of the scholarship that went into developing "Ocean Planet." The script on file in the exhibit team offices has 400 footnotes that show the sources of facts used in the exhibition. Although this information was not available in the exhibition gallery, it is available through links from "Ocean Planet Online." We included this feature "because it was there," and it appears that some users spend a significant amount of time looking up the footnotes.

The curator's tours reflect an attempt to satisfy users who might be uncomfortable with the on-line medium. Many users had not yet learned to click fearlessly, and we wanted to provide a piece of the program that would appeal to the rank technology novice. The tours developed by the NASA programmers provide a directed look at the mass of material in "Ocean Planet." Users can choose from a few prearranged tours and "visit" the exhibition, viewing a series of screens where they only need to click "next" to keep moving. Although this heavily directed use of a Web site is somewhat anti-thetical to the free-wheeling ethic of the World Wide Web, the feature has received a moderate amount of use.

A calendar of events provided a direct link between the physical and electronic exhibitions during its tenure at the National Museum of Natural History. It listed all of the public events, including those related to "Ocean Planet."

Another hallmark of "Ocean Planet Online" is the extensive amount of statistical information that is available. Detailed data about the use of "Ocean Planet Online" is available in text and graphic formats that summarize when the site is used, from which country or domain users originate, which pages, graphics, and other features users requested most frequently, and even Internet provider (IP) addresses of the top 50 requesters each month.

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### **"Ocean Planet Online" User Study**

As of January 1997, after 17 years on-line, "Ocean Planet Online" had been visited by more than 400,000 unique computers, which

may represent 800,000 to 1,200,000 users. The program had shipped out over 170 gigabytes of material. The Smithsonian's Institutional Studies Office worked with NASA programmers to capture and analyze data about use of "Ocean Planet Online."<sup>1</sup> They analyzed 2,020 "visits" (separate logins by unique IP addresses separated by more than two hours). The sample size represents 7 percent of the total visits made to "Ocean Planet Online" between Aug. 31, 1995, and Nov. 1, 1995.

Most of the visits (1,813 out of 2,020) were new logins. The remainder were repeat visits by the same machines; on average, a machine would "visit" the site 10 times. Remember that IP addresses represent individual computers or "gateways" that bundle requests from members of subscription services. As such, we cannot determine from an analysis of IP addresses whether the same individuals re-visited "Ocean Planet Online."

On average a visit consisted of 4.9 stops (or page requests) per address, but nearly 40 percent of the visits consisted of only a single stop, while 14 percent made two stops. The maximum number of stops for an individual visit was 66. Two-thirds of the visits came via the home page, and one-third landed somewhere in the middle of the program from an outside link or previously set bookmark. "Drop-in" visitors were more likely to make only a single stop in "Ocean Planet Online" than the visitors who entered through the "front door."

Calculating a mean visit time required correcting for situations where visitors may have walked away from the computer or accessed another Web site frame without exiting "Ocean Planet Online." The mean visit time was 6.8 minutes ( $\pm$  10 minutes) and the median visit time was 1.9 minutes. Average stop time was 94 seconds ( $\pm$  134 seconds).

Visitors used every section of the exhibition and all of the features. The pages that received the most use were the home page (1,575 visits) and the floor plan (1,830). During prolonged use of "Ocean Planet Online," visitors used the floor plan repeatedly as a navigation device. Users made more visits (1,164) to the "Ocean Science" section than to other content of the exhibition; for example 431 visits were made to "Oceans in Peril" and 200 were made to the



"Sea Store." A surprisingly large number of visitors (935) made use of the tours. By comparison, the most popular exhibit in "Ocean Planet," the product pyramid in the "Sea Store," was visited by 92.3 percent of 246 visitors followed in a tracking study.

That is intriguing at a number of levels. It is unusual to find any data quantifying use of Web sites beyond the highly unsatisfying measurement of "hits." Most Web-tracking software follows hits because they are a very straightforward measurement of the amount of information requested by a user. However they are not a good indication of relative use of different sites because the number of hits depends upon the design of Web pages and the amount of information users are forced to load when they request a page. Hits measure every type of information that was transferred, including icons, lines, and other graphic elements that are not specifically requested by users.

The "Ocean Planet Online" study indicates a tremendous potential for applying some of the techniques we use to study visitors in physical museums to learn more about Web-based audiences. Study results imply that we may have several distinct audiences visiting Web sites, including: new visitors, repeat visitors, and "front-door" and "drop-in" visitors. The results also imply that we may have a limited number of screens in which to convey information to most users. Finally, they indicate that visitors on-line make different use of exhibition material than visitors to our physical galleries.

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## **What We Learned about Site Design**

Very early in the project we realized that the conversion of "Ocean Planet" to "Ocean Planet Online" was far more complicated than moving from three dimensions to two. When we first began working on the on-line project, most Web sites were linear in essence, allowing users to move between points on an outline through the magic of hyper-links. However, we felt that the sites that were set up like books were about as interesting but far more difficult to read. Although we were unwilling to abandon the linear story structure of the exhibition and the look and feel of the physical show, we tried to make it possible to bypass our narrative and still have a meaningful experience.

Moving on-line required us to change our expectations of the audience. In museum exhibits, and especially at the Smithsonian, we usually have only one chance at a visitor walking through an exhibition. Our goals in shaping a physical exhibition are to persuade the visitors to slow down and take in as much of the material as possible on a single visit. Although the average amount of time a person spent in the 6,000-square-foot "Ocean Planet" exhibition was 11 minutes, the material could easily sustain a visit of 45 minutes or longer. Thus we conceived, wrote, and designed the original show to encourage visitors to stay as long as possible.<sup>2</sup>

Furthermore, most museum visitors walk all the way through an exhibition even if they are just trying to find the exit. Exhibit headlines, varying display techniques, and changing colors and moods in various galleries all convey messages as the visitor walks by, even if he does not linger long enough to read the text. Visitors to most museums have gone to some trouble to get there (or they've found that impossible parking place), so they are likely to spend some time justifying the commitment of their time and resources.

All that changes on-line. Visitors can drop in and out of an on-line exhibition and any other Web site with ease. It is as though museum visitors could shoot through the roof with any given step in an exhibition. To compound this expectation of a truncated time commitment, the culture of Web surfing does not encourage the type of in-depth attention to a topic that reading or other media can promote.

These issues merely hint at the potential for new and unexpected audience behavior and expectations museum professionals encounter when they design Web sites. In museums we actively study our audience demographics and desires and even include audience surveys as a necessary first step when developing an idea for an exhibition. As we switch to this new and little-studied medium, we know very little about who our audiences are and even less about what they are looking for in a Web site.

When we began to work on "Ocean Planet Online," researchers were just starting to compile the demographics of Web users. In late 1994 we faced an audience comprised mostly of men between the ages of 20 and 40, who had Internet access through uni-



versities and research groups. After a few months, a fairly long time span in terms of the World Wide Web, the audience changed significantly. More women began using the Web, the age range expanded considerably, more homes and schools began to be wired, and transmission speeds improved substantially. The rapid change in audience demographics and in their expectations of Web sites continues today. This continual change means that the World Wide Web audience is a moving target. If we tailor an on-line program for a specific audience, it might be completely off-target in a matter of months.

We understood that we would not have the same firm grasp on the audience for "Ocean Planet Online" as we have in physical museums, so we tried to appeal to a wide range of users. We made many assumptions about the audience in developing the on-line exhibit. By using the same text and images as we used in the exhibit hall, we were aiming at a typical natural history museum audience, i.e., relatively well-educated and middle-class families.

The move to cyberspace also calls for consideration of the notion of community. Except for the small number of adults who visit exhibits alone (at the Smithsonian this averages around 15 percent of the visitor population), all museum visits have a social component. In fact, visitor studies have shown that social interactions can enhance the quality of a visit and encourage educational experiences. A truly successful label is one that visitors feel compelled to share with someone by reading it to them aloud.<sup>3</sup> By contrast, computer use is a relatively solitary activity. And it is frustrating to visit a Web site when somebody else has control of the mouse. However, with the proliferation of chat rooms, multi-user dimensions (MUDs), and bulletin board systems (BBS), there can be a strong sense of community on-line and many opportunities for interactions with other users. Because of the international and dispersed nature of the Web, the on-line community is broader than the museum community, but communication consists of momentary exchanges between strangers.

The quality of offerings on the World Wide Web has improved considerably since we began this project, but it still varies considerably. With the large quantity of transparent links in "Ocean Planet Online," we were concerned that users know when they were visiting the Smithsonian Institution and when they were looking at



pages produced elsewhere. We carefully vetted the links but had no control over those within the sites to which our site was connected, and we knew that we could never monitor all of the material on each linked site. We tried to develop a distinctive look and designed a banner for the top of each page that would help show the difference between information provided by the Smithsonian and that provided by others. It turned out that the banner added too much load time to many of pages, and we abandoned it as a standard format. In recent years new browsers have made it possible to add images that give a site a distinctive look yet do not take a great deal of time to load.

Nonetheless, as museums create more offerings on the World Wide Web, we need to consider the issue of authority. Traditionally museums have been bastions of the truth, and most visitors feel that they are receiving carefully conceived and factually correct information in museum exhibits. On the Web, however, anyone can initiate a museum and, in many cases, even draw material from other museum sites. Established institutions may need to consider how to distinguish their offerings from those not tied to collections, curators, educators, and the wide range of expertise housed in physical museums. Both the Web and Web-based culture are egalitarian in nature, and users are more accustomed to participating in content decisions. Presentations on the Web are likely to be more well-received if they avoid authoritarian tones, incorporate user views, and present open-ended material.

For a museum curator used to producing large, time-consuming, and expensive exhibitions, a foray onto the Web can be liberating. Although at the Smithsonian we conduct visitor studies to evaluate the effectiveness of exhibitions, we rarely have funds to make major revisions after the exhibition opens. In practice, unless a major factual, political, or fiscal mistake is made, all of the exhibit elements, graphics, and text that are complete at the 95-percent review are installed in the gallery until the exhibition closes. Revisions are very carefully considered and usually accomplished with least expense. It is rare, however, for a member of the exhibit team to walk through the exhibition just before the opening and not notice a few things that he or she would do differently the next time.

Change is not only expected on the World Wide Web, users value it. A good site is never truly finished, and this is even reflected



in the terminology used: We launch or open a site but never complete it. With "Ocean Planet Online," we had the luxury of taking a final, critical look at the program the day before it opened, and we made some significant changes. With any project developed over an extended period, revisiting decisions that are months old is difficult or even impossible. For Web-based programs, self-criticism and a willingness to make revisions are highly advisable.

With the availability of Web-authoring software and high-quality images, it could appear that museums are well suited to generate on-line counterparts to all of their exhibitions. Although the initial uneasiness about Web sites competing with the real things in our collections and galleries has abated, museums still should consider their goals in producing on-line programs. Web sites can encourage and enhance a visit to a physical museum by introducing material and providing logistical information. Web sites can expand the museum's audience by providing a channel of communication with people who traditionally are not museum visitors. Ideally, museum sites can give the public high-quality educational offerings.

With the proliferation of high-quality Web sites, Web-based offerings from museums are no longer inexpensive and easy. We need to approach them with the same level of professionalism as we do productions in the exhibit halls. Very few museums have in-house expertise for the design and production of sophisticated Web sites and would have difficulty meeting the high standards of commercial sites.

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## Conclusions

Despite our original intentions to recreate the experience of a visit to "Ocean Planet" on the World Wide Web, we learned that resisting the urge to create an on-line replicate of a physical exhibition is best. This is even more true today than when we launched "Ocean Planet Online" in the relative infancy of recreational use of the World Wide Web. Although the content may translate easily, the structure of the narrative, the design, and even the voice may be inappropriate for the new medium.

The study of the use of "Ocean Planet Online" indicates that Web-site users may have shorter attention spans than museum visitors. This may require a change in the way we organize informa-

tion for on-line presentations, and it has important design implications. On-line, it may be more vital to be efficient in presenting the main messages. Physical exhibitions often present background material to provide a foundation for understanding the themes. On-line it may be better to position the main themes before the background material. Additionally, a design that requires travel through four or five links to receive information may be less efficient than a design that requires fewer links.

The move from physical exhibitions to on-line presentations may require an entirely new metaphor. Many museum exhibitions are like three-dimensional books. The team develops a storyline that has an introduction, a plot or a message, and conclusions. Although visitors can and do wander randomly within an exhibition, they are generally encouraged to move unidirectionally, and galleries filled with related material are presented sequentially, like chapters in a book. Even in the most free-flowing exhibition, a great deal of thought goes into the clustering and ordering of objects and information.

Developing material for the Web is more like producing a landscape of information and helping users find trails of interest. It is somewhat analogous to the design of nature reserves in that there is a finite, delimited set of information or resources. Providing information and direction for visitors with a number of different interests is more important than arranging the resources so that everyone encounters similar assets. In fact, since Web site developers have even less ability to direct users than museum designers, it is unrealistic to try to provide much more than a clear understanding of the range of resources and an intuitive navigation system.

Although Web-based efforts ultimately could require as much effort and as many resources as physical exhibits, the World Wide Web presents a fascinating and important opportunity for museums. The key will be to take the best qualities of a museum visit and try to translate them so that they are effective in the new medium. While the offerings on the Web have grown more diverse and technologically exciting, high-quality content has lagged behind the technical and graphic capabilities. Museums and other educational institutions may find themselves well suited to further their educa-



tional missions by filling this void. We should see efforts like "Ocean Planet Online" as building blocks, but just as Web sites are never truly finished, all Web sites are essentially experimental efforts to respond to a rapidly evolving medium.

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