REAL, SIMPLE and NEW

by Joe Ansel

Nearly 31 years ago Frank Oppenheimer, founder of the Exploratorium, opened the massive doors of the Palace of Fine Arts so that the occasional visitor might wander in to see what was happening. And happening inside was a revolution in the museum world: the creation of the interactive exhibit and the modern science center.

Phenomena First Although I missed the Exploratorium's casual opening, I did arrive early enough, in 1972, to experience the raw simplicity of the place. Oppenheimer guided a small crew in creating experiments. Most valued in these creations were reproducible, but un-scripted, bits of reality: an electric arc, a rainbow, an echo or an illusion. Our exhibits were modest, but they did emphasize real, engaging phenomena above all. And usually it was not enough to show such phenomena, but rather the exhibit had to make their manipulation possible—visitors generally had to be able to do something interesting, fun or both. Occasionally, if the phenomena was real and simply stunning, such as Bob Miller's ***Sun Painting***, or Ned Kahn's ***Wind Wall***, it was OK just to display it—seeing it was enough.

Teaching Tools and Models Sometimes Oppenheimer also encouraged the creation of teaching tools, these would sometimes model, in a didactic way, phenomena which we had already displayed directly. Other times these models would show things which couldn't be displayed in real time and space—the orbit of the planets for example.

Functional, Minimal Design and Finish The Exploratorium's earliest exhibits were unpretentious to say the least: they were very roughly made. Oppenheimer himself used to make such exhibits, often assembling things out of old plumbing fittings and other junk. Having previously worked at an aerospace research lab, when I first began work in the Exploratorium's exhibit shop I was amazed, and sometimes aghast, at exhibit design and fabrication practices. There were precious few drawings, salvaged materials were often used and designs were eclectic to say the least. In 1974 many of the exhibits had hand written graphics which were taped down on plywood tables! Prototype exhibits were whacked out very quickly, and if they proved successful, were "hardened" a bit and placed on the exhibition floor where they were watched in use and frequently (more or less) modified. In fact we were creating the interactive exhibit genera, but we were not sure our work would be noticed, understood or accepted. At the early Exploratorium there were no

evaluators, administrators and certainly no bureaucrats. We were small—perhaps 15 people—plus the entire interactive science center movement had not yet started: precedents had not been created nor inertia formed. Young, over-educated mechanics, tinkers, artists, a few scientists and Oppenheimer himself designed and hand built the exhibits. By nature we were an unconstrained group, moreover our exhibition environment itself was akin to an airplane hanger--there were no fancy floors or high architecture to contrast with the Exploratorium's quirky exhibits. Function, interactivity and the phenomena itself were key. Notwithstanding such benign subjugation of design, many of the early Exploratorium's "exhibits" were actually artworks and they often had a strong, if unconventional aesthetic. In retrospect, we were amazingly prolific and in the early years, unknowingly, but deeply creative

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Science Centers Come of Age

Today the science center movement has come of age; hundreds of science centers exist worldwide. Very few doubt that science centers have contributed substantially to public education. And as it turned out, the growth of such science centers is due in part to Oppenheimer's work, particularly the publication of the Exploratorium's ***Cookbooks***--manuals describing how to build hundreds of exhibits. In the 1980's these manuals, combined with professional development courses offered by the Exploratorium and others, allowed fledgling science centers to quickly build a collection of exhibits and open their doors. Note that the Exploratorium was not alone in its early work, the Ontario Science Centre, the Boston Children's Museum and others also contributed to the science center movement, plus Oppenheimer himself took inspiration from a variety of rich, but more conventional, institutions such as the Science Museum in London and the Deutsches Museum in Munich.

While the science center field is still slowly developing new exhibit ideas and content, three decades later, early Exploratorium exhibits remain staples within interactive science centers. In August of 2000, I saw many, highly dressed up incarnations of early Exploratorium exhibits at new science centers in Europe. Many of the Exploratorium's exhibits remain staples because they efficiently, simply and clearly allow the visitor to interact with raw phenomena such as rainbows, counterintuitive illusions, heated glowing metal and vibrating strings. Such phenomena is ever engaging and will never be out of date.

What Should Science Centers Provide to their Visitors? Three things best distinguish science centers: they can; 1) show real phenomena and allow for real experiences, 2) do so in an enjoyable, unstructured, highly social setting and 3) provide teaching props, models and programs which visitors are unlikely to encounter elsewhere. Essentially science center are supplemental education resources; they cannot and should not be substitutes for schools, libraries or the like. As supplements, science centers work best when they provide what visitors otherwise cannot get in the schools or on the Internet: once again, real experiences, real objects in a highly social, interactive, non-coercive environment.

New Design Trends, Huge Icons, Computerized "Book on a Wall"

Having seen dozens of science centers over the past few years, and having just visited three new European science centers, I've noticed that 1) fancy design, 2) large iconic exhibits and 3) huge amounts of text now dominate particular exhibitions.

Fancy Design To create a designed rather than eclectic appearance, science centers are using stainless steel, fine woods, glass, cutting edge media, expensive decorative elements and fixed iconic set pieces--all carefully designed, placed and lighted in their exhibitions. Such exhibitions are integrated, highly finished and appear complete to the visitor. This trend is particularly apparent when generous funds are available for the construction or renovation of new science centers. Likely, exhibition designers also figure that stout materials aid exhibit reliability. In fact these fancy designs introduce major problems:

1. They can be very expensive. And money spent on the look of an exhibition might be better spent in programmatic activities, exhibit maintenance, new exhibit development or many other ways.
2. Design elements can be so strong as to overwhelm the phenomena they present. Years ago, I recall seeing a copy of Richard Gagnon's elegant, small ***Blue Sky*** exhibit mounted on a massive dark blue wall with a huge graphic panel. The exhibition designer obviously felt the small exhibit needed "mass." In fact, the wall and graphic panel distracted one from the simply beauty and wonder in the exhibit itself. And worse, the exhibit barely worked due to poor functional design and fabrication.
3. Designed exhibits are often extremely large or fixed to the ground and thus difficult to move into a shop area for repair--no small concern operationally. Also fixed exhibits cannot be easily moved for special events or rearranged for other reasons.
4. Expediently improving an exhibit which is made of highly finished materials is expensive and/or upsetting--one doesn't want to patch holes in a granite tabletop to better place an

exhibit element or otherwise make repairs or changes which are visible. Thus the finished look of exhibits retards ongoing improvements.

5. Once a strong design standard is established, new or replacement exhibits must match the design standard or detract from the overall "look." In highly designed exhibitions, most simply can't mix plain pine tables with stainless steel pedestals.
6. A strong exhibition design subtly, but wrongly, suggests that science--the pursuit of knowledge in a chaotic and eclectic universe--is as well ordered as the exhibition itself. But in fact science can be, and most often is, scruffy!
7. Highly designed exhibitions rarely use everyday objects to connect the public with science, notwithstanding the fact that the use of such objects helps visitors understand that science--simply a way of understanding the world--is embodied in common objects all around them.
8. The designed exhibition appears totally complete and does not imply, in its appearance, that the exhibition will change over time. Often highly finished exhibits are expensive and more difficult to change than simple exhibits. But of course, we do want to change our exhibitions as time passes in order to provide new content and address new subjects. And our exhibitions should also imply in their design that nature changes, science changes, indeed everything changes.
9. In part to achieve high finish and design, science centers too often outsource design and fabrication; they also do so in an attempt to eliminate the ongoing costs associated with a permanent in-house design/fabrication facility and staff. Yet many outside designers have little, or even no, genuine operational experience in science centers and moreover are often judged essentially by their two dimensional presentations--their drawings. Then evaluators are often charged with making sure the design and ultimately the exhibits themselves will function--but these evaluators rarely have substantial design or fabrication skills and thus sometimes miss critical functional issues. Finally fabricators, often hired at the end of the project, sometimes with less than adequate budgets and/or time, must make the best of the exhibition design. So understandably, when exhibits arrive, they sometime fail to work, are difficult to maintain or incorporate flaws which the staff discovers after installation. And the whole flawed process starts, in part, with the fatal desire to achieve a highly designed and finished look.
10. Finally, true creativity cannot flourish with rigid organizations, fixed situations, strictly limited schedules or with short term, multiple, conventional, highly stressed, "lowest bid" outside vendors.

Outsourcing has ongoing consequences. Fewer science centers now have their own exhibit designer-builders operating in their own fabrication shops. Plus as previously mentioned highly finished exhibitions tend to influence new designs which may follow. In fact, to invent completely new, exciting content, science centers need in-house prototyping and fabrication facilities as well as an organizational structure which accepts failures, fosters invention and prizes genuine discovery over visual design. Practically, creative institutions also need places where new exhibit prototypes, in their unfinished, rough form, may be placed on the exhibit floor for public testing.

For all of these reasons, and others, simple, clean, lightweight design is best in science centers. Phenomena, function and creative content should, but rarely do, come first.

Large Iconic Elements

Large iconic exhibition objects appeal to many architects and designers. Such objects "fill" a space and can add visually to the impression one gets upon entering an exhibition hall. Icons can be memorable and often in some way represent the theme of the exhibition. Note below images from the Welcome Wing at the Science Museum' London.

Figure 1 - "Who Am I" exhibition at the Welcome Wing, South Kensington, London

Likely the large row of iconic structures to the left are "cellular forms" and somehow relate to the topic of the exhibition. These structures are constructed of formed aluminum plate screwed onto a framework and as such are quite expensive to make. Their purpose is essentially to house computers and computer monitors.

Figure 2 - Visitor kneels to use an exhibit

The way certain stations are mounted forces some visitors to bend over--or kneel as shown above--just to gain access to the controls; other computers are too high for kids to reach. The forms are securely fixed to the floor so that if one of the computers fails, as several had when I visited, they cannot be removed from the exhibition floor. This portion of the exhibition creates a visual image, but functionally could be replaced with a row of computers on tables. But if an exhibit is computer based, likely it can be done on the Internet; for most people there is no need to go to a science center to use a computer. Elsewhere in this hall were physical artifacts, carefully curated and presented along with explanatory text. For me the artifacts were the better part.

The role that evaluation plays, or fails to play, in the development of such exhibits is revealing; the Welcome Wing exhibits were heavily evaluated.[1] But setting aside the important issues of content and overall design, relatively clear matters such as making the monitors, trackballs and switches in the "globule exhibits" easily accessible got completely lost in the evaluation process. And just a few months after opening, several of the powerful LCD projectors in the Welcome Wing announced continually on screen that their lamps would soon need to be replaced. Were maintenance issues carefully considered during the evaluation process? Given outsourcing, the project size, and resultant size and nature of the project team, likely the evaluators and, more importantly, the exhibit fabricators and exhibit maintenance people had too little influence on the initial design and the innumerable design details which each piece embodies.

[1] . Gammon, Bridgman ***Into the future - evaluating the Wellcome Wing project at the Science Museum***, London, unpublished paper circulated by Ben Gammon on the Museum L list

But proper evaluation is an ongoing process. Will evaluators at the Welcome Wing correct the flaws in their exhibits; even if doing so means modifying their appearance or discarding certain pieces? With such a dramatic look, likely it will be difficult to improve this exhibition without substantial cost and courage.

Figure 3 - The "Antenna" gallery at the Welcome Wing, South Kensington

Again from the Welcome Wing, pictured above is an exhibition about drugs in sports and drug testing. The center cluster of structures are predominately backboards for text and the occasional object. The structures are well designed to create a visual impression and the text and images are strong and well presented, but there is no real phenomena to be experienced. Although there are some “pushbutton” media pieces, the exhibition is not particularly interactive. As acknowledge by Grahmn Farmelo in a recent article concerning the Welcome Wing[2], topics such as this example are essentially impossible to do in real time, using the real content--the drugs, sports and athletes--on a tabletop. Perhaps such topics might best be addressed on the Internet, in books, films or perhaps via demonstrations. While creating a text based "pointer[3]" exhibition such as above seems a good idea to me, perhaps it would be best to make such exhibitions more modest designs, while retaining the funds and floor space to do interactive, real things.

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[2] Farmelo, Graham ***Keeping Up with Science, Creating the Welcome Wing,*** **Dimensions,** The Association of Science-Technology Centers, Washington DC, September/October 2000 issue, page 3

[3] Exhibit elements which touch on a topic to point the visitor to reading or further independent study.

Reading - Perhaps Personally "Interactive," But Best Done Privately

Now most folks love reading. There is even a sense in which it is interactive; in reading you draw upon your own experience and imagination as you transform the author's words into a world within your own consciousness. Unlike television which spoon feeds images, sounds and storyline, each reader contributes personally much to their own experience of reading; they "make" an internal world out of the author's text.

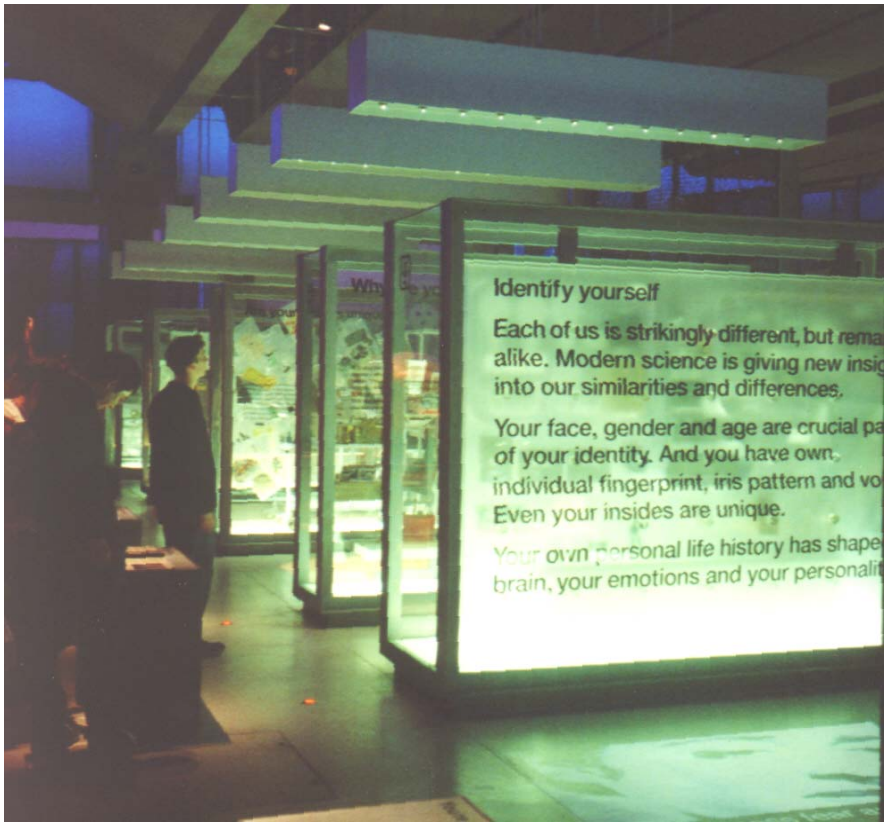
Yet reading should not be a major feature of science centers. While well written graphics and reference materials often support and supplement exhibits, with conventional publications and the Internet providing an astounding richness of material, we would do best to minimize the amount of text in our exhibitions. There is no need to go to a science center to read. Indeed museum visitors read very selectively for they know, or quickly learn, that they cannot read all the text in most museums--there simply is not enough time even on multiple visits[4]. And good science centers offer visitors something they cannot do elsewhere--the opportunity to see, touch and use real objects and have real experiences. So while reading should be secondary in science centers, so much of what passes for interactive exhibits is nothing more than computerized text or images—either on a screen or projected. While this text and these images may be brilliant, mundane or otherwise, clueless are those who hold such exhibits to be highly and truly interactive simply because the visitor can click “next” or chose from among a number of options.

Again the Welcome Wing at the Science Museum in London is a current example of over designed reading stations. But before I am altogether misinterpreted as attacking the Science Museum, consider the good work done there! The Science Museum in London:

1. Since the Great Exhibition of 1851, has contributed mightily to the rise of technology museums and displays a stunning collection of well conserved and presented science/technology related artifacts. It rightfully does fine curatorial and conservation work beyond the capacity of most science centers.
2. Operates programs there are of very good quality and serves the public day in and day out. Interactive galleries exist.
3. Has the finances and the staying power to experiment with exhibitions like the Welcome Wing's current offering.

[4] Falk, John H. and Dierking, Lynn D. ***The Museum Experience***, Whalesback Books, Washington D.C., ISBN 0-929590-06-6, page 73

Nevertheless, the current show at the Welcome Wing is very heavy on reading. This reading is either on basic signs as below or on computer monitors.



What makes reading in a science center necessary or more educational or enjoyable than reading elsewhere? Likely reading done in support of objects displayed--basic explanatory text--is justified. After all once the visitor sees a displayed object, they should be able to find out what it is. And of course instructions on how to use exhibits are helpful. Some supplemental text on exhibits is good for educating docents who may be called upon to explain the exhibit as well as serving the particularly interested visitor.

Conversely, reading a computer screen in an exhibition is very much like reading a computer screen anywhere. The private, focused nature of reading acts like blinders--indeed reading is often used defensively to fend off talkative seat mates on my frequent trans-Atlantic flights. Moreover, reading text often benefits little from the "contextualization" provided by iconic elements, media or the display of nearby interactive exhibits or artifacts. Reading is most often solitary. In addition, standing to read wall mounted or computerized text is tiring and limits the amount of text which can and will be read.

Re-focus, Invent and Perhaps Transform

If the science center visitor can get past obscure design and a flood of text, perhaps the beauty and simplicity intrinsic in natural phenomena, experience and real objects can engage the visitor and make the packaging irrelevant. But this assumes:

1. The phenomena itself has not been mortally diminished by the packaging.
2. That the exhibition is dense with phenomena and experiences and that design elements have not replaced such phenomena or experiences.

Unfortunately this seems rarely the case. It is all too easy to spend money predictably on fancy buildings, scenery, environments, dramatic media and excessive design. Having just seen three science centers in as many days, and notwithstanding the fact that my own group does considerable visual design, I cannot think of one exhibit that truly benefited from thick theming or overly fancy design.

Figure 4 - Ned Kahn's *Fire Tornado* as fabricated by Technorama, Winterthur, Switzerland

It is now essential to re-focus on the strengths of science centers--the ability to efficiently provide and newly create real objects, real experiences and/or educational social interactions unlikely to be gotten elsewhere. This should be done in a non-coercive, unpretentious, self structured social setting. Rather than trying to dress up the good content of the past or create predictable, but lavish designs and environments, we would do better to try to develop powerful, new, phenomena-rich exhibit-artworks, such as Ned Kahn's ***Fire Tornado***, (pictured above), Aurthur Ganson's perversely counter-intuitive ***Machine with Concrete*** or Norman Tuck's ***OscylinderScope.***[5] But such is rarely done because it demands genuine creativity, is often technically difficult, takes time and requires a flexible,

[5] Available at ***Technorama***, Winterthur, Switzerland

self-secure type of management to understand the value of such pieces. Note the three aforementioned pieces were not the product of a formal evaluation process, classic design or the "teamwork approach" to exhibit building, they were works done by individual artists in their workshops. As the science center field has developed and grown, it has become more “professional,” but dramatically less inventive.

In the 1970's science centers discovered themselves and the power of presenting real objects and real phenomena in interactive exhibits. Science centers developed programs to better use, interpret and supplement their exhibit collections and began to undertake teaching activities which can be best done programmatically. Also science centers have occasionally used valid exhibition techniques borrowed from trade shows, the entertainment industry, natural history museums, art museums and "conserve and preserve" institutions. So now it is right to use, refine and improve upon all techniques developed in years past, but overly fancy design and text based exhibitions are limited improvements--if improvements at all. Rather we must continue to find new exhibits and ways to show and model reality in an interactive, self-guided, social way.

But the grand challenge is once again to catch the imagination of the world as Oppenheimer did: to find a completely new paradigm for teaching and learning. People sometimes speak, using current cliches, as if such a change has already occurred and thus provide evidence that it has not. Perhaps such a new paradigm will not come from within our ranks, for we are bound by our own sedimented experience and by the institutions and the ways of thinking we have created. Clearly the current crop of today's science exhibitions, or science centers, falls well short of changing the present paradigm. But surely to foster such a change, we must encourage niches within the science center world where curiosity, invention and creativity reign.

Creative individuals and organizations, to a greater or lesser degree, make their own environments. They live and work in such places--both mentally and physically--and they see, take and change elements of the outside world as fits their vision. Arising in the world, the creative change their world a bit. In truth, many cannot understand such private worlds. Just as the taste of ripe strawberries is truly accessible only through experience, so is creativity. For the majority of us, the first challenge is simply to recognize, protect and nurture the truly new. And then in doing so, we may find ourselves part of it.

Formerly Exhibit Shop Manager and an Assistant Director at the Exploratorium, ***Joe Ansel*** led, and participated in, the design and fabrication of over 125 new, interactive science exhibits and artworks throughout in the 1970s and 80s. His work, combined with the efforts of others, contributed substantially to the creation of the interactive exhibit genre itself. Joe now heads a consulting, design and management group—***Ansel Associates, Inc***. ***AAI*** is currently (2003) advising on, and creating the exhibitions for, ***Phæno***, a 110,000 sq. foot science center in Wolfsburg, Germany. Zaha Hadid is the design architect for ***Phæno***. Other current ***AAI*** clients include the ***Wiener Stadthalle***, Vienna, Austria. Past clients have included municipalities, regional governments, science centers, design firms and two "think tanks."

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