

Durability: Building to Last

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Exhibits are pushed, pulled, scratched, dinged, climbed and generally abused by thousands of visitors every year. The durability and longevity of those exhibits can be critical to the success and sustainability of a museum, particularly those operating with increasingly stretched resources. Many museums now create interactive exhibitions with a five- to ten-year lifespan, with the possibility of reusing at least some of the exhibit components after that.

Designing for easy repair and maintenance isn't much appreciated, unless you are the staff member that has to take care of exhibits. Here are some built-to-last principles we stand behind, which have guided the design and fabrication of hundreds of experiences that have stood the test of time.

1. Materials matter

The materials you choose can, quite literally, make or break an exhibit. Near the floor, for example, stainless steel is a go-to material that withstands the beating of sneakers and vacuum cleaners; if it is cost-prohibitive, vinyl may be a high-traffic material stand-in that won't chip and scratch. Tabletops and other surfaces can be covered in Marmoleum® or other flooring sheet goods that can bend around corners. These materials perform better than laminates, can take a tremendous amount of wear and are well suited to years of abuse from thousands of sticky hands and rough backpacks. Medium Density Fiberboard (MDF) and particle board should be avoided due to their lack of durability, but if used, should never touch the floor because they can wick moisture up into an exhibit cabinet—a spilled drink or carpet shampooing could lead to a ruined exhibit.

2. Make it modular

Building exhibits in modular components means parts can be changed, repaired or replaced over time without tossing an en-

tire exhibit. This saves money, cuts down on material use and expense over time and ensures a floor filled with functioning exhibits that age gracefully.

Exhibit cabinets built with a strong structural frame of either steel or plywood can last for years. Decorative panels are then made and screwed to each side. If a panel gets damaged, it can be replaced easily and economically without replacing the entire cabinet. Fastening the panels with screws rather than glue ensures that the guts of the cabinet can be easily accessed from any side with a screwdriver. Making an exhibit easy to maintain greatly increases the odds that it will be maintained—a key component in long-term durability.

3. Simplify

Make exhibits only as complex as they need to be. The best way to make sure a part won't fail is not to use it in the first place!

Designs that grow organically in a shop or on the exhibit floor tend to get more complex. Once you know what an exhibit needs to do, however, stand back and ask, "Now that we know the final experience, what is the simplest way to make that happen?" It may mean a bit of wiring cleanup or a wholesale change to the guts, but this last simplification step results in an exhibit that is straightforward in its execution and more durable and easy to maintain.

4. Build uncommon experiences from common parts

Highly customized parts are difficult to replace over time when that one manufacturer goes out of business or an exhibit developer leaves the institution. If you can build exhibits with mechanical parts that

are readily available from McMaster Carr or other common sources, or modify those common parts only slightly, an exhibit's life will be extended.

And for electronics, again, no need to reinvent the wheel through one-off designs. Basing exhibits on common micro-controllers such as Arduino minimizes the amount of custom circuitry, building on a platform that many people understand and elevating chances of repairing an exhibit and keeping it working for years. It also makes economical sense to use printed circuit boards. They're easy to design, cheap to produce and duplicate, and provide excellent documentation for replacements. Even for simple things that could be wired by hand, printed circuit boards provide a durable, easy-to-replace alternative, especially if you pay to print multiple boards. A small expenditure upfront not only saves money in the long run, but also ensures that you can keep visitors happy with functioning exhibits.

5. Satisfaction is sustainable

Nothing adds to the durability of an exhibit like a satisfactory visitor experience. Some exhibits are clearly made by competent craftsmen who have little idea how visitors, especially young children, interact with the museum environment. Frustrated visitors are the hardest on exhibits—they're going to find something to do, no matter what. To counter this misuse, prototype the actual experience with visitors and gather ongoing feedback from staff as to how visitors actually use the exhibits. When the desired visitor behavior is the most obvious, intuitive and fun thing to do, the exhibit will work as designed, getting worn in all the right places. The most durable experience is the one that works on every level.

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Panic at the Wayback

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to do by another kid in an informal act of solidarity. Even the inactive buttons seemed to provide a source of lively play for younger visitors: the pure pleasure of twisting old Bakelite knobs all the way up! Kids helping kids learn! The collective process of working through a problem! An opportunity for families to engage in light-hearted problem solving!

But this wonderfully wide-open exhibit adventure failed in the end through our own need to assure that everyone "got it." Providing visitors with all the answers is, of course, a response to visitor discomfort with feeling less than instantly competent or immediately capable of plumbing the depths. Much as we may want to create truly open-ended experiences, we live in a culture that makes actually doing so a challenge.

Although generally received with enthu-

siasm the *Wayback* caused frustration to the occasional user. The ever-popular pinball machine was especially controversial. Because it was powered by one of the faucet handle switches and ran on a five-minute timer it would power down when the time ran out and not be playable again until someone reactivated the hidden switch. For those who discovered this, it was triumph. For those who didn't, it was maddening. For many adult visitors, the first reaction was