Traveling Exhibitions and the Environment

by Lea T. F. Warden

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The time has come to reflect upon the practice of traveling exhibitions and its impact on the environment. In its current state the practice produces a tremendous amount of pollution, from exhibit components and packaging waste to carbon dioxide emissions. Traveling exhibitions may never be categorized as environmentally sustainable, but there are ways the practice could be more environmentally friendly, or green. The following discussion centers on three interrelated aspects of traveling exhibitions where resource conservation is particularly in need of improvement: transportation, packaging, and scheduling.

Transportation

Inventive Thinking

An article in a recent issue of *Discover Magazine* discussed the invention of SkySails. One SkySail, a 1,700 ft^2 parachute-like sail, can help propel a quarter-mile long cargo ship, and reduce fuel consumption by up to 50% (Hewitt, 2008). The same article discussed hybrid tugboats and ecological ballasts, in which sea water flows through the ship rather than staying in massive tanks. The entire issue was full of inventions meant to protect the environment. The stories not only gave me hope for the future, but showed how current and past technologies are being adopted by a variety of industries in the effort to reduce humankind's impact on the environment. Fortunately, traveling exhibitions operate within the transport and shipping industries, and there are green technologies and methods that the museum profession could utilize. Although it is true that museum objects need special care, it is time to stop using that fact as a barrier against new ideas and methods. It is time to update and expand approved standards in order to incorporate environmentally friendly strategies. From the moment of conception a traveling exhibition is destined to produce large amounts of greenhouse gases. Exhibit developers do not base revenues on shows going to just one venue but to as many venues as possible. A way to reduce greenhouse gas emissions would be to seek out transport companies that are incorporating green technologies. The Environmental Protection Agency's (EPA) SmartWay Program supports energy and emission reduction initiatives in the transport industry. The program also provides information and financing for companies to upgrade their equipment. Examples of upgrades include auxiliary power units to reduce engine idling, aerodynamic truck and trailer add-ons, and lower rolling resistant tires. These options along with others have the potential to reduce fuel consumption by up to 15% and emissions of particulate matter by up to 90%. There are hundreds of SmartWay Program Partners listed on the EPA web site, and the list even includes company scorecards.

Intermodal Transport

Another green option is intermodal transport, which links the efficiencies of highway, rail and sea transport. Currently rail transport is rarely considered as an option; even though vibration levels in railcars are significantly lower than trailers (Richard, Mecklenburg, & Merril, 1991). Railcar coupling, a force that can reach 43 Gs, is often cited as the reason against rail transport. However standard shock and vibration packaging methods currently used would prevent this force from being a factor for many traveling exhibitions. Furthermore the railroad industry has impact prevention measures that reduce the chance of high force levels from occurring. Railroads

Cost Comparison between Highway and Intermodal Transport					
Origin	ST	Destination	ST	Highway	Rail
Washington	DC	Las Vegas	NV	$2,613	$2,030
Las Vegas	NV	Flint	MI	$2,800	$2,645
Flint	MI	Providence	RI	$2,015	$1,965
Providence	RI	Chicago	IL	$840	$758
Chicago	IL	Cedar Falls	IA	N/A	N/A
Cedar Falls	IA	Martinsville	VA	$2,000	$1,935
Martinsville	VA	Spartansburg	SC	N/A	N/A
Spartansburg	SC	Durham	NC	N/A	N/A
Durham	NC	Salinas	KS	$1,846	$1,915
Salinas	KS	Athens	GA	$1,675	$1,850
Athens	GA	Montezuma	KS	$1,800	$1,770
Montezuma	KS	Logan	KS	N/A	N/A
Logan	KS	Santa Cruz	CA	$2,100	$2,035
			Totals	$17,689	$16,930

Itinerary for **A Magic Web,** *produced by SITES. Cost comparison developed in April of 2007, courtesy of Hub Group, Inc. Rates do not include 2007 fuel surcharges—30% of rate for highway and 22% of rate for intermodal. N/A indicates distance between two locations is not significant enough to warrant intermodal.*

are approximately three times more fuel efficient than trucks in transporting goods long distances when considering gallons of fuel used per ton-mile of freight hauled (Moulis, personal communication December 24, 2008). In 2006 freight locomotives moved a ton of freight an average of 423 miles on a single gallon of diesel fuel (Federal Railroad Administration). Furthermore, over a 3,000 mile journey a diesel freight truck will emit three times as much carbon dioxide as a diesel locomotive.[1] On the cost side comparisons between highway and rail transport have shown it is more economical to use trains for distances beyond 500 miles. The itinerary of ***The Magic Web: The Tropical Forest of Barro Colorado Island,*** produced by the Smithsonian Institution Traveling Exhibition Service (SITES), was used to develop a cost comparison between highway and intermodal transport. The exhibition was composed of 40 framed large-format color photographs in 6 crates, with a total weight of 1400lbs.; For distances beyond 500 miles there was a price difference in favor of intermodal ranging from $30 and $580(Conlon, personal communication, April 5, 2007). If economic savings is coupled with the environmental benefits, intermodal could be viewed as the better option. There are numerous logistical companies that could assist museums and fine art shippers in developing procedures for intermodal exhibition transport.[2]

Flexible Design

Cosmic Questions: Our Place in Space and Time was a traveling exhibition managed by the Association of Science and Technology Centers (ASTC). The exhibition was hosted by seven museums over three years before being donated to the 'Imiloa Astronomy Center of Hawaii at the University of Hawaii-Hilo. During the exhibition's three-year tour it traveled by four tractor trailers. However, to move the exhibition from Ohio to Hawaii it was decided that intermodal transport would be more efficient. To carry out the move a new loading plan was created to properly transport the exhibition in standard 45 foot intermodal containers. The load plan had to comply with weight and distribution regulations required by the railroad. For instance, unlike typical van transport, empty space in cargo containers must be filled with adequate bracing material to prevent horizontal and vertical shifts. ***Cosmic Questions'*** 130 plus crates traveled in 5 cargo containers without incident. None of the exhibition components, including many fragile and sensitive objects, were damaged. Randy Skilling, an independent contractor hired by ASTC to supervise the exhibition's transport and on-site logistics, stated that reconfiguring the load plan did result in additional costs, but that if the exhibition had been originally designed for intermodal these costs would not have occurred (personal communication, November 2008). Designing crates to be compatible with cargo containers and trailers, as well as creating two load plans would give host institutions and or exhibit companies the leeway to choose a potentially greener and more economical method of transport.

Packaging

In the museum world a crate could be regarded as high-end art. Unfortunately these works of art are not protected by The Visual Artists Rights Act and are routinely destroyed. A

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majority of respondents who participated in a 2007 online crating and packaging survey stated that current methods used by the profession are wasteful (Warden, 2007). Here are a few comments:

-There is a lot of waste and not enough recycling.

-Crating has become such a science that it seems the industry (both museum and craters) want new crates for each loan.

-One criticism would be that high standards have meant high prices, which coupled with fairly inflexible attitudes have made it very expensive for smaller or economically challenged institutions and organizations to move or loan their collections.

-The lack of available in-house storage space leads to too much waste. The lack of available in-house staff time and subsequent reliance on crating contractors drives up operating costs unnecessarily.

Typical barriers to reducing packaging and crating waste are a lack of storage space, general "how-to" knowledge, and access to established recycling systems. Another barrier to reducing packaging waste has to do with design. Although reusable totes, containers, and crates are plentiful in the commodities transport sector, there are only a few reusable designs within fine art shipping.

Reusable Crating

First, wood crates are re-usable—a fact that could be maximized if they were designed to be readily dismantled for compact storage, such as the use of break-away walls. Second, there are several companies in Europe that have designed reusable crates made of plastic and metal.[3] These crates often have an interior wood mounting frame and are typically used for two dimensional works; however a version for three dimensional objects is under development. European museums have successfully used these reusable crates. Perhaps, with collaboration and customer demand they will become available in the United States. Third, a few museums in the United States have created a packaging system involving reusable, rolling carts (Jefferies and Maloney, personal communications, 2008). The carts are designed to be compatible with the dimensions of transport trailers, and consist of a metal frame base on casters decked with laminated wood, and an upright metal frame. Clear stretch wrap, or another material covering, can be applied to the cart to inhibit moisture and dust intrusion. Collection items still travel in traditional wood crates mounted onto carts; however support materials are generally soft-packed and secured within the cart using the metal frame as an impact barrier. The design of the carts reduces waste by allowing them to be collapsible, reusable, and made of readily recyclable materials.

The above crates and carts have to be stored and managed in order to be reused. For those institutions with adequate resources, storing materials for a later use is viewed as a beneficial undertaking. The J. Paul Getty Museum manages 150 crates using the software Excel. Seventy crates in the collection have traveled more than twice, and 50 crates have traveled more than 3 or 4 times. A few of the Getty's crates are more than 15 years old (Gomez, personal communication, November 1, 2008). The National Gallery of Art

(NGA) also retains a large collection of crates (approximately 300) which are stored and managed by a local fine art shipper. NGA has found that retrofitted crates cost a third less than the cost of a new crate (Freitag, personal communication, September 27, 2007).

A Leasing System for Crates

For those who cannot store their own crates a leasing system could alleviate the negative impacts of continually building new crates. Participants in the aforementioned crating and packaging survey were asked if a crate leasing system could be established in the United States. Here are some responses:

-Yes, especially for the smaller museums with small budgets and [limited] staff.

-Would the savings on materials make up for the environmental impact of hauling empty crates?

-Yes provided the crates are available in a wide variety of sizes, easily ordered, delivered, and if necessary, available for long-term lease.

-I think it is possible but difficult to accomplish. Most [crate] designs we've seen to date [that] are one-size-fits-all do not function well.

While there are obstacles to installing a nationwide system of crate leasing in the United States, a regional approach may be the better option. Furthermore, crate leasing could be seen as an alternative to include in a company's portfolio of services rather than adopting an entirely new business model. Crate companies could form partnerships to facilitate the circulation and storage of leased crates—which would reduce the need of transporting empty crates. Museums could work together and develop a cooperative warehousing system where crates and other commonly used exhibit items could be stored, shared, and rented. Although material leasing will not work for every situation, the museum profession would benefit from a material salvage-type business.

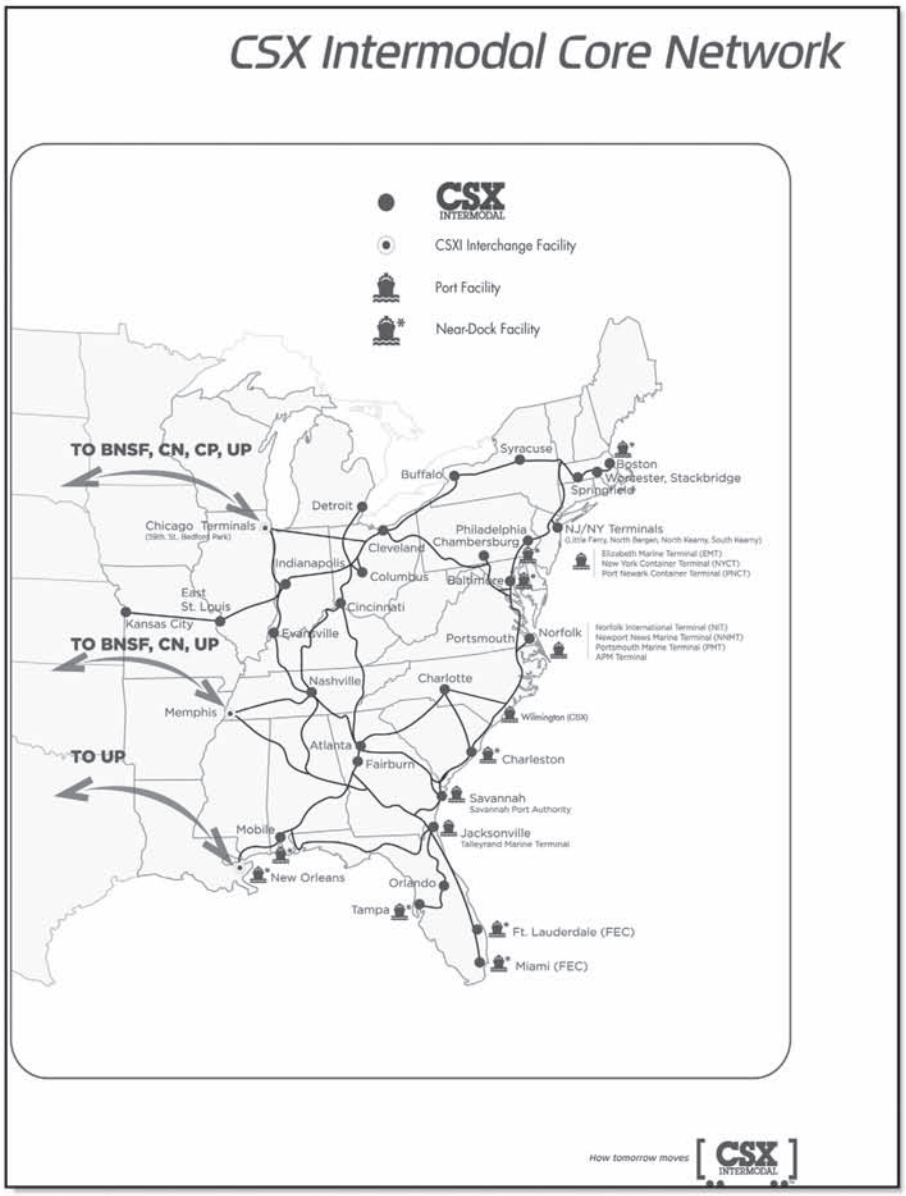

Illustration of CSX portion of core network of intermodal rail link. Secondary regional maps are not shown. ©2008 CSX Corporation, Inc.

Packing Materials

Packing material choice is a major component of waste production. The profession is skilled at choosing materials that are both benign and durable. Unfortunately, the durability factor is rendered a liability in museum packaging

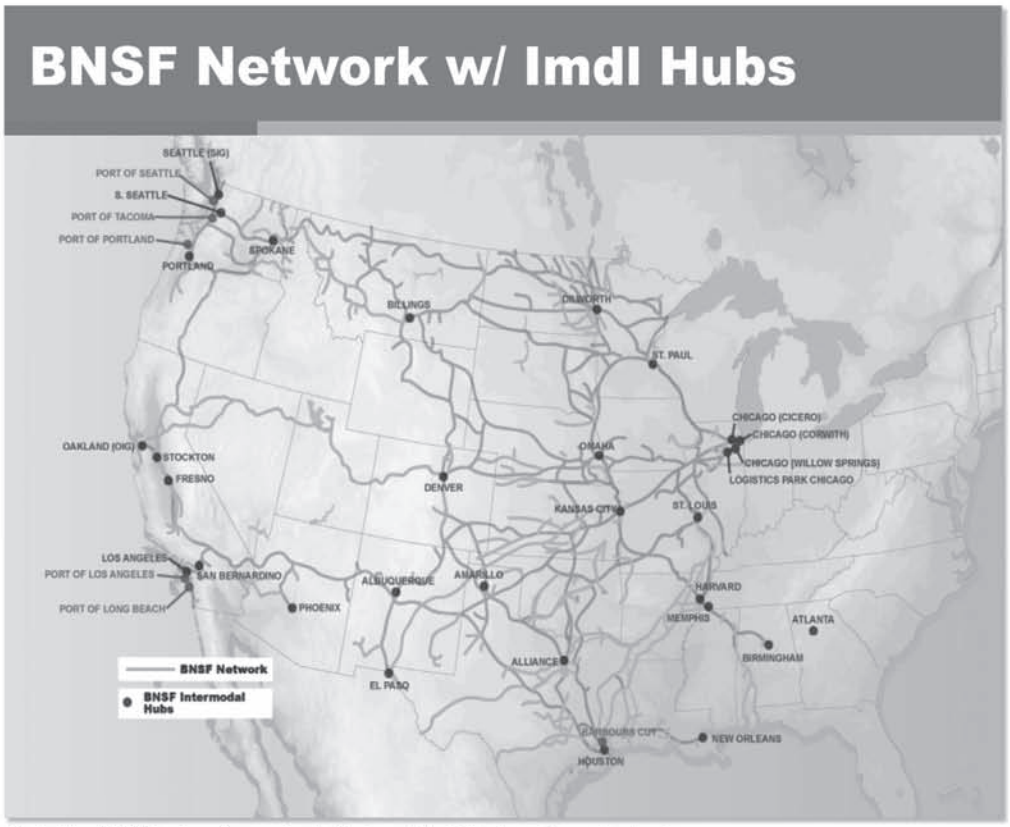

Illustration of BNSF portion of core network of intermodal rail link. Secondary regional maps are not shown.

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and crating as materials often live out their useful life in landfills. Prioritizing materials based on recyclability will create a shorter supplies list. Sturdy cardboard panels and boxes could replace all plastic and foam boards. Cardboard is readily accepted in municipal recycling programs. And, there are vendors who offer cardboard made of 100% post-consumer content. Depending on the shock and vibration requirements there are reusable cushioning units, made of rubber, plastic, or an enclosed metal spring, that could be used instead of petroleum based foams.[4] If petroleum based material is necessary, choose a manufacturer that will take back used materials. For example, Sealed Air Corporation, the manufacturer of both Bubble Wrap® and ETHAFOAM®, will accept used materials for reprocessing.

Scheduling

The final inefficiency of traveling exhibitions is scheduling. The current method of open-ended booking causes exhibitions to crisscross the country. Each of the four vans used to transport ***Cosmic Questions*** traveled 7,430 miles for a total of 29,720 miles.[5] This quantity equals 68 tons of carbon dioxide and is equivalent to: 120 barrels of oil; the annual emissions from 9.4 passenger vehicles; and the annual energy used by 4.5 homes.[6] A new system where lenders direct how shows circulate based on geography, not time, could be developed. For example exhibitions could be offered within a particular region for a set period of time. ***Museum on Main Street,*** a Smithsonian Institution and State Humanities Councils' exhibition program, produces exhibitions that are transported to one state and then circulated within that state for a period of a year. If a geographically based scheduling system were phased-in, advance planning by lenders and host institutions would still be possible. Exhibition organizers who research interest levels prior to completing an exhibition could design itineraries based on the location of interested parties.

Conclusion

The traveling exhibition industry has grown dramatically over the last thirty years. The rise in the number of traveling exhibitions

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If the profession chooses to continue the production and consumption of traveling exhibitions it must take responsibility for the role it plays in the larger context of environmental degradation.

reflects not only market demand, but a significant shift in how budgets are allocated and a broader perspective of what constitutes a museum's constituency. Any argument supporting the merit of traveling exhibitions does not negate the fact that the industry consumes and wastes numerous resources; resources that could be allocated for localized, long-term initiatives. To downplay the resource drain and say the industry is small, and therefore has a minimal impact on the environment, is like saying pockets of slash and burn subsistence farmers in the Amazon do not affect climate change. Both actions are a part of the answer to why the environment is in distress. If the profession chooses to continue the production and consumption of traveling exhibitions it must take responsibility for the role it plays in the larger context of environmental degradation. The sentiment that people and institutions should be good not less bad is valid. How cultural resources are shared and to what end will be a topic of debate as museums grapple with correcting unsustainable behavior. Perhaps in the end there will be more *good* and less *bad*.

End Notes:

[1]Carbon Dioxide data was calculated using The Greenhouse Gas Protocol Initiative's Sector Tool, CO2 Emissions from Transport or Mobile Sources, http://www.ghgprotocol.org/calculation-tools/all-tools

[2]For further information about intermodal including a list of companies and service providers visit Intermodal Association of North America http://www.intermodal.org

[3]Hasenkamp, 2-D and 3-D crates www.hasenkamp.com; Turtle Box by Hizkia Van Kralingen, Netherlands, www.turtlebox.com. See also www.vankralingen.com; Pegasus Packaging Crate by Helicon: The Conservation Specialist, Netherlands www.helicon-cs.com; An example of a re-mountable and re-usable shock absorber can be found at http://www.skidmatesnow.com/

[4]An example of a reusable cushioning unit is Hardigg's Skid-Mates® http://www.hardigg.com/Hardigg-Skidmates.htm

[5]Itinerary for Cosmic Questions available at Association of Science and Technology Centers' website http://www.astc.org/, accessed November 08, 2008

[6]The average tractor trailer, fully loaded, gets 6 miles per gallon. Carbon Dioxide data was calculated using The Greenhouse Gas Protocol Initiative's Sector Tool, CO2 Emissions from Transport or Mobile Sources, http://www.ghgprotocol.org/calculation-tools/all-tools; and the U.S. Environmental Protection Agency Greenhouse Gas Equivalencies Calculator; http://www.epa.gov/solar/energy-resources/calculator.html both accessed November 8, 2008.

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