

**Conference on Sustainable Cultural Heritage
The National Endowment for the Humanities (NEH) and
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Speaker:

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Title:

***To everything there is a season:
strategic thinking for sustainable environmental management for collections conservation***

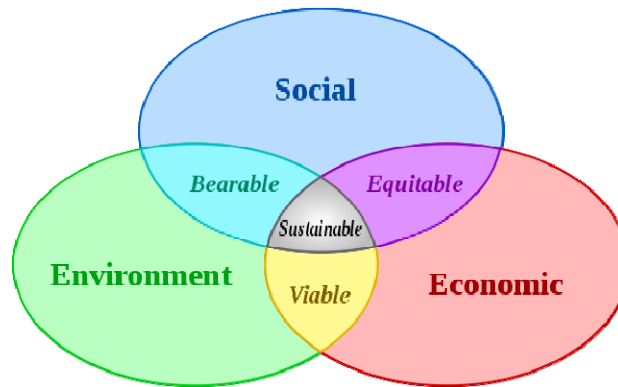
The great thing about being the last speaker on a day like today is you get to stand on the shoulders of giants. I want to thank my Italian and American colleagues who have spoken before me. They have provided us with fertile ideas as to how to execute sustainable preventive conservation within an immediate context of climate change and economic disruption, both of which are challenging everyone.

Given the opportunities shown to us today, hopefully we are already thinking about how we might integrate these ideas into a cohesive strategy for sustainable stewardship at our institutions or sites.

Sustainability is like many concepts; as a catch word, it sounds good and we feel good about it. However, when we go back home or to the office, someone might ask us: "What *is* sustainability?" and we have to articulate the concept.

So, as we wrap up today's meeting, let us revisit what "sustainability" means and how we can approach sustainable strategies for environmental management for collections conservation, with some emphasis on collections in existing and historic buildings.

Earlier today, Jerry Podany cited the Oxford English dictionary for his definition of sustainability. I went to the peoples' encyclopedia, Wikipedia, and found a similar definition. Wikipedia tells us: "Sustainability, in general terms, is the ability to maintain balance of a certain process or state in any system" while further noting that human sustainability is typically taken to integrate social, economic and environmental spheres.



Johann Dréo: <http://en.wikipedia.org/wiki/Sustainability>

In 1989, the *World Commission on Environment and Development* (Brundtland Commission) articulated what has been a widely accepted definition of sustainability: "[to meet] the needs of the present without compromising the ability of future generations to meet their own needs."

Embedded explicitly and implicitly in these and other definitions of sustainability are the core elements of sustainability:

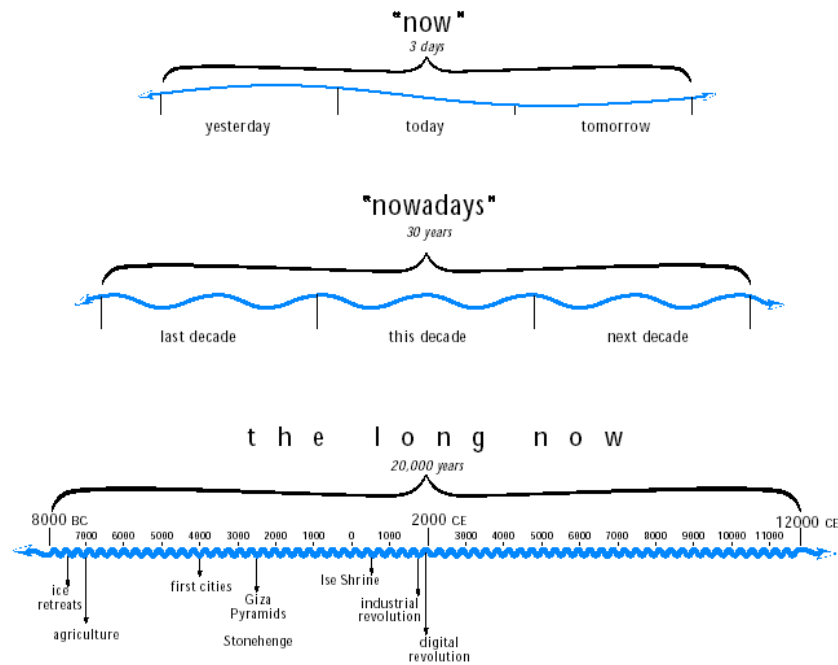
- Integration of social, economic and environmental spheres;
- Intergenerational responsibility;
- Capacity and need;
- Thinking in long-time;
- Finding a balance;
- Follow-through.

Intergenerational responsibility is fundamental to stewardship of cultural heritage. However, in cultural heritage we might think of our responsibility in the limited sense of preserving the integrity of moveable or immovable heritage for future generations. Sustainability pushes the boundary of this responsibility to include the social, environmental and economic considerations of our efforts, leaving us to find the balance point of a complex, dynamic interrelationship of the three.

A sustainable approach includes an *understanding of need*, in the true sense of necessity. Reciprocal to need, but not explicitly stated, is an *understanding of capacity*. A sustainable approach therefore requires that *needs be met within our social, economic and environmental capacities*. So sustainable stewardship for cultural heritage requires that we have an understanding of the multi-variant needs and capacities for an institution and the heritage for which it is responsible. In the context of our work, examples of these include: financial resources, human resources, technological sophistication of the institution, visitor market, building envelope performance, building size, site size, community support, and utility and transportation infrastructure.

Central to the concept of sustainability is a *long view of time*, implied by the intergenerational compact.

Long time has been fundamental to cultural heritage, which is the aggregate product of changes over past long time. But stewardship of cultural heritage must also be forward-looking in long time if we are to limit those changes that result in value-robbing deterioration or loss.



<http://www.longnow.org/about/>

There are two links between change and time, the first being the inevitability of change over time due to the second law of thermodynamics, a conservation problem. The second is that change provides the basis for our own psychological sense of time.

Thinking in long-time is challenging because we function in the present, and thanks to technology, the present is defined by increasingly shorter intervals of time. Anyone who has checked their email or instant messages today can attest to the immediacy and brevity of the present. However, the present offers us a very small window within which to identify and measure the driving forces and resultant changes that affect cultural heritage in long-time.

If we stretch our reference time frame, we can see the trends and perhaps patterns of variables in long time.

If we broaden our view of long time to include the social, economic and environmental spheres required to be sustainable, we can begin to identify trends and patterns in large driving forces that can affect cultural heritage, such as national and global economies, energy resource availability and costs, technology, climate trends and social and governmental stability. Some of these long-time driving forces seem so slow that they might be perceived as static, but they are in fact highly dynamic and synergistic, sometimes culminating in rapid and significant change.

Over the decade or two, several events have occurred that have had lasting direct and indirect implications for cultural heritage. Debra Hess Norris has given us several examples from the natural disaster standpoint. We have not only the flooding of New Orleans after Hurricane Katrina, but also the global credit market collapse, the international scientific acknowledgement of human-influenced climate

change and the increasing global demand for energy, for example. But in retrospective study, we realize that these events have been the result of long slow trends that were below our collective radar.

Could we have predicted when the credit markets would collapse? Probably not, but we could reasonably have expected that there would be an economic downturn at some point, and planned accordingly. From the standpoint of economic sustainability, an institution might include a virtual economic “stress test” as part of decision-making about the next capital project, such as a new visitors’ center.

Taking the long view and broad perspective of sustainability will not prevent these large driving forces. However, it will help us consider “what if” scenarios, and our strategic response to the “what if” scenarios will leave us better prepared to continue stewardship when endowments shrink, or travel and visitation decrease, or energy prices increase.

Sustainability includes the directive to *find “balance”* of multiple variables across social, economic and environmental spheres. In cultural heritage, striking balance sounds a lot like the pejorative “compromise,” a term that might be alien to engineers and conservators alike.

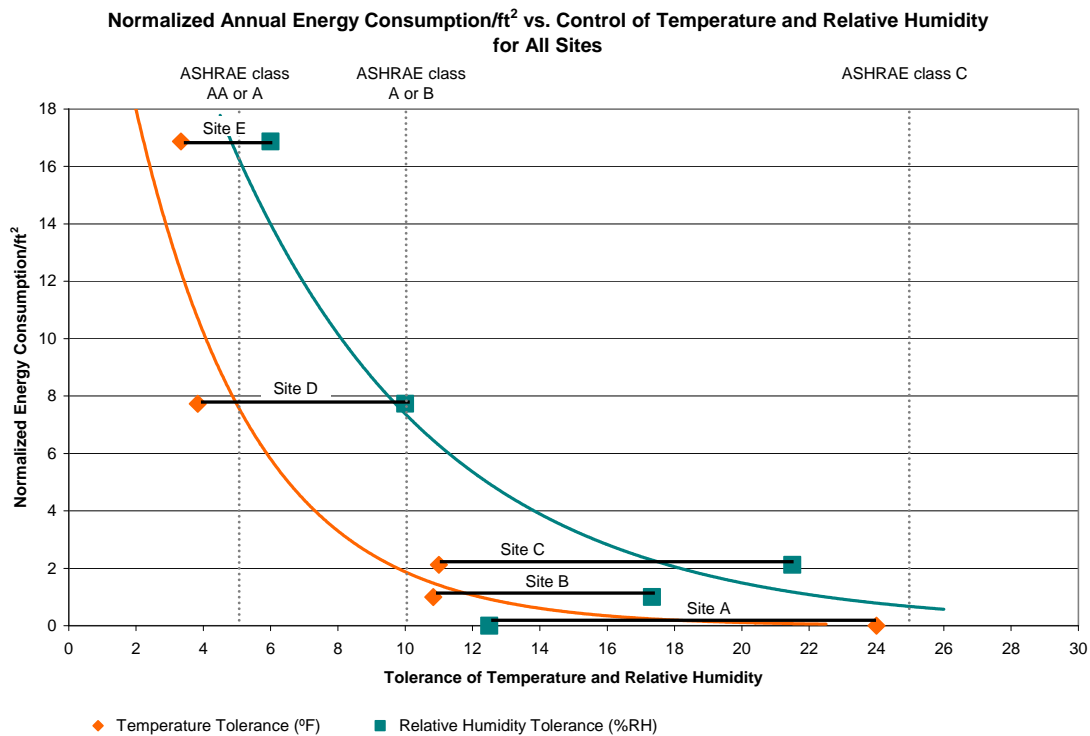
Given our training and principles that we “do no harm” and “avoid all risks,” the idea of balance is difficult, since balance is specific to each case and cannot be prescribed by standards.

Witness the discussion about fluctuation in temperature and relative humidity. We can't have a strict standard for these because, as pointed out in today's presentations, there are situations where there are multiple factors and mitigating approaches, some of which may be competing or conflicting.

Lastly, sustainability is achieved as an *on-going process of measurement, feedback and adjustment* to confirm that objectives are met. Jim Reilly has eloquently stated “You can't manage what you don't measure.” The driving forces that affect cultural heritage will vary with time. So, in order to maintain sustainability, we must monitor results and adjust our strategic responses. This requires continued application of preservation metrics as well as metrics with which to monitor energy consumption and operating costs.

As an example of *strategic thinking for sustainable cultural heritage*, let us consider interior environmental management for collections conservation.

As discussed in several of today's presentations, for the past few decades, the goal of an “ideal” conservation environment for collections has led to installation of sophisticated mechanical systems for climate control. Under this prescriptive model, the logic has been that if tight control is good for collections, tighter control must be even better. Unfortunately, the cost of control follows the curve of diminishing returns, and the tightest control becomes prohibitively expensive in energy and currency.



David Artigas, 2007 University of Pennsylvania Thesis

Not only are these systems expensive to install and operate, but the primary equipment has a finite service life, which means replacement is needed within a 20 to 30 year cycle. Hardware and software for the control functions may be technologically obsolete within 5 years. A collective view has emerged that the prescriptive approach of tight mechanical control for collections environments is not sustainable for the cultural heritage sector.

Equally significant, energy consumption by buildings is a major component in our generation of greenhouse gases that affect global climate. So purely from an environmental perspective, we need to reduce the greenhouse-gas-emitting energy consumption associated with systems for collections environments.

Therefore, in lieu of the prescriptive model we need the strategic model for sustainable environmental management for collections.

Here are some thoughts on how to proceed strategically:

- Engage an interdisciplinary collaborative team.

This team might include: collections conservator; engineer and architect; curators (collections, interpretation, and education); facilities and maintenance personnel; director and chief financial officer; key board members; installation and service contractors.

This team should participate in key decisions through the conception and execution of the

strategies.

- Analyze the existing environmental contexts.

Jerry Podany has spoken today about “harvesting” the information that is in the object, with the collections, about their past history and conditions. We can mine the same information from a building. Both movable property and immovable property are information rich. They contain the summary history of what has gone before.

As part of information gathering and analysis, we can also: acquire accurate data for interior & exterior environments; apply statistical analysis to the data set; use standard deviation to define range and variability, rather than the difference between extremes; identify risks as they relate to seasonal fluctuations or extremes in temperature or relative humidity; use preservation metrics to gauge relative collections risks from the environment.

- Determine needs of the collections.

We might look at the object or building and determine what has happened in the past and why the object or the building has survived in its present condition. From this we can identify determine vulnerabilities and needs, specific to past contexts. It is also important that we assess the rate of change in condition as part of this analysis.

We might answer the following questions:

- What are the current condition and the recent rates of change in condition?
- Do the conditions correlate with risks identified in the environmental analysis?
- Have the collections been “proofed” by prior exposure of environmental extremes?
- What are the future environmental vulnerabilities and risks to the collections?
- How will the collections change in material and size in the future?
- What are the opportunities for improving the collections environment?

Today, Dr. Cristina Sabbioni showed us an excellent example of analysis of future threats to cultural heritage - the Vulnerability Atlas produced in the European Noah’s Ark Project.

- Assess capacity of the building and its envelope.

The building envelope moderates the effects of exterior climate on the interior environment, and hence the collections. It may accomplish this as either a passive or active element; in either case, the building envelope exerts a large influence on what we can realistically and practically achieve with respect to interior conditions.

So we might address the following questions:

- How well does the building envelope perform its climate management function?
- What are the environmental risks and vulnerabilities of the building materials?
- How is the building used?
- What is the occupant census?
- Is adequate space available for systems?
- How well does the building envelope moderate differences between the exterior and the interior?

The impact of building occupancy and use in the interior environment was clearly demonstrated today with Dr. Adriana Bernardi's presentation. With the respect to the last question, Chapter 21 of the ASHRAE (American Society of Heating Refrigeration and Air-Conditioning Engineers) Applications Handbook provides good guidance for several of the climate zones in the United States and Europe.

- Assess capacity: the institution & stewardship.

As consultants and conservators, we must be realistic in our assessment of institutional capacity to undertake and implement our recommended improvements.

We should consider the following questions:

- Can the institution reinvest in systems replacement every 20 to 30 years?
- Can the institution pay increased energy and maintenance costs over the system lifetime?
- Is the institution technologically self-sufficient or does it rely on outside technical support?
- Is the institution financially prepared to weather economical downturns?

- Scenario thinking in long-time.

Long-term capital investments for cultural heritage conservation must address and endure future events and changes. Scenario thinking helps us visualize the possibilities.

Examples of things we might consider include:

- What is the state of the supporting utility infrastructure?
- Will natural disasters become more frequent?
- What if the systems become economically or climatically obsolescent?
- What happens to the system if there are rolling brownouts or energy production curtailments?
- How can fuel rationing or similar disruption of imported fuel supplies be addressed?
- How would reduced travel and visitation affect institutional income and budgets?

- Find the balance point.

This is the difficult part, the departure from the prescriptive model.

Considerations might include:

- What aspects of the present interior environment are likely to damage collections?
- Have we balanced environmental concerns with other collections risk factors (security, fire, light)?
- What interior environmental improvements can be made to reduce risk to an acceptable level?
- Are these improvements achievable and sustainable and within capacity?
- Will we reduce greenhouse gas emissions? If not, what are the alternatives?

- Follow-through to maintain sustainability.

Strategies and designs are rarely perfect from the start. Adjustments will be needed, but future adjustments must be based on information and data, not ad hoc trial and error or "hunches."

In order to accomplish this we should:

- Plan for on-going measurement of effectiveness of the strategies;
- Establish procedures for monitoring, reporting and adjustments;
- Determine the metrics that will be used;

- Assign responsibility for implementation.
- Basic strategies for Environmental Sustainability and Collections.

Passive approaches first

Allow the building do some of the work by exploiting passive environmental features.

Select building materials with high thermal inertia and moisture buffering capacity that can stabilize fluctuations in temperature and relative humidity. In many climates, passive stability can reduce the size and capacity of building systems, and smaller system capacity means that such systems operate closer to their efficiency point.

Cascade gradients in temperature and moisture

Large differences between exterior and interior conditions can be cascaded across multiple spaces and enclosures, reducing the gradients that drive energy and moisture exchange through the building envelope. The effectiveness of this approach can be seen on a smaller scale when objects are “nested” within packing materials, housings and storage cabinets.

Make systems simple, robust and repairable.

Provide sufficient space for access.

In closing, let us remember that our actions will affect the world we leave for future generations. The cultural heritage, society, and environment that we leave behind will be the record of those actions.

Thank you for listening. On behalf of my fellow speakers, thanks to the National Endowment for the Humanities (NEH) and *grazie* to the National Research Council of Italy for making today’s conference possible.

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Michael Henry NEH text May 09 w. 08 Sept edits