Sustainability Means "Less Is More"

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AN ART HISTORIAN'S EXPERIENCE

The more than 800-year-old Reliquiary Shrine in the Cathedral of Sion, Switzerland, has an important artistic and historic value. In the context of a discussion about sustainability, it is interesting how this object physically survived for such a long time. Although it has been damaged several times over the centuries, the shrine is still a very rare masterpiece of 11th century European silverwork. What has helped this precious object to survive?

Key Factors For Long Term Preservation

- The shrine is of good quality: two deeply carved pieces of larch wood covered with sheets of silver repoussée work of very pure quality silver.
- The object has needed little maintenance over the centuries, because of its simple construction.
- The object was venerated by the local population, because it contained the relics of their local saint, St. Theodule.
- People felt responsible for the object. They looked after it , even hiding or rescuing the object in times of fear and disaster.
- The object was mostly kept in a dry, dark, and secure place – in the crypt of the church dedicated to Saint Theodule.[1] A short time neglect (e.g. during wartimes or epidemics) thus presented little problem.
- The building site was cleverly chosen in a safe area with few natural risks. During insecure times, the shrine was taken to a castle-like church overlooking the city of Sion.
- Ecclesiastical buildings were low–tech, but nevertheless sometimes very massive, constructions that survived centuries with little maintenance and literally no operation cost for heating, refrigeration and air-conditioning.

Since 1999, the shrine has been – like so many others – kept in a museum. It has been stripped of its religious context, and is no longer venerated or used in religious processions. Its exhibition room, in the former cellar of a building near the Cathedral of Sion and the Church of Saint Theodule, can be kept dry only by using a high-tech dehumidifier, which like any technology, may be subject to failure.

Similar transfers from low-tech but stable environments to so-called "museum environments" with high-tech equipment have taken place frequently in recent decades. In the short term,

1 During recent archaeological excavations, the niche where the shrine presumably stood was rediscovered.

these museum environments may be a benefit to transferred objects, as long as the technical equipment works properly and financial resources are available to run the sophisticated systems. *Will* these systems always work? *Will* they work in the future? *Will* we have the resources to run them in the future? What we know for sure is that so-called technological progress has not always been the best for our heritage.

There has always been a loss of cultural heritage over time, through natural and man-made disasters, and through neglect, as well as the steady, natural decay of materials. This is normal and inevitable. At the same time, we should regret the considerable damage and loss of cultural heritage during the last fifty years due to neglect, drastic changes in building materials, building technologies, wrongly designed buildings and air conditioning systems, and, last but not least, the inappropriate choice of building sites. These problems reflect our fast-living society, which is primarily interested in immediate profit and not in long-term preservation strategies. A new, high-tech building, planned hurriedly and set up quickly, is very often not compatible with the long-term preservation needs of cultural heritage, whether recent or centuries-old.

Five 5 Major Issues With Changing Museums

1. Since the mid-20th century, there has been the belief that every problem can be solved with new technologies and energy-consuming technical equipment. For example, new and often lightweight building technologies in combination with highly sophisticated, but excessively energy-consuming, climate controls has superseded traditional, local know-how and long-term experience. As long as all of these systems work as intended, they can be maintained and properly run. However, what about damage caused by technical failures, technical neglect, missing spare parts, a lack of operational resources, or faulty design in these technical systems?
2. Today, construction technology has to be quick and easy. Traditional, well-tested but laborious building technology can no longer compete with modern technologies, thus imposing a loss of traditional, local knowledge in the sustainable building technologies suitable for a specific region. Building technology has become international and uniform, but less adequate to local needs, and is consuming too much energy for production, transport, and setup. Furthermore, these systems often need excessive maintenance through specialized, and therefore expensive, staff.
3. In most developed countries, levels for human comfort have been defined as standards to be achieved throughout the year. 68°F/20°C is very often the target for interior temperatures, whether the outdoors is hot in summer or freezing in winter. People wear summer clothing to the office all year long. Maintaining a stable environment throughout the year implies a significant technical effort and huge energy consumption.
4. Along with higher standards for human comfort, guidelines for museum environments have also been defined (e.g., by ICOM). These standards are so narrow that, in many cases, sophisticated climate controls have been imperative. These standards are mainly based on research on single aspects of object behaviour, and not on long-term experience with collections as heterogeneous groups of objects.

We have seen enormous growth in collections, museum activities, and museums themselves in recent decades, with a gradual shift from museum activities in the traditional sense towards glamorous events. Although there is greater collection care and responsibility in absolute terms, too much staff energy has been absorbed by museum activities eager to attract the

public, as opposed to the care for our heritage. Somehow, collection care has been delegated to technology.
The actual solution to all five of these issues has only been possible through the availability of cheap energy (mainly petrol) worldwide.

A Comparison of Building Strategies
A brief comparison of building strategies in three different time-periods will be helpful to understand the changes over time.

- Period 1: before the 20th century
- Period 2: in the present time, at the beginning of the 21st century
- Period 3: in a possible future, at about 2030 AD

Past	**Beginning of 21st Century**	**Future (2030)**
thoughtful choice of building site	build wherever you like	thoughtful choice of building site
In future, we will again choose buildings sites carefully to avoid natural risks. We will have to think about the wisdom of building a museum on a riverbank or the sea shore.		
durable materials, massive and/or simple construction, low-tech methods (based on experience)	short-lived materials and composite systems, lightweight, sophisticated, high-tech con-struction technology (expensive), difficult maintenance	durable materials and durable systems, optimization of construction materials and"sophisticated low-tech" technology
The Roman brick wall survived for more than 2000 years with almost no maintenance. Will the sophisticated, high-tech materials used for the "Allianz Arena" in Munich survive even 20 years with as little maintenance?		
little or no maintenance, easy to maintain	replacement or intensive maintenance (expensive)	least possible maintenance, easy to maintain
The climate in a centuries-old winery is stable and easy to maintain. In a recent project for new storage facilities, technicians were not able to solve problems with the climate control system for a year.		
no environmental standards, seasonal fluctuation of climate, passive climate	narrow standards, superseding experience, same climate all year, active climate control	experience, clever standards, seasonal fluctuation of climate, sophisticated passive climate
little or no energy consump-tion, few operational expenses	waste of energy, high operational costs	least possible energy consumption, few operational expenses
Modern, "standard buildings" are highly expensive to run because of exuberant energy consumption.		

What we need in future are clever constructions adapted to specific regions in order to reduce operational costs to an absolute minimum. However, what has been the reality for the last 50

years?

The Belief In Cheap Energy Will Get Us Into Serious Trouble

We depend on the availability of cheap energy 24 hours a day, worldwide. Almost everything in our daily life is based on this fact - from human comfort to mobility, food, and health. Those who have access to energy have the power, in any sense. Most changes in our world, especially during the last hundred years, have been based on extra energy becoming available and being used, but it is doubtful whether this has always been a sustainable development.

- Every single thing we do today is based upon cheap energy:high standards of living
- mobility via cars, buses, trains, and planes
- high technology, like active air-conditioning
- a mentality of replacement instead of maintenance
- high commercial profits
- globalization and its world-wide mobility of goods and services
- short-term thinking may even be seen as an indirect result of cheap energy

Petroleum has been the solution to the abundant demand for energy for more than a hundred years, and will last for maybe another thirty years. Nuclear power has been an option for fifty years, and has its own life cycle.

In the not-so-distant future, there will definitely be a shortage of energy, or at least a problem with its distribution, since no other energy source is as easily transportable as petrol. Increasingly high prices for energy (petrol prices have more than tripled in the last decade) will affect every aspect of our daily li. It will also affect museums, archives collections and their struggle to conserve cultural property for the future. It may be assumed that, compared to the present, a smaller proportion of available resources will be available for heritage preservation and heritage interpretation. This trend can already be observed in today's stagnation, or even reduction, of government subsidies for the heritage sector.

The challenge for museums in the future will be to cope with smaller resources, but to maintain the same obligation to preserve and interpret our cultural heritage. Museums with exuberant energy consumption and intensive maintenance needs are therefore definitely out of fashion and out of touch for most communities.

Life Cycle Cost of Buildings

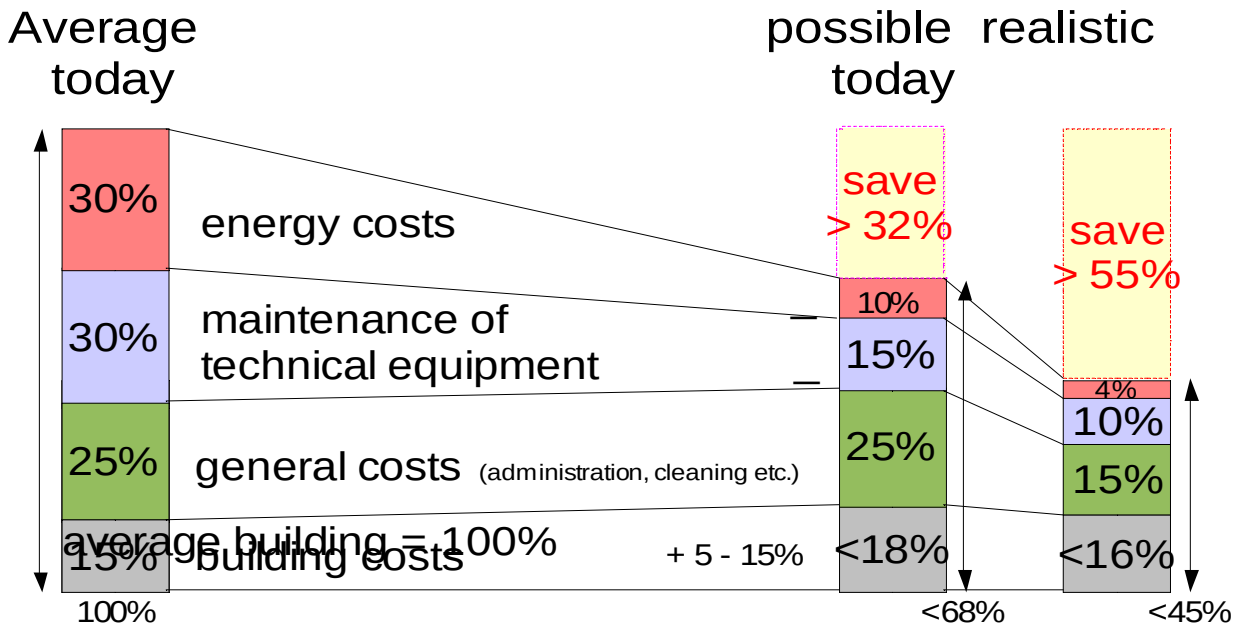
Studies show that, today, 85% of the life cycle costs of an average office building in Europe are generated during its use over 40 years (the average life cycle). These costs includes energy, maintenance, cleaning, administration, etc. Only 15% of the life cycle costs comprise the initial costs for planning and construction of the building itself. Transferring this ratio to museums, the ratio may actually be closer to 90% use versus10% initial cost, because of the energy-consuming technical equipment necessary to meet narrow museum standards for climatization. Costs for sophisticated, changing exhibitions would be another issue to discuss. In many museum development projects, life cycle costs are not really discussed. In Switzerland, Germany, and Austria, we identify a critical need to catch up with long-established standards in other countries. To realize that 85% of the life cycle costs are to be paid *after* the architect and the building contractor have left the site should prompt concern and thought about the matter. We know that it is relatively easy to find the funding for building a museum, but much harder to find the funding to run it afterwards, especially for 40 years, at roughly 2% a year of the total life cycle costs (or, in other words, about 1/8 of the initial building costs annually). There are already recently built museums that have had to shut

down or drastically reduce their climate control because of lack of resources to finance their exuberant energy costs.

The afore-mentioned 85% for running costs are roughly divided into 30% energy, 30% maintenance, and 25% other costs, such as cleaning, administration, etc. Clearly, any investment in saving energy and increasing efficiency is of major interest to any institution in the long run. Given that 60% of the lifetime costs of a building are for energy and maintenance, we should even more be alarmed and ready to turn towards more efficient architecture and technology.

We know from recent projects at the Novartis Campus in Basel that about two-thirds of today's average energy consumption in an office building can easily be saved through clever architecture and technology. The new office building of the Swiss Federal Institute of Aquatic Science and Technology is even lower than that.2 Recent museum projects show that there is even greater potential. Other studies show that maintenance costs can be cut in half through clever planning, the use of less sophisticated equipment, and more realistic, less narrow museum environment standards. At what cost may this be achieved? Recent figures show that the additional costs for improvements in energy consumption and maintenance compared to an actual average buildings are about 4 to 15%.

Compared to today's 100% life cycle costs over 40 years we can therefore at least save 20% through energy savings and another 15% through cheaper maintenance and replacement cost at the price of a maximum of 15% higher initial building costs.



An average museum extension at the initial building cost of 15 million dollars generates running costs of 85 million dollars over its 40-year lifespan. The life cycle cost will therefore be 100 million dollars.

2 http://www.international-sustainable-campus-network.org

The optimized museum will initially cost less than 17.25 million dollars (5 - 15% more than average) and generate running costs during its lifetime of about 50 million dollars. The life cycle costs are therefore roughly two-thirds of the average model. The running costs per year are less than1.25 million compared to a bit more than 2 million for the average building, or more than 40% less. This calculation doesn't take into account that the price for energy – and therefore also for technology – will rise rapidly in the future. This certain increase will make it even more profitable to invest in a sound building.

We haven not yet addressed the entire potential for savings. Reaching one-third of the actual life time cost may be realistic, with annual running costs of less than one-fifth of the actual average solution (including energy costs).

In order to give our heritage a chance to survive in the long term, lower life cycle costs will be key in the years to come. The less resources consumed, the better. The increase in energy prices and future energy shortages will soon force museums to rethink their strategies for collecting, exhibiting, and preserving, as well as their approach to infrastructure and architecture.

What Can Museum Conservators Contribute?

During the last several decades, museum environmental standards have been very strict. They have been based on the belief that modern technology is better than tested experience. Sometimes museums ask for thresholds for relative humidity of +/- 2%, or even less, all year round. In most regions, this is not possible without high-tech climate control. If these classic, narrow environmental standards were correct and imperative for the survival of the objects, no historic object would have been passed on to our generation. So what can we do?

1. We should look at the whole picture and not only at the details.
2. We have to think far ahead and to the benefit of the future generations that will have to run our institutions with their resources and infrastructures.
3. We have to be aware that nature is never uniform, and allow fluctuations in climate over the year. Most museum objects will not suffer damage in a moderate environment with slow climate change.
4. We have to look at what our ancestors (not our parents, but at least two generations back) did. They knew, for example, which constructions were suitable for specific geographical regions and specific climates.
5. We need guidelines for museum environments that can reasonably be followed and controlled.
6. We have to think about what will happen if technical systems fail or institutions run out of money to maintain and run the systems.
7. Instead of planning the whole museum or storage area for the needs of the most vulnerable objects, we should focus on moderate solutions for the majority (90%) of the objects and seek for special solutions for the small percentage of objects with special needs.
8. We should accept some reasonable risk instead of trying to avoid every risk at very high cost.

We need scientific research in single aspects of object behaviour. However, in order to do our daily museum jobs, we need practical help to cope with the long-term preservation of our collections as a whole. Guidelines must be realistic, understanding that there are limited resources available and that the use of sophisticated systems always has an immanent risk of

failure – not only a risk of technical failure, but also of financial failure. Last but not least, let's keep in mind that material heritage is transient, and may last 500 years or only 10 years.

What Can Museum Curators Do?
First of all, a museum is not an archive, and has no legal function by definition. Therefore, every museum can set its own carefully considered priorities in collecting objects. The Anglo-American world is, in some fields, ahead of other countries in that they have an easier approach to deaccessioning than many other countries with a long-established tradition of collecting. We do not only have to think about what we would like to collect in our museums, but also what we can afford, not in the sense of "afford to buy," but what we can afford to store, preserve and maintain in the long term. Are we effective? Do we do the right thing? Museums are often not effective because they do not have a proper profile, and the focus in collection management is more on acquiring than on long-term preservation. Sometimes, collecting is even based on curators' personal interests and not on a sustainable, long-term, museum strategy.

What Can Museums As Institutions Contribute?
Nowadays, museums are keen to draw large audiences. Larger institutions try to take part in a national or international arena. The size and programming of actual museums demand a non-local audience, the mobile human being of the 21st century coming from far away, the tourists and the glamour. What will happen when this mobility decreases, when travelling becomes more of a luxury good again? Very probably, museums will have to find their place in local and regional society as opposed to globalized society. Their principal audience will again be a local one, with new, but also in many aspects old, needs to give identity to their society. It might be that in future, visitors do not want international, mainstream exhibitions, but something more reflective of their personal situation and their regional environment. After a period of globalization, we will very probably see a period of deglobalization and regionalization again.

The focus of museum architecture should be less on the glamour of exhibitions, events, architects, and directors, and more on the needs of the visitor. Museums should be able to perform in such a way that their objects can act as a catalyst for interaction between human beings, among visitors themselves, or between visitors and friendly museum staff.
Another challenging aspect of museum function is that many museums have old collections which no longer fit their profile, but which cannot be deaccessioned because of legal reasons (at least, this is the case in many countries in Europe). Museums should be in a position to rethink their profiles and be able to carefully redesign their profile as well as their collections.

CONCLUSIONS

- The availability of resources of any kind (energy, funding, staff) will be one of the major problems facing museums in the future.
- Museums will be forced to run at lower costs. Therefore, we need what might be called "sophisticated low-tech" building technology.
- Museums will be forced to keep their collections small, so that they are assured of keeping them properly under these less favourable circumstances. We are not only users of our collections, but are also in charge of their long-term preservation for future generations.

I Have A Dream

- **Museum directors** will strive for sustainable museum development. To cite Walter Benjamin: “It is not important how many visitors come to an exhibition but how many leave it smart.”[3] One could add that it also doesn't matter what size a museum is, but how many people leave it smart.
- **Architects** will give us interesting buildings that have a low risk of failure, are easy to maintain, and are cost-efficient to run. They will consider the human being a first priority, not the building design or somebody's ego.
- **Conservators** will base their reasoning on long-term risk assessment. Their reasonable and moderate demands will be based on empiric and scientific knowledge of materials behaviour, balancing long-term preservation of mixed collections with limited resources.
- **Curators** will set priorities in their institutions and give it a sharp profile backed in the local and regional community. Museums will work together in order to share their collections, yet keep each of them to a reasonable size.
- **Visitors**, in search of identity, will ask that museums use their collections and objects as catalysts for personal interaction and as a reflection of local and regional needs.
- **Museum consultants** will learn to advise clients in understanding the transitional character of our heritage and to cope with reasonable risks and reduced resources.

  We need to reinvent museums under new circumstances, where cheap energy and unlimited mobility is no longer the creed of our society, and where we accept the need to cope reasonably with risks and smaller resources.

3 *Original in german “Es kommt nicht darauf an, wie viele Menschen in eine Ausstellung gehen, sondern dass sie wieder gewitzter herauskommen”*