# Risk management: a case study of the wooden collection held in storage at the Folk Art Museum of Athens, Greece

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**Abstract**
This work deals with the implementation of a risk management (RM) methodology that was undertaken in 2008, for the wooden collection held in storage at the Folk Art Museum of Athens (M.E.L.T.), Greece. The goal of the RM at MELT was to establish the context, identify, analyze and evaluate the risks to the wooden collection, in order to propose a plan of action and communicate the results to the stakeholders. The results of the RM showed that the risk with the greatest magnitude and the most catastrophic impact to the wooden collection was *fire*, and that the measures to reduce this risk were easy to apply and of relatively low cost. Recommendations for a Fire Prevention Program were proposed, that can easily be adopted by the museum management and staff of M.E.L.T. The risk of fire was followed by the risks of *dissociation* and some scenarios of *physical forces*, while the lowest risks appeared to be the action of *criminals / vandals* and *water*. Based on the results obtained, it appears that wood properties, such as hygroscopicity, flammability, biodegradability and so on, will affect the magnitude of each risk and the priority of actions that need to be followed. However, in a RM, the site, building, room, fittings and the support and packaging of the wooden artifacts would determine the actual risk and the measures that need to be taken. Finally, it appears that RM for wooden artifact collections is imperative as it can describe equally the gradual and cumulative damage to the collection, quantify all possible risks and determine the most cost-effective means to reduce them.

## Introduction

The Folk Art Museum of Athens was founded in 1918 and exhibits artefacts from recent Greek history, since 1650. Its permanent collection houses exceptional artifacts of woodcarvings, embroidery, textiles and traditional costumes, ceramics, metals and folk paintings. The aim of the museum is to collect, conserve, exhibit and protect the material evidence of recent Greek cultural heritage. The Museum has four branches, where special collections or themes are presented. These are the 'Central building', the 'Mosque', the 'Bath-house of the Winds' and the 'Panos Building'. The Museum organization also controls three more buildings in different locations, which house the museum central storage area where artifacts not in the permanent exhibition are kept, the conservation laboratory and the documentation laboratory where the recording, documentation and study of the artifacts takes place, (Romeou-Karastamati 1997, MELT 2009).

The movable collection housed in the museum central storage facility, consists of 14,327 artefacts, of which 2,135 are made of wood (woodcarvings, traditional furniture, ecclesiastic objects, tools and household tools), 8,748 are made of textiles (costumes and accessories, embroideries), 3,092 are made of metal (tools, parts of costumes, etc) and 132 are made of paper (maps, drawings). A further 220 artefacts are Coptic textiles and icons, made of a range of materials.
This storage facility is a former apartment on the ground floor of a three storey building located close to the Central Museum building. The facility was not purpose built but has been altered and developed to meet the museum's needs in order to house the movable collection. In recent years, the museum's policy of increasing acquisitions has lead to the lack of proper arrangement of the artifacts and to overcrowding. Artifacts are stored in various locations, including on the floor, on top of cabinets and in the corridors (fig.1). The larger wooden

objects in the storage area (furniture, woodcarving, mirrors) have no protection whatsoever and lie directly on the floor, while smaller packaged objects are placed on top of wooden cupboards or structural elements of the building. For the packaging of much of the wooden collection, wooden and cardboard boxes, kraft paper or bubble wrap have been used (fig. 2).
It had become clear to the Museum organization and personnel that the facility required reorganization in order to be safe and more accessible. Thus, the museum management initiated a systematic study to identify areas in need of improvement, through a risk assessment and re-evaluation of management processes. The goal was to develop a new layout that would work for the collection and for the staff, would be safe for both artifacts and personnel, meet their access needs and at the same time contribute to the preservation of the collection.

Figure 1- Overcrowding in the storage facility

Figure 2-Packaging of wooden artefacts

Figure 3- Faulty electrical board in the storage facility

**Risk Assessment Methodology**

Risk management is a tool through which we look at the evidence of past damage, to inform our assessment of future damage, in order to make improvements to the environment where the artefacts are located. The process is based on the explanation of the past chain of cause and effect, the prediction of the likelihood of repetition, the setting of priorities and the planning and implementing of improvements.
The Risk Assessment that was applied in the storage area of M.E.L.T., was Stefan Michalski's methodology (Michaslki 2004, 2007), using simple rank order scales Risk Assessment was based on visible and invisible data. The visible data concerned the observations made on the site, the building itself, the rooms, the storage furniture, the support /packaging and the collections, while the invisible data was based on local staff interviews and activities, prior history of the museum, records, and environmental monitoring.
According to the above mentioned methodology, all risks were divided into ten generic risks/agents of deterioration. These risks were: physical forces (PF), criminals and vandals (Cr), fire (F), water (W), pests (P), contaminants (Co), UV-light (R), incorrect temperature, incorrect relative humidity (RH & T), and dissociation (DISS). Each risk was then subdivided into three categories: rare, sporadic and constant, according to its likelihood of occurring.
Through the combination of the ten generic risks and the three subcategories, 21 specific risks were found to threaten the collection. Each specific risk was then predicted by conducting a scenario of possible damage, where the risk was described, analyzed and evaluated. The components of each scenario were: the hazard or force, the description of the chain of events, the mitigating and magnifying factors and finally the effect and loss in value. The acceptance that all the wooden artefacts were considered to have equal aesthetic, historic and cultural value, must be underlined.

The magnitude of risk (MR) was assessed through a value system of three scales (A: frequency, B: loss of value for each affected object and C: loss of value for the collection) and calculated based on the equation MR=A+B+C. Then the prioritization of actions to be taken for each specific risk was determined and ranked from catastrophic, extreme, high, or medium priority, down to simple museum maintenance.

Based on the results obtained from this prioritization and taking into account the agents that gave the higher risk values, a Risk Management plan was formulated, using the following actions: avoid the danger - block the access to the collection - respond to the agent - recover from the agent's effects.

**Results**

The Risk Assessment results, presented in figure 4, showed that fire (F2) presented the highest risk for the wooden collection of M.EL.T. held in storage. The loss of the collection could be significant during a fire. The assessment indicates a high probability for fire to start in the storage area, due to the poor quality installation of electrical wiring in the building. A thorough examination identified a faulty electrical board on the wall between two wooden cupboards (fig.3). The heavy electrical load carried in this central electric supply, and the large number of individual cables within it, present an immediate and serious risk of fire. Given that there is a great amount of wooden material (artifacts, packaging material and equipment) close to it, the result could be catastrophic for the collection. The flammability of the materials inside the storage area could aid the spreading of the fire, with irreversible results. A fire alarm system does exist within the storage area, though there is the absence of an automatic fire suppression system. Thus, a fire could only be put out manually, using the extinguishers placed in a nearby room. Taking into account the degree of combustibility of material ignited, the density and the arrangement of the materials in the room (including both collection and non-collection items) and the size of the room, the scenario examined the possibility of fire reaching the flashover point, where the fire spreads from its source throughout the room, (Tétreault 2008).

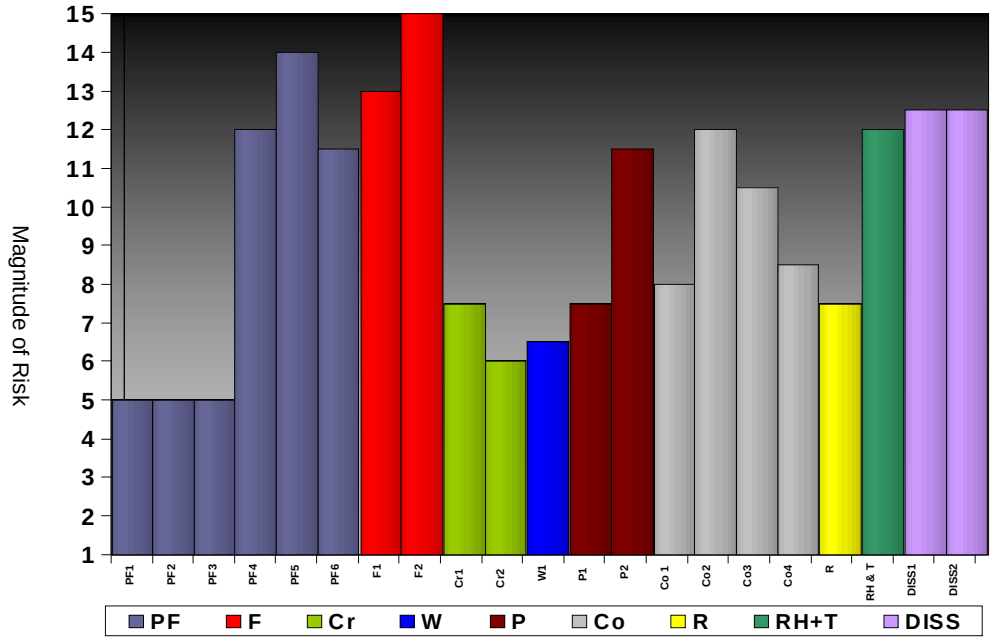


Figure 1- All MR values, as estimated by the 21 scenarios
(MR values on the y-axis, specific risks on x-axis)

Another risk that was characterized as catastrophic, regarding the action to be taken, is physical forces (PF5). This risk involves the damage caused to the artefacts that are stored in card boxes above the wooden cupboards and the structural elements of the building. It was calculated that 90% of the wooden collection is stored in this way. Bad placing and crowding of the artefacts, in conjunction with the lack of proper support, creates tension that could result in buckling or breakage of their most sensitive parts of objects. This fact, in combination with the constant growing number of objects and the poor handling and internal transport of objects used in temporary exhibitions, enhance the risk.

Another risk classified as extreme priority was dissociation (Diss) between the artefact and its documentary information. The link between the information and the artefact itself is of great importance, while the loss of information leads to the loss of value for the artefact. The risk is concentrated in the poor state of the often inappropriate informative material.

Incorrect levels of Relative humidity and Temperature (RH&T) are another high risk that threatens the collection. RH and T measurements were taken with the use of LCD electronic thermo-hygrometers in order to monitor and register the climatic conditions in the building. The results obtained were compared with the external measurements of RH and T, over the same monitoring period and were evaluated with the use of a psychrometric chart. Analysis of results revealed that T in isolation was not a threat to the collection, but was in combination with RH. The levels of RH were found to fluctuate and reach unacceptably high values. Wood biodegradability is directly related to high RH values as many decay fungi, moulds and wood destroying insects favor high RH values.
Risks like Contaminants (Co), Pests (P) and UV-light (R), were found to be of medium priority, while the least threatening risks were Water (W) and Criminals and Vandals (Cr).
As far as the water risk was concerned, a low score was derived from the fact that water pipe installations are new and external to the storage area and thus can easily be inspected, allowing potential leaks to be immediately identified and dealt with.
Regarding the risk from Criminals, the low score derives from the Museum's strict safety policy concerning the movement of artefacts inside and out the storage facility (informed records and inventories) and the limited access of the personnel involved.

**Improvements**
Based on the risk assessment, interviews, inspections of the site, building and collection itself, as well as environmental monitoring, the actions to be taken can be divided into intermediate and long-term improvements.
In the first case, most are easily implemented, as these risks can easily be mitigated by introducing stricter procedures for the handling of artifacts and keeping records and labels made from appropriate materials. In this way, the physical forces and dissociation risk can be addressed with minimal financial investment. Extra storage space and adequate access can be provided in order to mitigate risks from overcrowding, by rearranging the storage facility and by conducting a stricter plan regarding the museums acquisition policy.
As far as the fire risk is concerned, part of the solution can be addressed with immediate and low cost improvements, though part of the plan will require a more thorough financing programme. The biggest risk to the collection derives form the existing faulty electrical board. The solution is the replacement of that problematic installation and the removal of part of the electrical load, which should be redistributed equally to the three existing main supplies. In addition, more $CO_2$ fire extinguishers can be added in appropriate parts of the storage area to allow an immediate respond in case of fire, with staff fully trained in their proper use.

The long term improvements requiring further financing and planning could entail the replacement of the existing flammable fittings and packing material. For optimal protection from fire, the museum is encouraged to install an automatic suppression system and to create an active fire safety committee composed of staff and management. As far as the RH & T risk is concerned, in the absence of a full environmental control system, provided by a properly

designed air conditioning system, the use of portable dehumidifiers could eliminate rapid fluctuations and extremes in relative humidity and lower the risk. However, continuous monitoring and recording of RH & T levels should be carried out through seasonal cycles, in order to have an in-depth knowledge of levels, trends and variations.

**Conclusion**

Based on the results obtained, it appears that wood properties, such as hygroscopicity, flammability, biodegradability and so on, will affect the magnitude of each risk and the priority of actions that need to be followed. However, in any Risk Assessment, the site, building, room, fittings and the support and packaging of the wooden artifacts will determine the actual risk and the measures that need to be taken. Finally, a RM for all wooden artefact collections is an imperative part of museum practice, as it can describe the gradual and cumulative damage to the collection, quantify all possible risks and determine the most cost-effective means to reduce them.

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