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Organizational tools for salvage operations

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ABSTRACT

Since the UN International Decade for Natural Disaster Reduction in the 1990s, many text-based disaster response tools have been developed and published. Research in neurology, psychology, and behavioral science has shown that in situations of stress even short texts are not understood. The use of more pictorial and decision diagram-based instructions and tools is suggested, focusing on procedures that will fit many different types of objects and situations. Some of the instructions given in existing manuals, when tested in salvage operations or large-scale exercises, turn out to be well intended but not applicable, causing bottlenecks. Based on fundamental institutional needs in object tracing and documenting, labels were developed that allow quick, efficient, pencil-based, but information-rich object tracking in any kind of disaster situation.

INTRODUCTION

Since the International Decade for Natural Disaster Reduction, declared for the 1990s by the United Nations General Assembly, knowledge about disaster preparedness planning has increased considerably. Resources for writing disaster plans are available on the web (CoOL 2009) and in print (e.g., Dorge and Jones 1999, Wenzel 2007). There are many guidelines and manuals addressing disaster response for archives, books, and paper (e.g, National Archives, online; Northeast Document Conservation Center, online). Mixed collections, however, have fewer resources available (e.g., Heritage Preservation 2006, Hutchins and Roberts 2013, National Park Service, online). All of these are text based, and thus difficult to understand in situations of stress. Except for the disaster response wheel, which is also text based, but in a well-structured form (Heritage Preservation 2011), and the Cultural Heritage Protection Handbook Series (Roberts and Hutchins 2008), there seem to be no non-text publications describing procedures for decision making and response.

During disaster responses and disaster response exercises, it has been observed that most people do not understand even short texts when under stress. If, however, images or pictograms are added, instructions and related text are quickly understood. This article describes diagrams, object-tracking systems, and treatment instruction-sheets developed to promote comprehension and effective response.[1]

HUMAN BEHAVIOR UNDER STRESS

Unknown images are perceived and correctly interpreted in 100–200 milliseconds to 1/100 second, and can be roughly remembered after this short viewing. This is much faster than perception of text in both oral and written form. Images increase comprehensibility, memorization, and cognitive processing (Lobinger 2012, 76). This effect is enhanced when text and images are combined (meta-study by Klinger 2000–2003; Niederhaus 2011, 7).

When we are under stress, the capacity of our brain to memorize things is drastically reduced (De Quervain et al. 1998, 787–790; De Quervain 2000, 314; Barncard 2012, 2) and we have difficulty making complicated decisions (Heinrich et al. 2011, 17). Answering yes-or-no questions under stress is easier than answering complex questions (Wittig-Goetz, online).

Improved disaster response decision making occurs with appropriate decision-making tools and with repetitive practice of disaster scenarios, which move the control away from the cerebral cortex into the basal ganglia (Heinrich et al. 2011, 18).

The key disaster response manuals already cited do not take these facts into account. They present explanations and detailed choices. While they are suitable when working on a disaster plan and preparing for disasters, their use has proved difficult and ineffective even in exercises.

Consequences for disaster response manuals/handouts

During exercises organized by the author, tests with handouts that contained only images and pictograms showed that information became too simplified for salvage operations. However, mixing short text and pictograms to reinforce the content improved comprehension, even under stress. It was observed that people first look at the pictograms. Once they have calmed down, they start reading some of the short text, progressively integrating more detailed information. The same effect has been observed with process diagrams that allow yes-or-no decisions. In the beginning, participants stuck strictly to the diagram, reading each question aloud and thus using two different perception channels (visual and aural) located in two different areas of the brain (Buchweitz et al. 2009). After some time, they became more at ease with the decisions and looked at the sheet less frequently. Without either a lot of practice or adequate support, the orientation phase, when people struggle with the amount of information, is much longer (KfV online, 2–3) and people feel overwhelmed and uncertain.[2] This feeling of uncertainty should be avoided because it causes stress, impairing decision making and increasing uncertainty, thus creating a vicious circle.

TRACEABILITY OF OBJECTS, THEIR CONDITION, AND TREATMENT

Among the first decisions a rescue team must take is how to trace objects during salvage, stabilization, and reintegration. The system has to be appropriate for the situation and reflect the need for:

- tracking the location of objects
- maintaining or re-establishing a specific arrangement of objects
- condition and treatment reporting.

The system chosen and the importance given to the above topics vary with the type of institution, value of the collection, size of the disaster, and cultural context. A culture of mutual trust may favor pragmatic and fast rescue over precise tracking, whereas where legal or insurance concerns prevail, tracking will be critical.[3] A variety of tracking systems has been used by the author, two of which are presented here.

Masking-tape numbering

For a collection of water-damaged ceramics that needed exact repositioning on the shelves after the salvage operations, shelf numbers were written on small pieces of masking tape. Each shelf number was written as many times as there were objects on each shelf. Several overlapping photographs

Figure 1
Masking-tape numbers for object tracking: 1) prepared masking-tape numbers; 2) photo taken to document the placement of objects on the shelves; 3) and 4) tape numbers accompanying the objects during transportation and on the drying tables. Photo 1: Kunstgewerbesammlung des Museum für Gestaltung Zürich; photo 3: Schutz & Rettung Zürich; photos 2, 4: K. von Lerber

were taken of each shelf, with these numbers visible on the image. During evacuation, each object was accompanied by its shelf number on masking tape, either stuck to the container or to the hand of the person carrying the object. Upon arrival at the stabilizing site and at the temporary storage, the tape number was stuck to the table/shelf next to the object (Figure 1). Before the dry objects were moved back, printouts of the photos were attached to the corresponding shelves. Each object – accompanied by its masking-tape number – was moved back to storage, the shelf located with the number, and the exact location found with the help of the pictures. Preparing the labels for 3000 objects took four hours, which was about the time needed for the helpers to arrive on site. This system proved to be quick, easy, inexpensive, and very effective.

Tear-off labels

Many disaster response manuals and emergency plans (e.g., California Preservation Program, online) emphasize the need to list each object rescued from the site with its inventory number. Such lists are among the most significant bottlenecks in salvage procedures. A decision must be made about which is more important: having complete inventory lists (e.g., for very valuable collections like fine art), or speeding the salvage operation and rescuing more objects with less damage. In our experience, many museums and insurance agencies in Europe can accept a prolonged phase of approximate knowledge in order to facilitate the rescue of the art works before secondary damage like distortion, mold growth, or further bleeding of colors begins.

To prevent the inventory bottleneck and still keep track of the information the institution might need in the future, the author co-developed a tear-off label with four sections that can be completed in pencil and attached to the object (Figure 2).[4] Each page of labels has a "salvage number" that is *not* related to the inventory number. Manipulating fragile objects in order to search for the inventory number (which already might have become unreadable or lost) is unnecessary. The inventory number can be entered later, as it is recognized. Labels can be attributed to single objects or cases filled with objects, and the salvage numbering can be subdivided or combined later as needed.

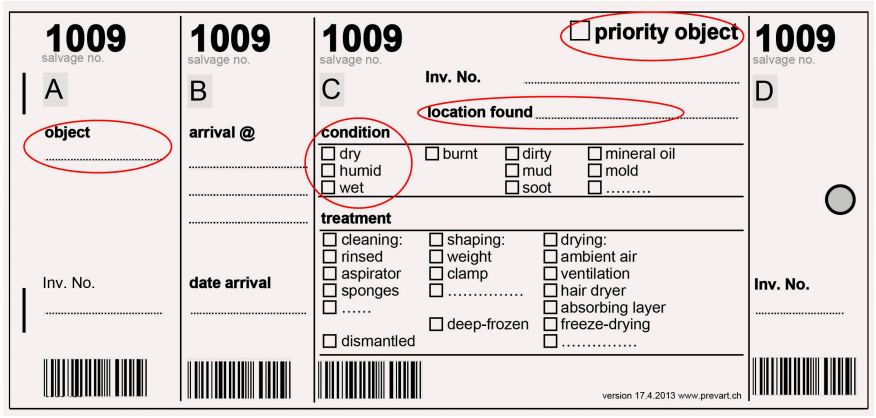


Figure 2
Tear-off labels for object tracking. The consecutively numbered polypropylene labels can be written on with pencil, are stapled to a block along the left margin, and have a hole on the right edge. At the salvage site, only information circled in red is entered

The labels are completed either where objects are found, by a gatekeeper, or in the treatment line, as appropriate. At first, only the following information is filled in: priority object (if recognizable as such), where the object was found, a general description of the object ("fork," "book," "box with books") and the general condition of the object (wet, humid, dry, etc.) indicating the proper treatment line. Priority objects are recognizable as such and can be grouped in each treatment line. The location found might be valuable if, for instance, a damaging substance is later discovered (e.g., heating fuel), and objects with potential additional risks need to be attributable to affected areas.

Slip A stays on the block as a proof. The three remaining parts are removed in one piece and attached to the object with a polyethylene loop pin or string. Slip B is an extra slip that can be removed at any reception site (e.g., if objects are directly transferred to a conservator), and mailed back to the museum. Using digital workflows on the disaster site is *not* recommended because of the high probability of failure; bar codes are for future processing. Slips C and D remain on the object. Slip C is the conservation report, growing as salvage procedures unfold. Whenever an object is handled or treated, adding a cross or a note will continue the report. Slip C should *not* be misunderstood as an "instruction sheet" that has to be filled in at the beginning; doing so would create a bottleneck. Once the object is completely stable and ready for reintegration into the collection, Slip C is removed. Information from Slip C can be entered manually into the museum database or scanned using an inventory-card scanner, creating individual PDF files that can enter the database using the salvage number as an interface. Slip D remains on the object until the museum is absolutely sure that all objects have been correctly reintegrated, and that no confusion of inventory numbers has occurred. The salvage number provides backup information during this time.

DECISION MAKING AT THE BEGINNING OF SALVAGE OPERATIONS

Disaster response can be described by a general scheme applicable to most situations (Figure 3). At the beginning of a salvage operation,[5] the head of operations is confronted with a seemingly overwhelming number of decisions to be taken. If these decisions are condensed down to essentials, a clearer structure emerges that applies to any disaster site (Figure 4).

First, information has to be gathered by dispatching two teams: one retrieving general information needed for further decision making, and one beginning documentation for the institution, insurance company, and press. A third team selects and implements the system of object tracking.

As information comes in, three questions must be answered:

- Are the necessary knowledge and skills/*people* available on site?
- Is there enough *space* to salvage the objects on site or do they have to be evacuated?
- Is there enough *material* and equipment available?

The answers to these three questions will guide the tasks (red fields in Figure 4) given to working teams. Such tasks can be defined in a disaster

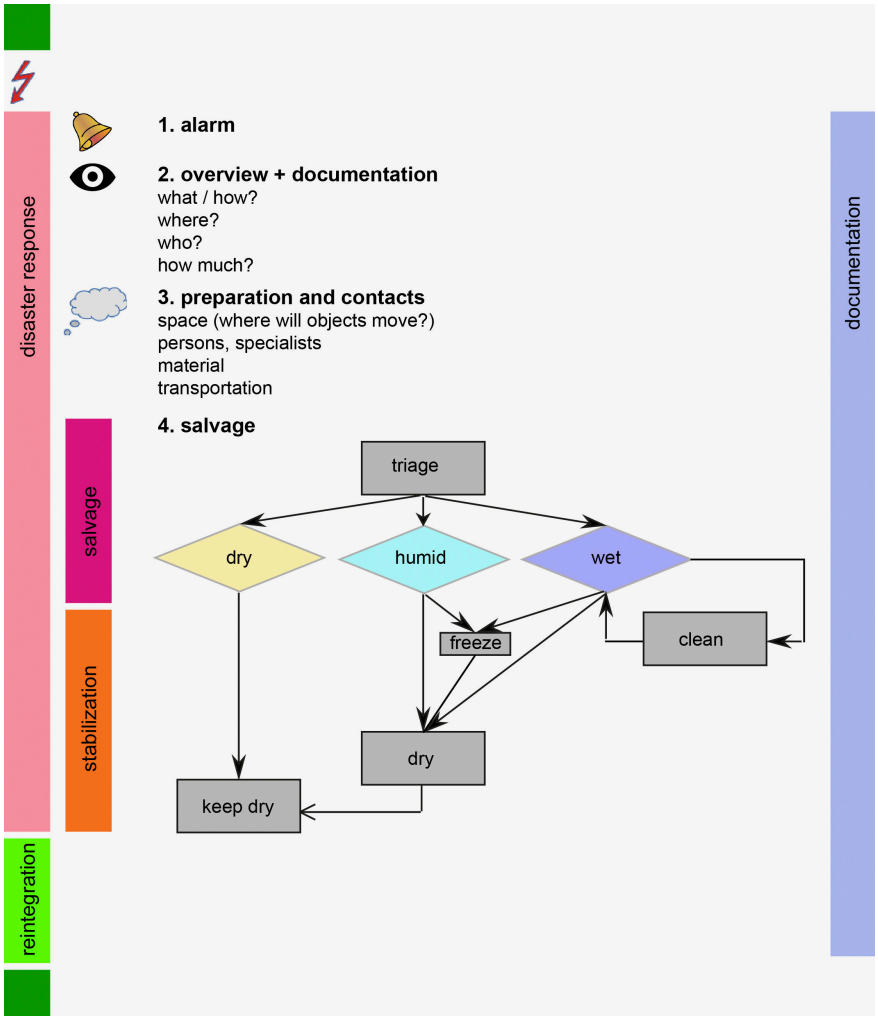


Figure 3
Schematic of a disaster response with main tasks to be performed during the salvage and stabilization phases. After all objects are stable, rescue teams leave and the museum enters the long reintegration phase (www.prevart.ch/notfall/hilfsmittel)

plan (laminated "pullout" pages for each task) but if no disaster plan has been prepared, this diagram provides a minimum structure.

DECISION MAKING DURING SORTING/TRIAGE AND STABILIZATION

Once the basic structure of salvage has been established, the workflow for salvage and rescue can be organized. This workflow must begin with triage by condition: dry, humid, and wet, as applicable.[6] These groups will become treatment lines where priority objects will be separated and remain under constant control, both for safety and for the evolution of their physical state. Further subdivisions within the treatment lines may be made by material, further facilitating the workflow. As objects dry, they change treatment line until finally all objects are considered stable and dry. The diagram in Figure 5 allows yes-or-no answers and helps teams of non-conservators correctly choose stabilization treatments: dry objects, for example, need to be kept dry and thus separate. Among the remaining humid and wet objects, very delicate objects that need to be dried/treated by professional conservators will be separated (pink cases in Figure 5) and sent to conservators. All remaining humid and wet objects need to be dried. Soaking-wet objects might be rinsed with clean water in order to remove mud and dirt.

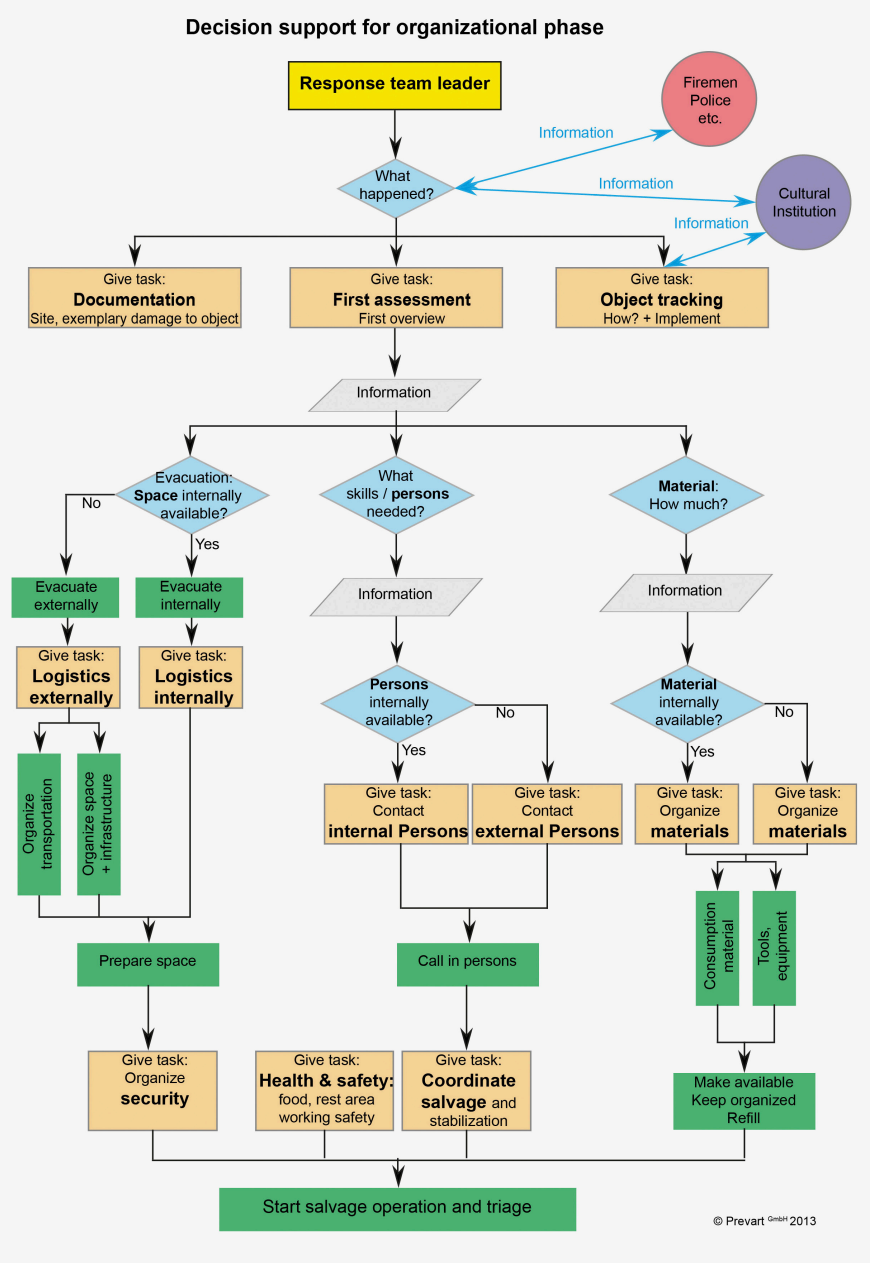


Figure 4
Decision diagram for the head of disaster response, with guidance for the critical planning steps before the actual salvage and stabilization begins (www.prevart.ch/notfall/hilfsmittel)

At this point, some groups of objects will leave the treatment lines: books to go to the freezer (and subsequent freeze-drying), or technical instruments and film rolls to be treated by conservators, for example. For the remaining objects, it must be determined whether – with the available space, material, and workforce – the number of objects to be dried is manageable. If yes, air-drying can continue. If not, are there more object groups that could be deep-frozen? Freezing is not a drying treatment; it merely provides additional time to prevent secondary damage like mold, color bleeding, or distortion from occurring. The risk of cracking in small decorative elements on textiles and leather has to be evaluated against a possible mold outbreak and dye bleeding, and on balance may become acceptable. Wet leather stiffens while drying and so, even if the conservation literature does not mention freezing as an option for leather, in disaster response freezing becomes an option. Other objects that have been frozen include basketry and millinery (hats,

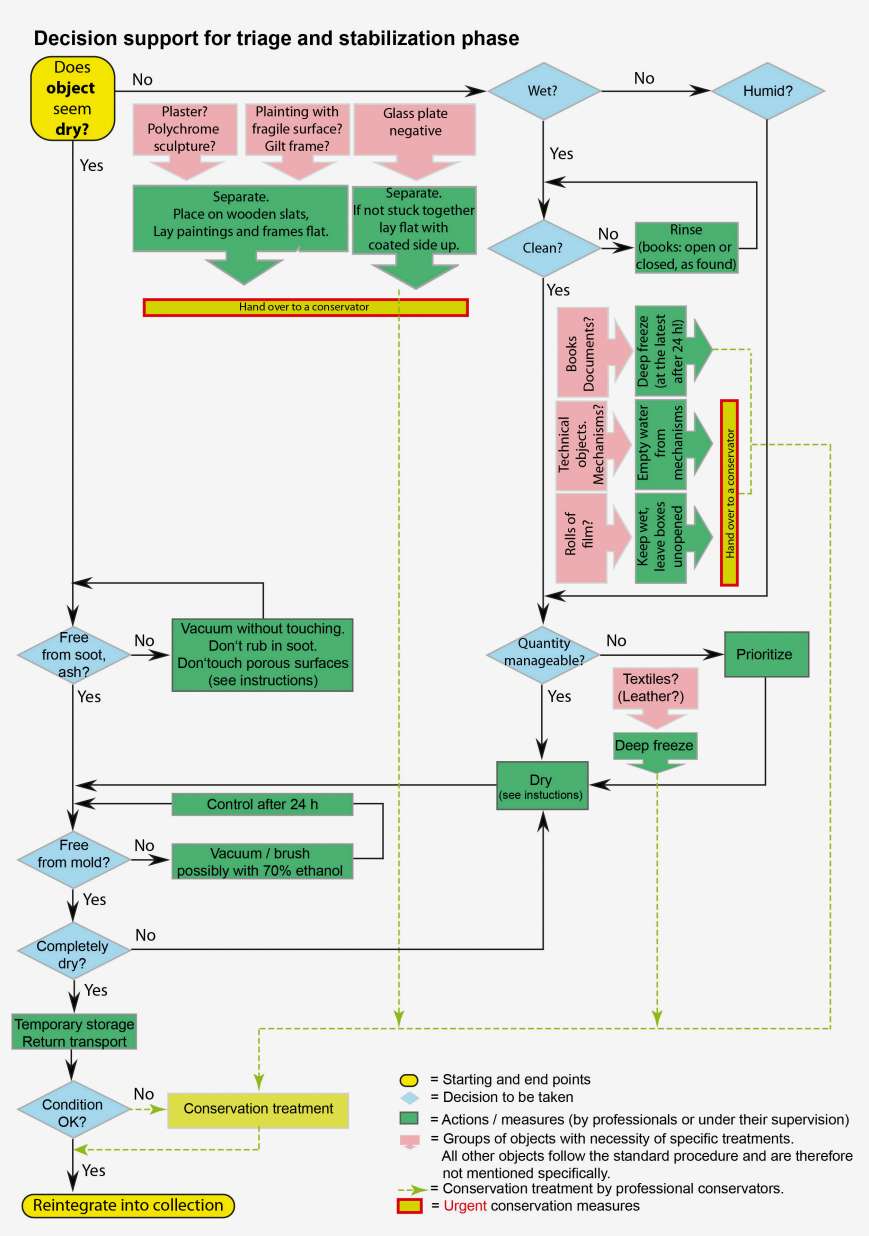


Figure 5
Decision diagram for triage and stabilization. Pink fields mark groups of objects that should be sent to professional conservators. Objects are physically separated into three treatment lines: dry, humid, and wet (www.prevart.ch/notfall/hilfsmittel)

bonnets). Freezing does *not* influence the choice of any future drying treatment. Objects can be defrosted and continue their drying where it was interrupted but under more controlled conditions, or they can be freeze-dried. For all objects that cannot be frozen, prioritizing cannot be avoided lest objects be neglected. Continuous inspection for mold is imperative, as is a final inspection to determine if objects previously considered dry are truly completely dry.

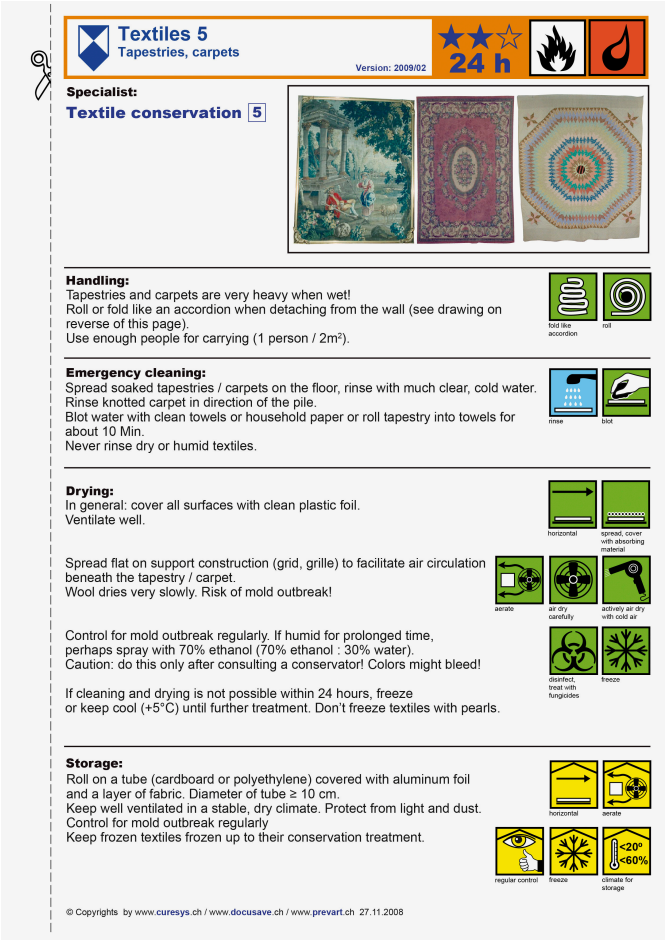
INSTRUCTION SHEETS FOR STABILIZING DIFFERENT TYPES OF OBJECTS

Detailed text-based handouts were designed in 1997–98 for the stabilization phase, during which retrieved objects are rinsed, reshaped, and dried.[7] One double-sided page for each object type is hung above each work station. The non-conservators handling the objects were already trained by conservators,

but under stressful conditions, such sheets allow repeated verification of the tasks to be performed. The 2003 revision incorporated icons[8] and was further improved in a pilot project[9] to increase comprehensibility (Figures 6–7). Further development awaits funding.

CONCLUSIONS

Decision-making capacity and memory are reduced in situations of stress. According to the literature in neuroscience, behavioral science, and advertising, information that has both graphic and textual content is received and retained better than text alone. Manuals on disaster response for cultural property do not acknowledge these findings and are heavily text based. The decision-making diagrams and object-stabilization handouts presented in this article are an attempt to integrate neuroscience knowledge and provide conservation rescue teams with useful tools for stressful situations. These tools do not rely on technical equipment that may fail in emergency situations.



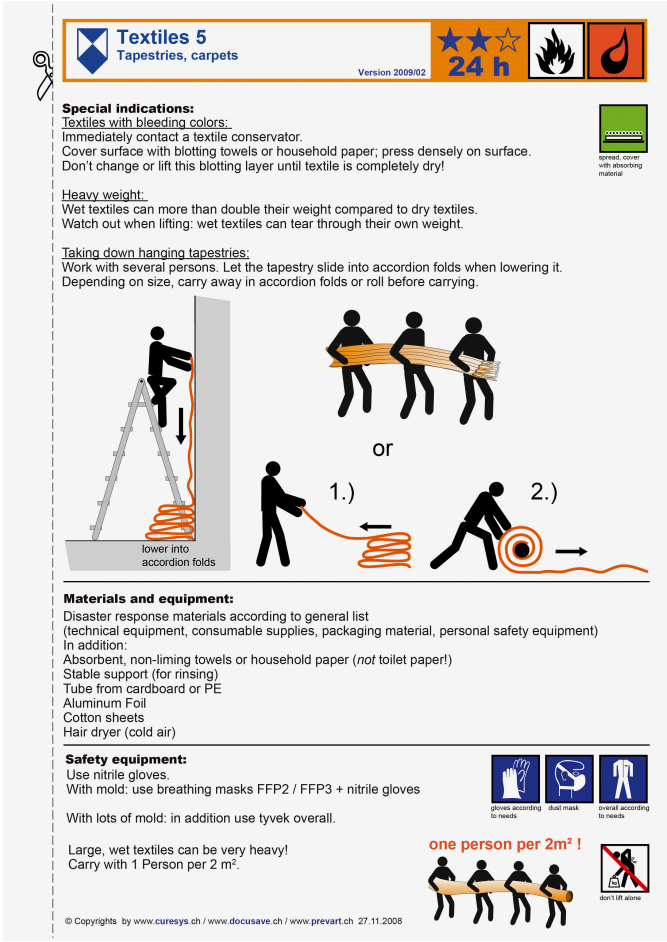


Figure 6
Stabilization sheet for tapestries and carpets, obverse (www.prevart.ch/notfall/hilfsmittel)

Figure 7
Stabilization sheet for tapestries and carpets, reverse (www.prevart.ch/notfall/hilfsmittel)

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NOTES

1 Available at www.prevart.ch/notfall/hilfsmittel.

2 Stressors are: time pressure, unknown procedures, unknown structures, lack of knowledge, overwhelming amount of information, lack of material, etc. (Steinmann 2005, 6; Wittig-Goetz online, 2); avoiding stressors will reduce impairment of cognitive decision making.

3 This difference in perspective is reflected in law. Whereas Anglo-Saxon "common law" regulates with a high degree of detail the decisions to be taken by the lawyer, continental European "civil law" formulates principles that allow for interpretation by the lawyer. (Oral presentation by W. Ernst, *Kunstgutachten – juristische Sicht*, workshop on art law, 17 May 2013, Swiss Institute for Art Research, Zürich; see also Wikipedia "Rechtskreis": http://de.wikipedia.org/wiki/Rechtskreis). The legal situation influences the level of traceability insurance companies require in different areas of the world.

4 Based on P. Pichard, *Après un séisme: Mesures d'urgence,* évaluation *des dommages*. Collection Études et documents sur le patrimoine culturel, Paris, UNESCO, 40 pp. (co-developed with E. Kissel, Paris).

5 Human safety of course comes first. This article concentrates on object-based decision making.

6 Most disasters involve water as a cause (flood, heavy rain) or as a secondary effect (fire extinguishing, broken pipes, and water flow after falling rocks, avalanches, landslides, or earthquakes). If in a disaster, all objects are dry, there is no threat of mold, thus less time pressure. In this case, triage will begin by object type, contamination, and conservation measures to be taken, taking care not to mix non-contaminated objects with contaminated ones. Freezing will not be needed in such cases.

7 Unpublished documents by J.-D. Jeanneret, ca. 1997–98. *Protection des biens culturels, Montagnes Neuchâteloises (Switzerland).*

8 J. Huber, K. von Lerber, K. Prevart, Winterthur, Switzerland, 2003.

9 M. Fritschi, Curesys (disaster planning); E. Mürau, Swiss National Museum (textile conservator); K. von Lerber, Prevart (museum consultant); G. Voser, Docusave (conservation freeze-drying) for the Swiss Federal Office for Civil Protection. The project was stopped by the FOCP for fear that such short guidelines might be too simplifying.

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