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The different options will have a different scale of benefits for a collection and its host institution. These benefits can be numerically scored. This is the outcome of the discussion on how well each option fulfils the individual aims and objectives of the plan. The exercise of comparing all the options with the museum's plan should involve a multi-disciplinary team including curators, conservators, scientists, researchers, education officers, events managers, marketing personnel and building managers.

By comparing the estimated costs and benefits of each option, the option which appears to deliver the greatest benefit at the lowest cost emerges as the preferred solution. If a costly option emerges as the one likely to deliver the greatest benefit, its acceptance can be argued more convincingly, particularly if sensitivity analysis of the preferred solution has been carried out. This analysis will test the robustness of the proposal compared to other discarded options. The test consists of asking 'what if?' questions, to see whether any change of circumstances might produce a change of the preferred option.

Conclusion

A cost/benefit appraisal method has a number of advantages:

- It can convince others of the need for appropriate levels of investment.
- It involves others who may be more involved with collection use than collection care.

- It involves those making decisions on how resources are allocated.
- It involves others who may not deal with collections on a day to day basis, but whose decisions may affect the survival of a collection.

*May Cassar
Museums & Galleries Commission*

Heating and Humidity Control for Conservation

At Colebrooke Consulting Ltd I have been helping conservators and conservation-minded organisations to set up and improve preventive conservation measures for the last fifteen years. I am a technical adviser to the National Trust's Conservation Service, and am involved as a Conservation Engineer with museums, galleries, local authority and private historic buildings, auction houses, and others with environmental control problems.

We need to control the environment in stores and display areas, to maintain objects in an unstressed condition and enable long life for them. We cannot get away with doing nothing, but we do not have to do much to maintain benign conditions. If the RH is allowed to remain higher than about 70-75% there is a danger of mould growth. If it is brought down much below 50% there can be permanent

damage by shrinkage beyond the limit of elastic recovery. Most materials in mixed collections (of furniture, paintings, textiles, natural history etc) are altered physically by changes in RH, so that RH cycles stress and age them.

Where conservation is the governing criterion and heating for people can be avoided, then room temperatures can be allowed to fluctuate. Unless we allow temperatures to fall, sometimes to as low as 10°C in cold weather, we shall need to humidify to bring the RH back up to the safe range.

It is possible to control both temperature and RH at the same time - using air conditioning. That option has very high installation costs, high maintenance and running costs, and is often inappropriate in historic buildings because of the disruption involved to the building fabric. Fortunately this solution is rarely necessary. Over the last 10 years the National Trust has pioneered the technique of controlling RH using heating driven by humidity sensors, which we have called Conservation Heating. Since the heating needed to control RH for conservation is very much less than that needed for human comfort, it is often possible to achieve good environmental control using existing heating arrangements - with minor hardware modifications and a new control system.

The alternative to heating is to dry the air with a dehumidifier. This can only work if the amount of incoming air to

be dried is minimised by draught-sealing. Its application has been particularly successful in conservation stores.

Our approach to the specification and design of conservation environmental control systems is to achieve acceptable conditions as gently and unobtrusively as possible, using technology which is understandable and whose sophistication has to be justified in each case. We have commissioned and championed the design and production of appropriate equipment where it was not available.

Good conditions can often be maintained with equipment off the shelf, plugged in or fitted by your electrician. Even where allowances must be made for people, tolerable specifications can be achieved by compromise. Provided that RH values down to say 45 or 40% can be accepted on occasion, and that people can put up with temperatures down to say 15°C in cold weather in rooms with sensitive contents, Conservation Heating can provide an answer - and air conditioning and humidification can still be avoided.

If I can help you with an environmental control problem, please call 01892 750307, fax 01892 750222, or write to Colebrooke Consulting Ltd, Diamonds, Bells Yew Green TN3 9AX.

*Bob Hayes
Colebrooke Consultancy Ltd*