'Museums fail to care for nation's treasures'

A case of arts for oblivion

admits 'disastrous failure'

Storage

Preprints for UKIC conference, Restoration '91

MPs warn of 'breakdown' in museums

Museum treasures decaying

United Kingdom Institute for Conservation of Historic and Artistic Works of Art

Storage

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AUDITS OF CARE: A FRAMEWORK FOR COLLECTIONS CONDITION SURVEYS

Suzanne Keene

Collections condition surveys are surveys undertaken in order to assess, or audit, the condition of collections as a whole, rather than to identify individual objects requiring action.

This paper introduces a general methodology for assessing the condition of museum collections. It includes definitions of the data which need to be collected, and a method of surveying, based on examining a statistically designed random sample of objects in the collection or collections, thus making the most effective use of scarce conservation expertise. Then, the analysis of the data is described, and a checklist for the resulting report is presented.

Background

In 1988, the National Audit Office published a report, **Management of the collections of the English National Museums and Galleries**[1]. In it the Auditor General remarked that "this represents a major breakdown over many years in the proper stewardship of national assets", ie the collections of the national museums. The Report was swiftly followed by a sitting of the Commons Public Accounts Committee, to which the Directors of the Victoria and Albert and British Museums gave evidence[2]. This evidence elicited much press comment (Fig. 1 Front cover: Selection of the newspaper headlines elicited by the Auditor General's Report).

This initial interest in the state of publicly owned collections is being pursued further by the National Audit Office, which is extending its interest to local authority museums, in its recent report, **The Road to Wigan Pier**[3].

Clearly then, the condition of museum collections generally is now a matter of public concern, as it has been for many years to conservators and others in museums. The question is, can the general condition of collections be measured? Can a simple, practical measure of performance in this vital museum function be devised?

Condition surveys of objects in collections are not uncommon. But these are often very time-consuming, since they generally aim to examine every single object. A variety of methods of recording the results is in use. If we are to be able to determine the state of collections on a large scale, and compare the results from one collection to another, or from one institution to another, a more practical and general methodology will have to be developed. A framework for this is presented here, for debate and further work.

Interest in collections condition surveys

The Office of Arts and Libraries is currently encouraging and developing the use of performance indicators for museums. The condition of collections is one such important indicator. Collections condition is also a central factor in the **Cost of Collecting** formula, developed by the OAL[4]. The Museums and Galleries Commission has also assisted the project; it is interested in a standard surveying methodology for use in connection with its work on Curatorial Standards. The Conservation Unit's forward plan includes work on assessing collections condition.

Several other bodies have expressed great interest in, or adopted the methodology, such as the Public Record Office, the Oxford Joint Libraries Board, and national museums.

Work abroad, in the USA and in Europe, is discussed below.

I: The research project

As a result of the reports described above, the Museum of London decided in 1989 that the general condition of its collections should be assessed. As a social history museum, these are extremely large and varied, and include almost every sort of material except natural history. The Museum's interest coincided with that of the Office of Arts and Libraries. A research project was therefore part funded by them, to develop a generalised approach to collections condition assessment, using the MoL surveys as a test bed.

The Working Party

The general framework for these surveys was thus first developed in the Museum. Following this, a working party was assembled in 1990, made up of those known to have undertaken surveys, or with useful expertise, or whose institutions had a particular interest in surveys.

Working Party members

Suzanne Keene:	(Chair) Museum of London
Louise Bacon:	Horniman Museum and Gardens
Lawrence Birney and Chris Gregson:	National Maritime Museum
May Cassar:	Museums & Galleries Commission
Mike Corfield:	National Museum of Wales
Velson Horie:	Manchester Museum
Nick Umney:	Victoria & Albert Museum

Existing work on surveys

The Working Party members between them found information for the UK on well over 20 surveys past or present, in six museums, two libraries, some museum "umbrella" bodies, and the National Trust. Most surveys have been object-by-object. Very large amounts of data are being collected, but most of these projects have placed more importance on surveying itself - collecting data - than on analysing, reporting, and making use of the results. One objective of the proposed framework is to correct this imbalance.

There is some other work on general surveys, for example, museums in Scotland[5]. These, however, do not include detailed surveys based on objects in collections. Other published references are to work on surveys of particular collections, rather than on how surveys can in general be undertaken. Some useful information has been assembled on data collection and terminology[6].

At the same time, work on terminology is proceding at the Getty Institute, and in the ICOM Conservation Committee Working Group for Documentation. There is a great deal of work on conservation matters, including information and data in Europe, under the EUREKA umbrella and by the International Standards Organisation.

Different types of survey

In fact, at least three types of survey are needed to provide a truly comprehensive view of collections preservation:

Conservation Assessments
Assessments of the preservation environment, in the broadest sense, covering institutional policies, procedures, available staff and skills, the history of the collections and space and physical resources for their preservation. Work on these has been completed in America. The Getty Conservation Institute together with the National Institute for the Preservation of Cultural Property have developed a standard Conservation Assessment, to be used for "planning, implementing and fundraising" [7].

Collections condition surveys
Data on the condition of objects and collections themselves - the subject of this report. These are the exact complement to Conservation Assessments.

Curatorial assessments
Curatorial assessments of the importance of the object as part of the collection. This sort of assessment is clearly essential for prioritising action to be taken as a result of Condition Surveys, and for allocating resources.

As well as these general surveys, object-by-object surveys will still of course be required for other purposes. For example, a Collections Condition Survey may show which collections are the highest priority; to plan work, one will need to know which objects are the highest priority, and for this an object-by-object survey is essential.

At a more detailed level still, instrumental or microscopic examination and recording of individual objects or parts of objects is required to investigate exact mechanisms of deterioration, and this may in time influence the form of surveys. (See for example[8]).

Work to date

The concepts, definitions and framework for surveying which has been developed by the Working Party is presented below.

The next steps

Using the methodology

The benefits of using a general method of assessing collections condition could be substantial, and are set out above. The Office of Arts and Libraries and the Museums and Galleries Commission are both interested in developing such a method, as the OAL has done with the **Cost of Collecting** formula[4].

Field testing

The survey methodology needs to be thoroughly tested. Three aspects need to be examined:

Surveyor bias
Different surveyors need to survey the same collections (probably even the same objects) to see if the definitions of damage factors and condition rating enable them to arrive at comparable results.

Differences between collections
The same surveyors need to inspect similar collections in different institutions, to see how much genuine variation there is.

Blind testing
A few institutions which have not been involved in the development should be persuaded to try out the method.

Survey software

Although simple software has been adapted for part of the task (see below) it is probably desirable for a standard package to be developed, which would be available for any museum to use in collecting data and analysing the results.

Writing or developing software which will design sampling procedures is a separate project.

Communicating and debating the results

Collections condition is a very sensitive topic. Both curators and conservators can easily perceive survey results as criticisms of their stewardship. Recommendations could radically affect how resources are distributed in museums. It is very important that the project is fully debated by the museum community, and it is envisaged that one or more special seminars should be devoted to this.

Any method of recording collections condition which is developed in the U.K. should also be promoted for use by the international and overseas organisations mentioned above.

Recommendations

The Working Party recommended that work proceeds to complete this project, in co-operation with the Conservation Unit, the Museums and Galleries Commission, and

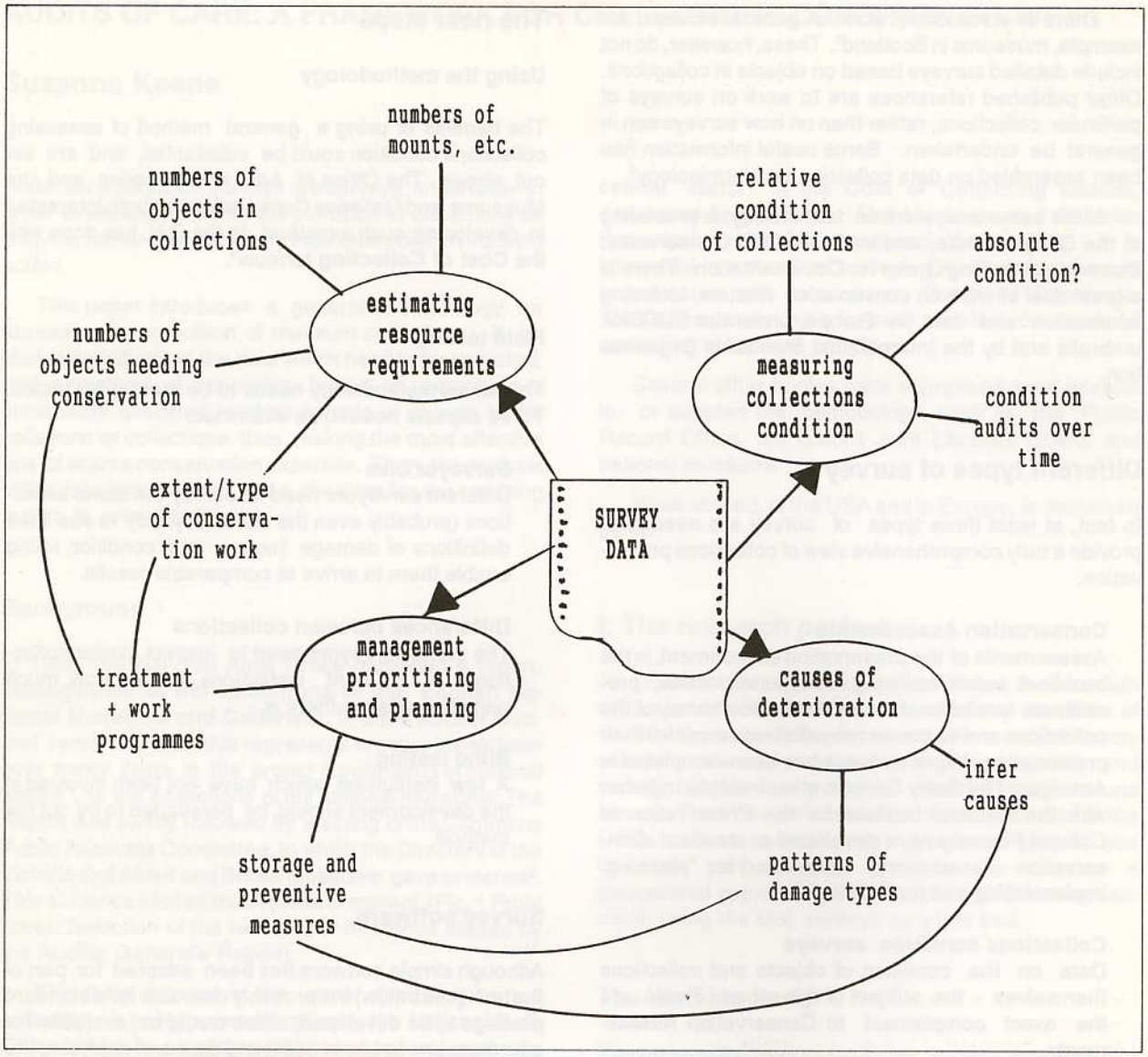


Fig. 2 The uses of collections condition surveys

the Office of Arts and Libraries, as appropriate. As described above, the NEXT STEPS are:

* Communicate results through a special seminar or seminars
* Adopt the framework as the potential standard to be used in museums
* Undertake field tests
* Complete the work on sampling design - probably involving software development
* Prepare guidelines and instruction manual

II: The survey framework

Objectives of surveys

The uses of Collections Condition Surveys are summarised in Fig. 2. As a result of a Collections Condition Survey, the institution should be able to:

* Give a quantified assessment of the condition of the objects in the collection, and compare results for one collection to those for another (audit condition)
* Produce concrete evidence as to the major causes of deterioration
* Assess whether the collection is generally stable, or if its condition is deteriorating (diagnose trend)
* State what steps are needed to slow or halt deterioration (identify means of affecting trend)
* Assess resources needed
* Assess the benefits to be gained from different actions
* Recommend priorities

Data to collect

Table 1 sets out the objectives of surveying, and relevant factors to be investigated. On this depends what information or data is needed. Survey data quickly amounts to large quantities, which are difficult to handle and to understand. It is recommended that only essential data is collected. There are six main aspects of collections which can provide data:

Administrative data
These are the main groupings used in the analysis of the data and reporting on it: Collection, sub-collection, object identification, store, location

Table 1 The objectives of surveys, and the data needed

SURVEY OBJECTIVE	RELEVANT FACTORS	TYPE OF DATA NEEDED
Audit condition	Condition of individual objects Statistics on collections condition	Condition survey Damage types & severity
Identify causes of deterioration	Environment: space, enclosures, supports/mounts, growth of collection, humidity, temperature, light, contaminants, pests, provenance Use: display, handling, repairs/ conservation, examination, running/operation of objects	Observations Environmental records Environment now Damage types/severity
Diagnose trend	Condition: past vs. present, Likelihood and rate of future change ie vulnerability and stability Factors which have caused/ likely to cause change	Condition past (?inferred) Condition present Cond predicted future (= stability) Present and likely future environment Present and likely future use
Affect trend	Change environment (see above) Modify use (see above) - display conditions, handling/use procedures, conservation procedures, running or working Modify object - treat or restore	Most potent causes of deterioration
Assess resources needed	Space, buildings, plant (HVAC etc), Equipment (racks, cupboards, etc), Materials (for mounts, etc) Time, skills Cost	Size of task (eg number of objects, volume, storage area, etc) Nature of task (eg mounting, treatment, redo store, new store) Amount/ cost of resource (eg conservator/years, sq ft of storage)
Assess benefits	Present use, potential use, information potential, relevance to institution's purpose, monetary value, uniqueness, quality of workmanship, physical quality (eg wholeness), aesthetic quality	Present use (eg objects displayable, books readable, drawings accessible) Curatorial assessments [value] Number of objects being successfully preserved (= in condition defined acceptable)
Recommend priorities	Institutional objectives Resources vs. benefits Consequences of "do nothing"	Conservation/preservation policies Cost/benefit calculations using above data Vulnerability of objects/ collections Judgements re deterioration or not

Description of object

The amount of data here is optional, and may vary according to individual institutions' or collections' needs. It may include:
simple name, materials, type, manufacturing processes (eg photographic process). Data which might relate to condition is included here: fragility (the object may be fragile but in perfectly good condition); completeness; working or not (these do not necessarily reflect deterioration).

Damage

The Working Party agreed that eight general terms were sufficient to describe damage to objects. For a particular collection, it is useful to list all the terms which could describe damage to it under these headings, for reference during surveying (Table 2, see next page).

Major structural damage	Chemical deterioration
Minor structural damage	Biological attack
Surface damage	Bad old repairs
Disfigurement	Accretions

Condition

The following definitions of condition grades have been agreed:

C1 GOOD
Object in the context of its collection is in good conservation condition, or is stable.

C2 FAIR
Fair condition, disfigured or damaged but stable, needs no immediate action.

C3 POOR
Poor condition, and/or restricted use, and/or probably unstable, action desirable.

C4 UNACCEPTABLE
Completely unacceptable condition, and/or severely weakened, and/or highly unstable and actively deteriorating, and/or affecting other objects: immediate action should be taken.

"Action" means something done to the object itself, rather than to its surroundings or environment. Data on damage will give information on why the object has been assigned its rating.

Discussion of condition grades

A summary grading of each object's condition was agreed by all to be essential, as the main means of assessing and quantifying preservation. However, there are a number of different aspects to "condition", and all of these have been used in different (or even in the same) surveys (Buck, in 1971[9]); Walker and Bacon, in 1987[10]); the author, in 1990[11]). There was considerable debate among the Working Party over these definitions.

The aspects of condition that were identified were:

Insecurity: (Buck, 1971, and V. & A.): mechanical stresses, stability or vulnerability

Disfigurement: (Buck, 1971, and V. & A.): appearance of object

Conservation priority: (Horniman, Museum of London and others): how urgently is conservation needed?

Condition rating: (National Maritime, Public Records Office): usually good, fair, poor

It was eventually concluded that the condition of an object needed to be defined in the context of its particular collection. For example, a pot which is in separate sherds may be in GOOD condition as part of an archaeological archive, while the definition for an applied arts ceramic collection may place it in the UNACCEPTABLE category.

There was also doubt about the number of grades: between three and five. Four grades have been used in many institutions (British Museum, Horniman, Museum of London, National Museum of Wales). Allowing a fifth grade means that the majority of objects are assigned the middle, indeterminate grade, which does not give very useful information. Three grades are too few.

Table 2 Broad damage types, and the sorts of damage which the broad headings include

Each general term includes all the more specific types of damage shown below.

	Structural damage							
	Major structural	Minor structural	Surface damage	Disfigurement	Chemical/ internal	Biological	Accretions	Bad old repair
General:	Separate pieces/part; Loose crack; Large tear likely to spread; Large holes; Major splits; Parts missing; Mechanical disorder;	Crack; Small tear; Puncture; Small holes; Small splits; Obviously weak; Loose attachment; Bent; Warped; Creased; Distorted elements e.g. feathers	Flaking/lifted paint, etc; Peeling; Paint/surface losses; Bruised; Cupped; Delaminated; Crazed; Dented;	Scratched; Stained; Abraded; Discoloured; Faded; Tarnished; Colours bled;	Crumbling; Friable; Desiccated; Exudations; Grease; Salts;	Insect attack Moth Woodworm Foxed Rodent damage Mould Mildew	Dirty; Encrusted; Surface salts; Deposits; Greasy;	Adhesive; Misalignment; Staples; Sellotape; Patches;
Furniture:	Very loose joint; Separated attachment;		Lifted veneer;					
Paper:	Very badly crumpled with split; Very badly crease with split; Very badly distorted/ rolled;	Cockled; Crumpled; Folded;	Skinned;		Acid; Yellowed; Chemically changed edges; Matt burn; Redox spots; Metal impurity;			Tape; Sellotape;
Books:	Separated or nearly separated spine/ cover;				Acid paper; Red rot;			
Textiles, fibre	Split seam; Badly creased with split; Seriously crumpled; Crushed;	Shrunken; Detatched fibres;			Deteriorated silk; Acid dyes;			Clumsy stitching; Alterations;
Pictures:			Cupped paint; Losses; Flaking paint; Lifted paint;		Blanched; Deteriorated canvas;			
Ceramics/ glass:		Chipped; Small crack;			Salt damage; Crizzled;	Encrustations;		
Metals:					Corroded; Rusted;			Solder;

Data on work required

General categories of work are, in ascending order of elaboration:

None

Clean

Mount, box or support

Remount

Treat/conserve

Further categories tailored to individual collections could certainly be defined: rebinding books, for libraries, for example.

The survey method

The work so far has only pulled together and made more systematic what is already common to most surveys: data collection, more familiar as the survey form. A new departure for most people is the use of sampling, in which only a proportion of objects in the collection is examined, rather than every object.

The basis for this is a statistical method, by which we can learn what we want to know about the population (the whole collection) from statistics gathered about a sample[12, 13]. If the sample is correctly chosen, ie selected randomly from the population, then it is possible to know how *accurate* the estimate about the population is, and how much *confidence* we can place on the results.

There are several advantages in using a sampling method. Surveys take less time, which is important, because as we well know, conservators are in short supply, and surveying itself does nothing to directly improve the condition of the collection. Fewer objects, examined more carefully, will give more reliable results than many objects examined only cursorily. If huge quantities of data are collected, it is very difficult to make sense of them, whether they are analysed by hand or by computer. Finally, we can admit that surveying is rather boring, and so if reliable results can come from looking at fewer objects, this is cause for celebration!

The sampling method has been developed in collaboration with Clive Orton, of the Institute of Archaeology, to whom grateful thanks are due[14]. It is based on a technique known as cluster sampling. This is an alternative to true random sampling, in which items are selected from a list, and those chosen found and examined. In most museums this would be impossible - often, there is no list; and if there were, it would take far too long to find the objects. Cluster sampling is based on sampling geographical locations of objects i e their store locations.

Sampling units

The basis for condition survey sampling is the store location. For survey purposes, a store location is the smallest physical grouping of objects - a tray, a shelf, a box of objects on a shelf, or a group of objects on the

floor. If a shelf has some freestanding objects, and others contained in a box, then each group counts as a separate store location, and so on. The actual sampling method has been initially reported[14], but is still being developed. It is based on selecting every nth store location, and within that every xth object - as one might select every nth house, and within houses, every xth person to interview.

Sample size

Sample size depends on several factors. These are well explained for the non-expert[12]. GCSE texts on statistics are also very helpful.

Time for surveying

It is actually helpful to set a limit on the time to be spent on the survey, as this is then one known quantity. We spent six person-months on surveying part of the Museum of London collections; two months each on costume, paper (art on paper, printed ephemera, business archives), and social history objects. Time included all survey stages, including analysis and reporting, and proved adequate.

Statistical confidence limits

How sure do we want to be that the results from the survey can be extrapolated to the whole collection? This has to be simplified into statistically meaningful terms. What most conservators are most interested in is, "How many objects are in condition C4, needing urgent conservation?" or perhaps in C4 and C3 combined. Most of us would agree that given the slender resources we have to actually do anything about this, to be 95% sure that the proportion given by the sample applies to the collection as a whole would be good enough. We could settle for 68%, or 99%, which are the other two commonly used confidence limits, but the higher the confidence limit, the wider the range of figures we will end up applying. In statistical terms then, what we want to know is:

> What proportion of objects is in condition C4 (or C3 + C4), to 95% confidence limits?"

Statistical accuracy

When survey results are multiplied to give an estimate for the whole collection, the result will be expressed as a range. Say 1,000 objects were surveyed, and 80 objects were in condition C4. If there are 10,000 objects in the whole collection, then we could not truthfully say that 800 objects altogether were likely to be in condition C4: the real result would probably be more like "between 740 and 860", or 800±60.

There is a payoff between confidence limits and range: the wider the range settled for, the more confident we can be in the result, and vice versa.

Collections size

It seems paradoxical, but it needs to be appreciated that it is not the size of the collection that determines the size of the sample needed, but its variability. So a sample of say 1,000 objects out of a collection of 5,000 will be only very marginally more reliable than a sample of 500 objects from the same collection. This may seem to fly in the face of common sense, but it is so. But what is meant by "variability" in survey terms? For survey purposes, this is simplified to mean numbers of objects per location, and the proportion of objects in the different grades of condition.

Statistical sample design

Before a survey can be designed, therefore, information has to be obtained on all these factors. This is done by means of a pilot survey (see below). The data from this is used to calculate the sample size required. The next step is to design the best possible way of selecting the objects to be sampled.

For the most effective survey, and the most reliable results, a statistician should use the results of the pilot survey to calculate a sampling design. An example might be: every 8th object from every 4th store location. Work on this is not yet complete, but results to date are summarised in[14] and can be used by statisticians.

However, if no statistician is available, rule-of-thumb will have to be applied. There is no magic percentage sample which will always give accurate results. The minimum useful sample size in surveys generally is around a thousand objects, so for reasonable sized collections this should be used; for small collections, apply common sense. 25% of objects - one in four - should be sufficient.

Using an informal method like this has the advantage that it is very simple to extrapolate the results from the sample to the collection as a whole. Statistical techniques can still be used, if wished, to calculate the range and the confidence limit for the whole collection. The disadvantages are that too few objects may have been surveyed to give reliable results, or the optimum selection procedure may not have been used; or more objects may have been surveyed than necessary, meaning that scarce specialist time may not have been put to the best use; and that unnecessary quantities of data may have to be analysed.

There is also the likelihood that the selection may not be properly random. This is extremely important, because only if it is will statistics about the sample be valid for the collection. To guard against this, in an informal sample (say every 10th object) the first object must be selected randomly by drawing a ticket etc, and subsequent objects must be chosen according to a predetermined systematic procedure.

Monitoring condition over time

How to detect change over time was discussed in some detail. If a new random sample of the collection was to be taken for each resurveying exercise, there would be few if any objects common to both surveys. Any real change in the overall state of the collection might be masked by the variability introduced by the sampling procedure. The best way around this may be for subsequent surveys to include a subset of the original sample in the new sample, perhaps around a third of the original. More detailed logging of data on the subset may be required in order to spot differences more easily. The subset would provide a bench-mark against which

the other parts of the survey can be measured. The subset itself would have to be randomly selected.

There is some work based on this and on using particular types of object as tell tales of condition[15, 16].

Survey procedures and sampling

There are six distinct stages in a survey, and sufficient time needs to be allotted to each of them:

Agree statement of survey purpose

Describe collection(s) and define terms

Quantify task and test data collection (pilot survey)

Analyse pilot survey results and design sampling procedure, whether formal or informal

Collect data (surveying itself)

Analyse data and write report

Record the purpose of the survey

It is very useful to set out in writing beforehand what the survey is expected to achieve. This needs to be agreed by collections care staff (conservators or other), by curators and by management.

Describe the collections and define terms

The collection must be concisely described, and the main types of objects identified, for use in later analysing the data. What is included under the different damage headings should be set out, and the condition grades defined in the context of the collection. See above, **Data collection.**

Undertake pilot survey

A pilot survey is essential, to approximately quantify the task, find out how many objects can be surveyed in the time available, to test the method of collecting data and to refine the data definitions. About 20% of the total survey time should be allocated to the pilot survey, and to analysing and using the results. This is an important stage.

To undertake a pilot survey, allocate a certain number of person/days for it. Allow at least half a person day for analysis and writing up. Use the rest of the time to assemble the information set out in Table 3. The store locations and objects surveyed should be evenly distributed in the collection. The rules can be adjusted at this stage to ensure this. Time taken must be the overall time: ie, including meal breaks, getting to the store, etc. This is why it is best to allocate a certain time, and see how many objects are examined during it.

Analyse pilot survey results

Pilot survey data is recorded on survey forms. Its analysis is set out in Table 2.

TABLE 3 Information to be derived from pilot surveys.

Quantification:

1 Time spent on pilot survey (pre-determined): _____

2 Number of storage locations surveyed in the time: _____

3 Number of objects surveyed in the time: _____

4 Total number of storage locations: _____
(counted in pilot survey)

5 Mean number of objects per location: _____
(total of col. (b) from table below,
% number of locations surveyed)

6 Approximate total number of objects in collection: _____
(mean number per location
x total number of locations)

7 Number of objects that could be surveyed in the time allocated for the survey: _____
Allow at least 3 person-days for analysis and report writing.
(number surveyed per person/day x person/days for survey)

Variability:

For each of the locations surveyed:

Location identity	Total number of objects	Number surveyed	Number and per cent. in each condition rating			
			C1	C2	C3	C4

Design sampling procedure

That is, how to select which objects to examine in the real survey.

It is hoped in due course that a computer package will be developed, which will take pilot survey results and design a sampling procedure. At present it is necessary for a statistician to design this. The basis of the method is set out in detail elsewhere[14].

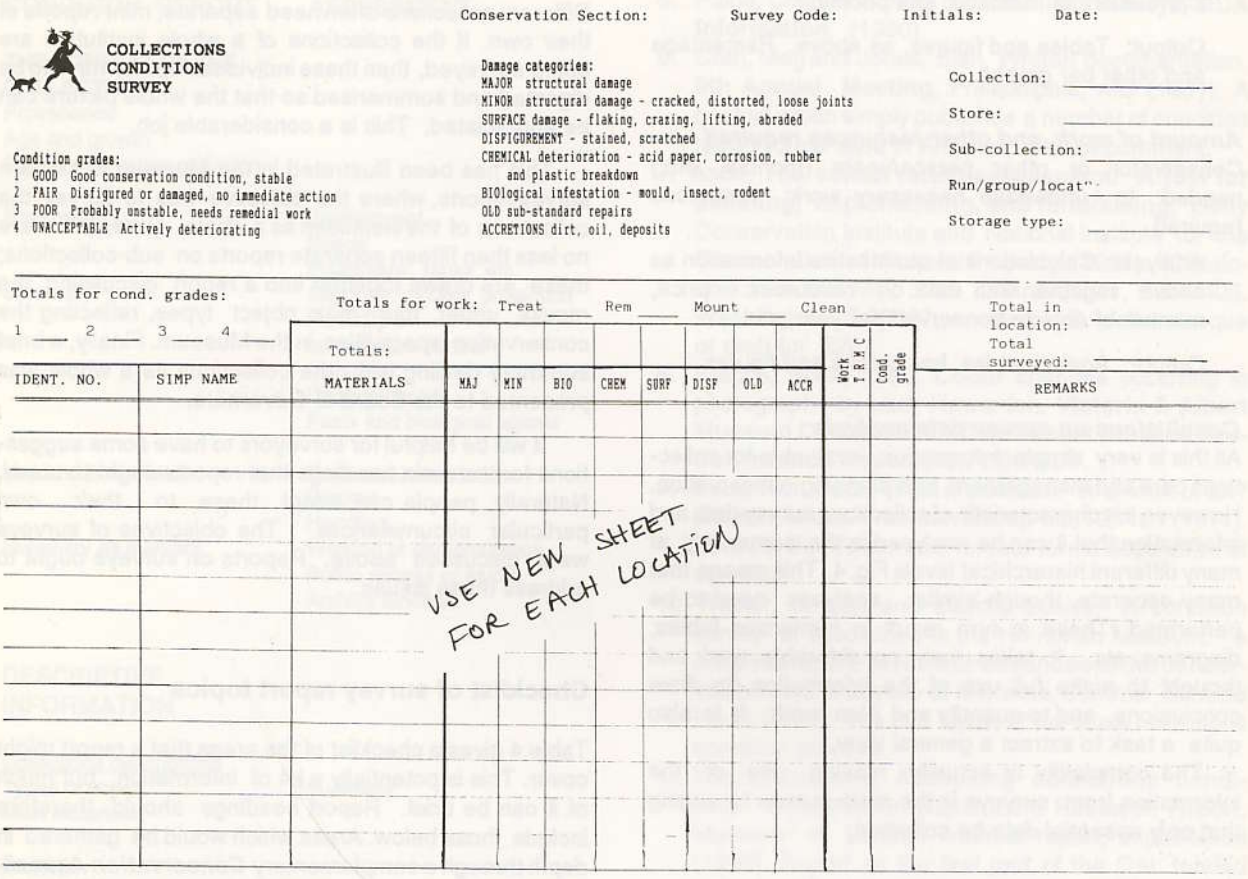
If no statistician is available, then rule-of-thumb has to be applied as described above (see **Statistical Sample Design**).

Collect data: the survey itself

Data can be collected either on paper or on computer. An example of a form used for surveying an historic photographs collection is shown in Fig. 3.

Alternatively, a computer can be used. Few surveys have been conducted using computers to date. An adaptation of the widely available program "Microsoft Works" has been set up and tested. This can be used on any IBM compatible computer.

This provides a form for entering survey records. The records can be listed and counted, and simple analysis such as percentages performed, using pre-



COLLECTIONS CONDITION SURVEY

Conservation Section: Survey Code: Initials: Date:

Condition grades:
1 GOOD Good conservation condition, stable
2 FAIR Disfigured or damaged, no immediate action
3 POOR Probably unstable, needs remedial work
4 UNACCEPTABLE Actively deteriorating

Damage categories:
MAJOR structural damage
MINOR structural damage - cracked, distorted, loose joints
SURFACE damage - flaking, crazing, lifting, abraded
DISFIGUREMENT - stained, scratched
CHEMICAL deterioration - acid paper, corrosion, rubber and plastic breakdown
BIOlogical infestation - mould, insect, rodent
OLD sub-standard repairs
ACCRETIONS dirt, oil, deposits

Collection:
Store:
Sub-collection:
Run/group/locat":
Storage type:

Totals for cond. grades: 1 ___ 2 ___ 3 ___ 4 ___

Totals for work: Treat ___ Rem ___ Mount ___ Clean ___

Total in location:
Total surveyed:

IDENT. NO.	SIMP NAME	Totals: MATERIALS	MAJ	MIN	BIO	CHEM	SURF	DISF	OLD	ACCR	Work T R M C	Cond. grade	REMARKS

USE NEW SHEET FOR EACH LOCATION

Fig. 3 An example of a survey form

designed forms. The results can then be printed out. (See Appendix). What this package will not do at present is draw graphs from the results.

Collecting data on paper has some advantages, in that it is easier to understand the results if the forms themselves are used for analysis. But it is impossible in practice to do some kinds of analysis - for instance, cross-tabulate condition by type of damage - by hand, and extra volumes of paper are really the last thing museums need.

Analyse and present data

Detailed research has been conducted into the analysis of the Museum of London survey data[17].

Descriptive Information

Different collections, sub-collections, object types; analysis of other descriptive information collected (fragility, broken, etc)

Analysis: Simple lists.

Output: Lists of object types, stores, collections, etc.. Because a sample only is collected, "object type" has to be fairly broad; for instance, if "object name" was analysed many kinds of object would not have been included in the sample. Even so, this is a very quick way of producing an accurate description of a collection.

Quantitative Information

Total numbers of:

Objects in collections, sub-collections, object types
Objects in different stores
Objects in different condition grades (therefore needing or not needing conservation)
Objects which have suffered different types of damage
Objects needing mounting, etc.

Analysis: Counts of cases (object records) by different groups; statistics - standard deviation, maximum number, minimum number; cross-tabulations; percentages.

Output: Lists, tables, diagrams such as pie diagrams, histograms, bar graphs.

Condition of collections

The main measure is the proportion of objects in different condition grades and types of damage suffered; correlation between type of damage and condition grade.

Analysis: Cross-tabulations of object type (or other

grouping: eg store) by priority, with percentages. Log-linear or contingency analysis to compare the condition of different object groupings. Percentages of objects with different types of damage. Correlation of damage and priority.

Output: Tables and figures, as above. Percentage and other bar graphs.

Amount of work, and other resources required

Conservator or other person/years (months, etc.) needed to undertake necessary work; resources required

Analysis: Calculations of quantitative information as above together with data on resources: price, number of objects conserved per year, etc.

Output: Again - tables, bar graphs and figures.

Conclusions on survey data analysis

All this is very simple information, invaluable for collections care and management, and planning conservation. However, it is characteristic of collections survey data and information that it can be analysed in the same way at many different hierarchical levels Fig. 4. This means that many separate, though similar, analyses need to be performed. These in turn result in numerous tables, diagrams, etc. It takes very considerable work and thought to make full use of the information, to draw conclusions, and to quantify and plan work. It is also quite a task to extract a general view.

The complexity of actually making use of the information from surveys is the main reason for urging that only essential data be collected.

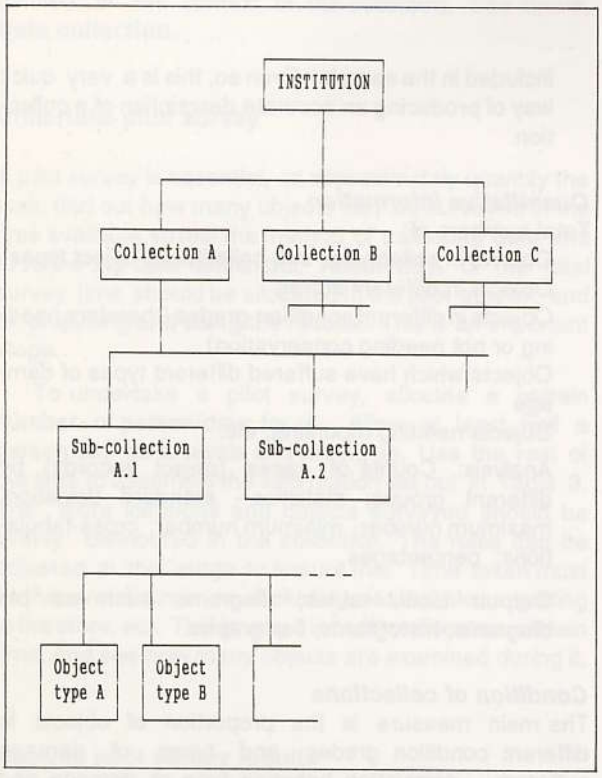


Fig. 4 The hierarchical nature of museum collections data. Large or complex institutions will have more organisational tiers in their collections than this.

Survey reports

The form of survey reports

Different collections often need separate, mini-reports of their own. If the collections of a whole institution are being surveyed, then these individual reports have to be digested and summarised so that the whole picture can be appreciated. This is a considerable job.

This has been illustrated in the Museum of London survey reports, where the objective was to survey the collections of the institution as a whole. Here, there are no less than fifteen separate reports on sub-collections; these are drawn together into a report discussing the results under four main object types, reflecting the conservation specialities in the Museum. Finally, a brief summary dealing with the collections as a whole was presented to the Board of Governors.

It will be helpful for surveyors to have some suggestions for the main headings that reports ought to cover. Naturally, people can adapt these to their own particular circumstances. The objectives of surveys were discussed above. Reports on surveys ought to address these issues.

Checklist of survey report topics

Table 4 gives a checklist of the areas that a report might cover. This is potentially a lot of information, but much of it can be brief. Report headings should therefore include those below. Areas which would be gathered in depth through a complementary ***Conservation Assessment Survey*** are shown under that heading, although they would need to be touched on in a ***Collections Condition Survey*** report.

Conclusions on the survey framework

The suggested framework has been agreed by all the Working Party members. It can be used by anyone wishing to make use of it, or of elements in it. We hope that it will eventually be refined and generally adopted by museums in the U.K.

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Table 4. Checklist of topics for survey reports.

COLLECTIONS CONDITION REPORT	CONSERVATION ASSESSMENT
THE CONTEXT OF THE COLLECTION	
Provenance	
Age and growth	
Past conservation provision	
Environment	Environment
	Space
	Equipment: racks, etc.
Summary	Supports, mounts, protection
	Humidity +
	temperature control
	Light
	Contaminants
	Pests and biological agents
Use and procedures	Uses and procedures
	Display
	Handling
Summary as relevant	Working or demonstration
	Public access or study
	Archive function
DESCRIPTIVE INFORMATION	
Collections descriptions	
Types of object	Summary
Main materials	
Damage	
Nature of damage	
Analysis of data	
Condition	
Analysis of data	
Comparisons and discussion	
Inferences	
Causes of deterioration	
Quantification	
Numbers of objects	
Resources required	
POSSIBLE ACTION	**POSSIBLE ACTION**
Collections management	Collections management
	Improve store or building
	Improve environment
Summary	Eliminate pests
	Rack or mount or protect
	Control or alter use

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Appendix

Printout of survey data analysis from Microsoft "Works"
See next page.

HISTORIC PHOTOGRAPHS COLLECTION: pilot survey data summary

Runs		Storage groups		Locations		Objects		Priorities			
Run	Sub-col	T-grps	Samp.gp	T-locs	Smp.loc	T-objs	T-samp	Pri	Pr2	Pr3	Pr4
R.01	HenryG	8	G.4	2900	L.2	65	12	2	1	6	3
								17%	8%	50%	25%
R.02	Mounted co	8	G.3	179	L.2	170	34	0	36	0	0
								0%	106%	0%	0%
R.03	Postcds	4	G.4	365	L.2	3	1	0	0	0	1
								0%	0%	0%	100%
R.03	Postcds		G.4		L.7	17	4	1	1	1	1
								25%	25%	25%	25%
R.03	Postcds		G.3		L.12	20	3	0	2	1	0
								0%	67%	33%	0%
R.04	HenryG	15	G.3	2100	L.1	25	6	0	1	2	4
								0%	17%	33%	67%
R.05	Mixed5	24	G.3	324	L.3	52	10	0	0	2	8
								0%	0%	20%	80%
R.05	Mixed5		G.3		L.8	87	4	1	1	0	2
								25%	25%	0%	50%
R.05	Mixed5		G.3		L.13	406	14	7	4	3	0
								50%	29%	21%	0%
R.05	Mixed5		G.3		L.18	20	4	0	2	2	0
								0%	50%	50%	0%
R.05	Mixed5		G.3		L.23	142	27	4	11	8	4
								15%	41%	30%	15%
R.06	Mixed6	28	G.2	255	L.8	147	10	0	5	5	0
								0%	50%	50%	0%
R.07	Mixed7	16	G.4	560	L.7	276	10	1	3	6	0
								10%	30%	60%	0%
R.08	HenryG	31	G.7	295	L.1	15	4	0	2	2	0
								0%	50%	50%	0%
R.09	BussArch	21	G.6	910	L.3	12	2	1	0	0	1
								50%	0%	0%	50%
R.09	BussArch		G.6		L.6	212	10	5	2	3	0
								50%	20%	30%	0%
R.10	JeanStr	9	G.6	36	L.3	1130	11	5	6	0	0
								45%	55%	0%	0%
R.11	PatSmith	8	G.6	78	L.8	1230	10	10	0	0	0
								100%	0%	0%	0%
R.12	Slides	33		33	L.1	739	26	0	3	7	16
								0%	12%	27%	62%

Totals:	Groups:	Locations:	Objects:	Priority totals:			
				Pri	Pr2	Pr3	Pr4
	205	8035	4768				
Max:	33	2900	1230	37	80	48	40
Min:	4	33	3	18%	40%	24%	20%
SD:	9.65624	866.62	363.653				
Samples: (counts)	Groups: 18	Locations: 19	Objects: 202				

Samples of objects:
Total: 202
Max: 34
Min: 1
SD: 8.85087

Run: i.d. of run
Sub-col: Name of sub-collection
T-grps - Number of groups in run
Samp.gp: i.d. of sampled group
T-locs: Number of locations in sampled group
Smp.loc: i.d. of sampled location
T-objs: Number of objects in sampled locatio
T-samp: Number of objects surveyed

HISTORIC PHOTOGRAPHS SURVEY

Location	Count	Sample	Pri 1	Pri 2	Pri 3	Pri 4	Mean pri
9-6-6	212	10	5	2	3	0	1.8
Business Archiv	212	10	5	2	3	0	1.8
Percent:			50%	20%	30%	0%	
8-7-1	15	4	0	2	2	0	2.5
Henry Grant	15	4	0	2	2	0	2.5
Percent:			0%	50%	50%	0%	
10-6-3	1130	11	5	6	0	0	1.5
Jean Straker	1130	11	5	6	0	0	1.5
Percent:			45%	55%	0%	0%	
6-2-8	147	10	0	5	5	0	2.5
Mixed Cupbs 6	147	10	0	5	5	0	2.5
Percent:			0%	50%	50%	0%	
7-4-7	276	10	1	3	6	0	2.5
Mixed cupbs 7	276	10	1	3	6	0	2.5
Percent:			10%	30%	60%	0%	
11-6-8	1230	10	0	10	0	0	2.0
Pat. Smith	1230	10	0	10	0	0	2.0
Percent:			0%	100%	0%	0%	

Statistics for this collection:

	Pri 1	Pri 2	Pri 3	Pri 4	Mean p
Totals:	11	28	16	0	2.1
Percent:	20%	51%	29%	0%	

Sample of 55 objects from 3010 in sampled locatio

Max. objs/location: 1230 Min. objs/location 15
SD: 487

HISTORIC PHOTOGRAPHS SURVEY

Run/gp/loc		Image no.	Prior.	Damage Ma	Mi	Bl	Ch	Su	Di	Ol	Ac	Work
Business Arc	9-6-6	nn.	1	1			1		1			TMC
Business Arc	9-6-6	nn.	1		1		1		1			TMC
Business Arc	9-6-6	nn.	1		1		1	1	1			TMC
Business Arc	9-6-6	nn.	1		1		1	1	1			TMC
Business Arc	9-6-6	nn.	1	1			1	1	1			TMC
Objects in this priority:		5										
Business Arc	9-6-6	nn.	2		1		1					TMC
Business Arc	9-6-6	nn.	2		1		1		1			TMC
Objects in this priority:		2										
Business Arc	9-6-6	nn.	3		1		1		1			TMC
Business Arc	9-6-6	nn.	3		1			1				TMC
Business Arc	9-6-6	nn.	3		1		1	1				TMC
Objects in this priority:		3										
Objects in this location:		10										
Objects with damage:				2	8	0	9	5	7	0	0	
Henry Grant	8-7-1	1528/54	2		1			1			1	TMC
Henry Grant	8-7-1	1528	2	1				1				TMC
Objects in this priority:		2										
Henry Grant	8-7-1	1528/25A	3		1			1				MC
Henry Grant	8-7-1	1528/25B	3		1			1				MC
Objects in this priority:		2										
Objects in this location:		4										
Objects with damage:				1	3	0	0	4	0	0	1	
Mixed cupbs	7-4-7	nn.	1		1		1	1			1	TM
Objects in this priority:		1										
Mixed cupbs	7-4-7	nn.	2				1	1			1	TM
Mixed cupbs	7-4-7	nn.	2				1	1	1		1	TM
Mixed cupbs	7-4-7	nn.	2				1	1	1		1	TM
Objects in this priority:		3										
Mixed cupbs	7-4-7	nn.	3					1	1			M
Mixed cupbs	7-4-7	nn.	3					1			1	M
Mixed cupbs	7-4-7	nn.	3				1	1	1		1	TM
Mixed cupbs	7-4-7	nn.	3				1	1				M
Mixed cupbs	7-4-7	nn.	3				1				1	TM
Mixed cupbs	7-4-7	nn.	3				1				1	TM
Objects in this priority:		6										
Objects in this location:		10										
Objects with damage:				0	1	0	8	8	4	0	8	
Mixed Cupbs	6-2-8	nn.	2				1	1	1			TR
Mixed Cupbs	6-2-8	nn.	2				1	1	1			TR
Mixed Cupbs	6-2-8	nn.	2				1	1	1			TR
Mixed Cupbs	6-2-8	nn.	2				1	1	1			TR
Mixed Cupbs	6-2-8	nn.	2				1	1	1			TR
Objects in this priority:		5										
Mixed Cupbs	6-2-8	nn.	3				1	1	1		1	TR
Mixed Cupbs	6-2-8	nn.	3				1		1			TR
Mixed Cupbs	6-2-8	nn.	3				1	1	1			TR
Mixed Cupbs	6-2-8	nn.	3					1	1			TR
Mixed Cupbs	6-2-8	nn.	3				1		1			TR
Objects in this priority:		5										

Run/gp/loc		Image no.	Prior.	Damage Ma	Mi	Bl	Ch	Su	Di	Ol	Ac	Work
Objects in this location:		10										
Objects with damage:				0	0	0	9	8	10	0	1	
Pat. Smith	11-6-8	501/67/22	2	1			1	1				TMC
Pat. Smith	11-6-8	/30	2	1			1	1				TMC
Pat. Smith	11-6-8	/11	2	1			1	1				TMC
Pat. Smith	11-6-8	/14	2	1			1	1				TMC
Pat. Smith	11-6-8	/22A	2	1			1	1				TMC
Pat. Smith	11-6-8	/27A	2	1			1	1				TMC
Pat. Smith	11-6-8	/33A	2	1			1	1				TMC
Pat. Smith	11-6-8	/0A	2	1			1	1				TMC
Pat. Smith	11-6-8	/6A	2	1			1	1				TMC
Pat. Smith	11-6-8	/11	2	1			1	1				TMC
Objects in this priority:		10										
Objects in this location:		10										
Objects with damage:				0	10	0	10	10	0	0	0	
Jean Straker	10-6-3	R5106	1	1			1	1	1			TMC
Jean Straker	10-6-3	R5109	1	1			1	1	1			TMC
Jean Straker	10-6-3	R5111	1	1			1	1	1			TMC
Jean Straker	10-6-3	R5113	1	1			1	1	1			TMC
Jean Straker	10-6-3	R5115	1	1			1	1	1			TMC
Objects in this priority:		5										
Jean Straker	10-6-3	R5117	2		1		1	1	1			TMC
Jean Straker	10-6-3	R5119	2		1		1	1	1			TMC
Jean Straker	10-6-3	R5121	2		1		1	1	1			TMC
Jean Straker	10-6-3	R5122	2		1		1	1	1			TMC
Jean Straker	10-6-3	R5124	2		1		1	1	1			TMC
Jean Straker	10-6-3	R5126	2		1		1	1	1			TMC
Objects in this priority:		6										
Objects in this location:		11										
Objects with damage:				5	6	0	11	11	11	0	0	

Statistics on this data file

Total sample 55 objects from 3010

Max.objs/loc 1230 Min. objs/loc= 15
Variance: 237123 SD: 487.0