SYNTHESYS Performance Indicators for Natural History Collections Management.

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SYNTHESYS is a European Union-funded Integrated Activities grant which aims to create an accessible, integrated European resource for researchers in the Natural Sciences. Networking is one of its three main activities, and one of the Networking Activities (NA2.1) aims to implement best practice benchmarks in collections care, to raise standards and improve accessibility to collections for all physical Users.

One of the objectives of NA2.1 was to deliver Performance Indicators (PIs) in collections management. The traditional measures supplied to funding bodies etc. such as numbers of loans, are limited in their value for determining genuine change or attainment of a benchmark in collections management. The aim was to produce a set of transferable collections management PIs and definitions. They have been designed to allow institutions to create their own subset of indicators for internal management, which will prove useful in developing new, more efficient ways of working. A workshop was held in October 2011 to develop the PIs, and to give an opportunity for other museums and science sector organisations to have a two-way exchange of ideas, and to seek new methods to improve workflows and processes to maximise the efficient use of staff time and other resources.

What are Performance Indicators?

Since the 1980s, museums and other public-sector institutions, where performance cannot be measured simply by profit, have developed performance indicators (PIs) for use by museum managers, funding bodies and regulators to demonstrate accountability, efficiency and effectiveness.

Collections managers often use PIs in this context, rather than to inform policy and planning in collections management, for which these traditional measures are often of limited value.

How can PIs help?

Areas where performance measurement contributes to museum management activities include:

1. Formation and implementation of policy

2. Planning and budgeting of service provision

3. Service standards

4. Efficient use of resources

5. Control and influence over decision making

Collections managers can also use PIs to identify how performance has changed over time, compare departments within an institution or between similar museums.

The process of determining which areas of collections management should be monitored, and setting standards, has the potential to encourage discussion of what collections management should be, and what qualities all museums in the same sector (e.g. Natural History) should have, leading to museums within that sector to unite and be strengthened under a common goal.

The process of developing targets and the ability to measure performance should clarify the mission and sense of purpose of collections managers, provide evidence of their commitment to excellence and improve their management systems.

What makes a good PI?

Consistency and comparability. Definitions consistent over time and between institutions to enable comparison of like with like

Clarity. Simple, well-defined, easily understood

Controllability. Only aspects of performance over which there is control should be measured

Limited. Concentrate on a limited number of PIs that give the most valuable collections management information

Feasibility. Can the PIs be measured easily?

What are the risks?

Measurement

- PIs from different institutions or departments must be comparable: definitions of units of measure and rules must be exactly the same.

Behavioural

- PIs must be kept in perspective to prevent the focus of collections management switching from actual mission accomplishment to the PI system itself!
- PIs must help enough to be worth the effort.
- PIs should not focus too much on the managerial control or appraisal aspects, or performance measurement could be regarded by staff with apprehension or hostility.

Conceptual

Many of the qualities of good museums cannot be measured numerically, for example PIs cannot easily measure importance or quality and should not be read as more than a partial portrait. At best, they can only identify characteristics of efficiency that lend themselves to numerical analysis, and give some indication of whether a collection is well managed.

SYNTHESYS Collections Management Performance Indicators for Natural History Collections

The SYNTHESYS Performance Indicators (PIs) have been assigned to four categories, relating to:

- long term trends in collections
- distinct collections management activities

and:

- the level to which activities are performed
- the efficiency with which activities are performed

	Long term trends	Distinct activities
Activity level	1	2
Efficiency level	3	4

A total of 68 indicators are suggested.

Words in italics are defined in the glossary at the end of the table.

To compare departments within an institution or to compare different institutions, most of these indicators can be compiled for any size of *collection unit*, and could be standardised, for example by dividing by the (estimated) number of *specimens* in that *collection unit* (PI 1.1).

Performance Indicator	What is it an indicator of?	Category	Comments
1. Collections			
1.1 Number of *specimens* in collection.	Collection size.	1	Estimated, based on SYNTHESYS collections survey. Updated each year.
1.2 Number of type *specimens* in collection.	Type richness.	1	Estimated, based on SYNTHESYS collections survey. Updated each year.
1.3 Number of species represented in collections.	Scope of collection.	1	For each taxonomic group. Updated each year.
2. Access and Use of Collections			
2.1 Number of *requests* for *specimens* on loan to other institutions for research in one year.	Interest in the collections by scientific community for visual examination at their home institution.	2	
2.2 Average time to process approved loan *requests* (working days) over one year.	Outgoing loan turnaround time.	4	Mean for all approved loan requests of the difference between the date loan request was received and date of loan despatch (in working days), over one year.
2.3 Number of *requests* for digital images in one year.	Interest in digital images of the collections.	2	
2.4 Number of *requests* for *specimens* on loan for exhibition in one year.	Interest in the collections by museum exhibition community.	2	Includes both internal and external requests, recorded separately.
2.5 Number of *requests* to visit the *collection* in one year.	Interest in the collections by scientific community for visual examination at the host institution.	2	
2.6 Number of destructive sampling *requests* for DNA extraction/other purposes in one year.	Interest in the collections by scientific community for testing beyond visual examination.	2	From both internal and external researchers. Sampling for DNA extraction and for other purposes counted separately.
2.7 Number of other requests.	Interest in the collections for other purposes.	2	Includes requests to visit for non-scientific purposes, collections enquiries etc. but not identification requests.
2.8 Number of research loans sent in one year.	Comparison with requests shows loan refusal rate (for any reason).	2	Number of approved loan transactions.
2.9 Number of *specimens* (or *curation units)* sent on loan to other institutions for research in one year.	Collections management activity (outgoing loans).	2	
2.10 Number of outgoing research loans returned (or partially returned) in one year.	Loan return rate, to compare with loan request rate.	2	
2.11 Number of *specimens* (or *curation units)*, loaned for research, returned in one year.	Collections management activity (return of outgoing loans).	2	
2.12 Average length of research *loan transaction.*	Efficiency of loan management.	3	Mean for all returned loans of the difference between the date loan was requested and the date of complete return (*loan transaction* completed), for all loans returned over the past year.
2.13. Percentage of research *loan transactions* completed within 3 years.	Efficiency of loan management.	3	
2.14 Number of EU institutions to which research loans are in place at the beginning of each year.	Spread of use of collections within Europe.	1	
2.15 Number of non-EU institutions to which research loans are in place at the beginning of each year	Spread of use of collections outside Europe.	1	
2.16 Number of institutions from home country to which research loans are in place at the beginning of each year.	Spread of use of collection in home country.	1	

Performance Indicator	What is it an indicator of?	Category	Comments
2.17 Number of *specimens* (or *curation units*) sent on loan to other institutions for exhibition each year.	Collections management activity.	2	Usually involves more time and paperwork than research loans.
2.18 Number of specimens on loan for exhibition at the beginning of each year.	Number of specimens visually accessible to the public.	1	Include internal and external exhibition loans.
2.19 Number of scientific *visitor days* in one year funded by SYNTHESYS or other 'mobility' programmes or internal schemes.	Physical access to the *collections* through funded programmes. Usefully compared to access via loans.	2	
2.20 Number of scientific *visitor days* in one year not funded by SYNTHESYS or other 'mobility' programmes or internal schemes.	Physical access to the *collections* not through funded programmes. Usefully compared to access via loans.	2	
2.21 Number of scientific *visitor days* (visitors from home country) in one year.	Physical access to *collections* to scientific visitors from home country. Usefully compared to access via loans.	2	
2.22 Average length of visit for scientific visitors over one year.	Usefulness of collections to scientific visitors.	1	Median (and quartiles) duration of all scientific visits (recorded to nearest half day) over one year.
2.23 Proportion of taxonomic or systematics researchers/*non-taxonomic researchers* (scientific visitors) in one year.	Scientific diversity of users of collections.	1	
2.24 Number of non-scientific visitor days in one year.	Physical access to the collections for non-scientists.	2	Includes historians, artists, schools, VIPs, fund raising etc.
2.25 Number of *specimens* sampled for DNA extraction/other purposes in one year.	Use of collections by scientific community for testing beyond visual examination.	2	Both internally and from other institutions.
2.26 Cumulative total number of DNA/RNA extractions from *specimens* from *collection*, which are known to be lodged in a DNA bank.	Number (and therefore proportion) of collection linked to accessible DNA.	1	Number of DNA bank numbers returned in one year.
2.27 Number of DNA samples (aliquots) derived from specimens in collections supplied for institutional use/external use.	Use of institution's labs for extracting DNA/RNA from *specimens* in institution's *collections*.	2	
2.28 Specimen citation index.	Use of collections in published scientific research.	1	Number of articles from an agreed list of peer-reviews journals (to be agreed on) citing specimens from an institution's collections in one year. Investigate funding to undertake this centrally for all SYNTHESYS institutions.
2.29 Total number of *specimens* accessible via the internet through species lists or *collections*-level descriptions.	Digital accessibility: low level.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Updated each year.
2.30 Total number of *records* accessible via the internet in searchable databases where users can browse individual *specimen* records.	Digital accessibility: medium level.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Updated each year.
2.31 Total number of *records* accessible via the internet in downloadable data files for a selection of records defined by the user.	Digital accessibility: high level.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Updated each year.

Performance Indicator	What is it an indicator of?	Category	Comments
2.32 Total number of digital images linked to specimen records accessible via the internet to a minimum agreed quality standard.	Digital accessibility: images.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Minimum standard to be decided (e.g. 300 dpi JPEG and associated record with at least core fields complete. Updated each year.
2.33 Number of website hits/searches/downloads in one year.	Use of digital collections.	1	Updated each year.
3. Digitisation			
3.1 Cumulative total number of *records* in electronic collections database.	Collections management activity: databasing.	1	Includes molecular collections database entries, but counted separately. Updated each year.
3.2 Cumulative total number of *specimen* (or *curation unit*) records with only *core fields* completed.	Depth of digital record data: low level.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Updated each year.
3.3 Cumulative total number of *specimen* records with *full record* data (not georeferenced).	Depth of digital record data: high level.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Updated each year.
3.4 Cumulative total number of *georeferenced specimen* records.	Depth of digital record data: spatial data added.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Updated each year.
3.5 Cumulative total number of digitally imaged specimens to a minimum accepted quality standard.	Progress in digital imaging.	1	Count type specimens and non-type specimens separately. Can also be expressed as % of (estimated) total number of type/non-type specimens. Minimum standard to be decided (e.g. 300 dpi JPEG and associated record with at least core fields complete. Updated each year.
3.6 Number of individual collections databases used by institution.	Database integration.	1	Should ideally be minimised. Updated each year.
4. Collections management and conservation			
4.1 Collections storage area surveyed to assess their status and condition and identify potential risks in the past year (and cumulative total over last three years).	Monitoring of collection condition.	1	Expressed as percentage of total *collections storage area*. Updated each year.
4.2 Percentage of *specimens* surveyed in the past one/three years identified as damaged or deteriorating and requiring conservation treatment.	Collection condition.	1	Based on estimate of number of total number of *specimens* in *collections storage area* surveyed.
4.3 *Collections storage area* with environmental conditions monitored.	Environmental monitoring.	1	Expressed as percentage of total *collections storage area*. Updated each year.
4.4 *Collections storage area* with environmental conditions controlled within agreed environmental parameters.	Environmental standards.	1	Expressed as percentage of total *collections storage area*. Parameters will vary depending on the type of material stored. Use SYNTHESYS standards? Updated each year.
4.5 *Collections storage area* with storage furniture meeting established standards.	Collections storage furniture standards.	1	Expressed as percentage of total *collections storage area*. Use SYNTHESYS standards? Updated each year.
4.6 Total number of *specimens* given conservation treatment in one year.	Conservation activity.	2	Difference between no. of specimens identified as requiring treatment, and number receiving treatment each year will identify potential conservation backlog developing.

Performance Indicator	What is it an indicator of?	Category	Comments
4.7 *Collections storage area* covered by security procedures and guidelines operating to agreed standards.	Security.	1	Expressed as percentage of total *collections storage area*. Use SYNTHESYS standards? Updated each year.
4.8 *Collections storage area* covered by disaster/salvage plan operating to agreed standards.	Disaster planning.	1	Expressed as percentage of total *collections storage area*. Use SYNTHESYS standards? Updated each year.
4.9 Number of new *accession* transactions in one year.	Rate of accession activity.	2	
4.10 Total number of *specimens accessioned* in one year.	Rate of growth of collections.	2	Also expressed as percentage of total number of *specimens*. Includes silica gel/chilled/frozen collections (counted separately?).
4.11 Total number of "gifts-in" *specimens* in one year.	Level of incoming specimen donations.	2	Also expressed as percentage of total number of *specimens*.
4.12 Total number of "gifts-out" *specimens* in one year.	Level of outgoing specimen donations.	2	Also expressed as percentage of total number of *specimens*.
4.13 Number of *specimens* prepared in one year.	Collections management activity: preparation.	2	Also expressed as percentage of total number of *specimens* accessioned.
4.14 Total number of unprepared *specimens* (backlog).	Backlog size and trend (increasing/decreasing).	1	Equals historic backlog PLUS number of new specimen accessions in one year MINUS number of specimens prepared in one year.
4.15 Average time for collections management staff to locate/retrieve any *specimen* required.	Collections arrangement.	1	Write a procedure to get this number. Tested on an annual basis. Target should be within 15 minutes?
5. Research/scientific activities			
5.1 Number of papers published by collections management staff in one year (average per FTE staff member).	Collections management activity: research.	2	Includes papers on collections management, or collections-based research.
5.2 Number of determination fields in specimen database updated in one year.	Identification/naming activity.	2	Expressed as percentage of total specimen records, as a proxy for total number of new/revised identifications across the collections which might be too difficult to measure
5.3 Number of type specimens newly recognised in one year.	Indication of value added through loans, visitors, digitising projects etc.	2	Number of type specimens in the collection, which have not previously been recognised or marked as such, identified each year.
5.4 Percentage of records in specimen database identified to species level or above.	Level of identification.	1	Updated each year. Level of identification across whole collection too difficult to measure; this will provide an estimate.
6. Resourcing			
6.1 Total spending on collections management.	Collections management: financial resourcing.	1	As a proportion of overall budget. Excluding salaries of permanent/fixed-term staff. Including contractors.
6.2 Total spending on conservation.	Conservation: financial resourcing.	1	As a proportion of overall budget. Excluding salaries of permanent/fixed-term staff. Including contractors.
6.3 Total number of FTE collections management staff.	Collections management: staff resourcing.	1	As a proportion of total FTE staff for institution. Includes permanent/fixed-term staff.
6.4 Total number of FTE conservation staff.	Conservation: staff resourcing.	1	Includes permanent/fixed-term staff.
6.5 Total number of FTE collections management and conservation volunteers.	Volunteer activity	1	As a proportion of total FTE collections management and conservation staff for institution.
6.6 Percentage of collections management/conservation staff receiving training in one year.	Staff training level.	1	
6.7 Percentage of working time collections management/conservation staff attending training.	Staff training time.	1	

Glossary

Accessioning. The final stage in the acquisition process, when specimens are legally deposited into the institutions collections.
Collection = collection unit.
Collection Unit. Any defined set of specimens. E.g. lichen collection, Botany department or whole institution.
Collections storage area. Area containing collections, in m^2.
Conservation treatment. Any interventive treatment of a specimen to minimise the risk of deterioration to the specimen or their associated information.
Core fields. Unique identifier (barcode), Collector, Collection number, Date, Determination/Identification, Country. Fields filled with "unknown" or s.n. if data unavailable on specimen. The core fields parameters may vary from one collection to another, e.g. collector may be an important core field in Botany but not in Entomology.
Curation Unit. The unit used for administration purposes when recording loans etc. Can be an individual specimen, or a group of specimens e.g. a herbarium sheet or diatom slide.
Full record data. Core fields plus *all* other data associated with and found on the specimen (complete locality, habitat, description, determination history etc.). The number of records with full data will be difficult to measure, a better approach may be number of records containing more than core field data.
Georeferenced. Record includes latitude and longitude (as accurate as specimen locality data allows).
Gifts in. New acquisitions acquired through donations from other institutions.
Gifts out. Duplicate specimens and unwanted acquisitions donated to other institutions.
Loan transaction. Complete outgoing loan process from receipt of loan request to complete return of all specimens. Each loan transaction step (receipt of request, partial dispatch, full dispatch, partial return, full return) should be logged.
Non-taxonomic researchers. Users of the collections for purposes other than systematics or taxonomy (including molecular systematics), e.g. ecology, population studies, climate change research etc.
Record. A single entry in the institution's specimens database (not necessarily a *specimen* record, it could be a *curation unit* e.g. entomology tray or a *collection unit* (collections-level description).
Requests. The number of requests for visits, loans, destructive sampling etc. are counted even if the request is subsequently not approved or no material is available. The list of requests to be considered is: • Visits (by scientists for research purposes) • Loan for research: covers all requests which are simple with respect to administrative treatment (little paperwork) • Loan for exhibition: covers all requests that are complex with respect to administrative treatment (lot of paperwork: facility report, condition survey, insurance etc.). • Destructive sampling • Other (anything not in the above, includes vests for PR purposes, school visits, collections enquiries etc. but not identification requests).
Specimen. A unique object or portion of an object, accessioned into the institution's collection with associated data.
Visitor days. Total number of scientific visitors each day, to the nearest half day.