Developing Cultural Heritage Preservation Databases Based on Dublin Core Data Elements

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Cultural Heritage Information

- **Information used for preservation of historical objects critical in stewardship for future generations**
- **Requires careful monitoring and management**
  - State of the artifact
  - Environmental conditions
  - Standardized storage of information
- **Global access to preservation information**
  - Increases utility in preservation of other artifacts
  - Common standards,
  - Dublin Core metadata elements

Current Standards Used in Museums

- Dublin Core
- Art Museum Information Consortium (AMICO)
- *International Guidelines for Museum Object Information: The CIDOC Information Categories*
  - Developed by the International Committee for Documentation (CIDOC) of the International Council of Museums (ICOM)
- Machine-Readable Cataloging (MARC)
- Canadian Heritage Information Network (CHIN)
- SCIPIO Auction Catalogs
- Consortium for the Computer Interchange of Museum Information (CIMI)

Dublin Core as Common Standard

- **Fiber Reference Image Library (FRIL)**
  - Collaborative Web-based reference library of historic fibers and images to support research, education, training, and conservation treatment
  - for preservation and museum professionals, scientists, historians, educators, students
- **9/11 World Trade Center Archive**
  - Diverse range of objects retrieved from Ground Zero during the rescue and clean-up operations
  - For preservation and museum professionals, architects, structural engineers, scientists, historians, preservation architects, family members, survivors
- **Ongoing Efforts in Progress**

Standardized Evaluation of Object Deterioration

- **Useful & Accurate Deterioration Information**
  - Measurement and assessment of key object characteristics
  - Needed for effective storage and transfer across information domains
  - Specific standardized attributes measured, imaged or recorded, and stored as data
  - Access by users ranging from scientists and materials experts to conservators and curators
  - Universal information for all objects with common standards

Fiber Reference Image Standard

Metadata Standard Elements

1. Identification Information

Basic information about the objects and images (the data set); domain must be in accordance with Dublin Core Metadata Element definitions.

2. Sample Reference Information

Details about the original object from which the data set is derived.

3. Imaging and Spectral Data Reference Information

Information describing the conditions used to acquire image objects.

4. Data Type Information

Information about the technical format and protocols for the images and data elements.

5. Object Description Information

Information about the textile and yarn from which the sample is derived.

6. Fiber Information

Information about the fiber morphology and any changes or deterioration of the fiber sample.

7. Metadata Reference Information

Information about the status of the metadata information, and the responsible party.

8. Metadata Extensions

Additional specialized elements needed by the metadata producer or user.

Image Library Development

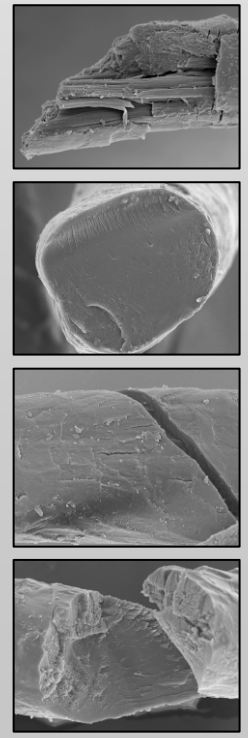
- Standardized terminology essential for description and database searching
- Use of database as a comparative fiber deterioration tool
- Data must be linked to object and conservation needs
- Image analysis must be supported by metadata information
- Links to related chemical and mechanical data expands deterioration information
- Links to treatment and environmental information expands knowledge of causes and sources of degradation

FRIL Controlled Vocabulary

Descriptors of Fiber Deterioration

- **Fiber fractures**
  - Fibrillar
  - Smooth
  - Shear
  - Concave
- **Surface soiling**
  - Particulates
  - Size
  - Amount
- Crushed / Flattening
- Fibrillation
- Broken distal ends

Standardizing Types of Fiber Fractures



Fiber Deterioration Categories

A	C	D	E	F	G	H	I	J	K	L	M
ID	Textile Changes	Textile Quality	Resilience	Dryness	Fiber Shedding	Discoloration	Fading	Loss	% Loss	Fiber Changes	Fiber Type
1	YES	5	5	5	6	4	5	4	20	YES	Wool
2	NO	1	2	2	1	1	2	1	0	NO	Leaf
3	NO	0	0	0	0	0	0	0	0	NO	Cotton
4	NO	1	1	1	1	1	1	1	0	NO	Wool
11	YES	5	6	5	6	3	2	2	3	YES	Cotton
5	YES	6	6	7	5	3	5	3	15	YES	Wool
6	YES	2	3	1	1	2	1	2	2	YES	Linen / Bast
7	YES	4	5	5	1	5	1	1	0	NO	Linen / Bast
8	YES	4	5	5	4	4	4	3	10	YES	Silk
9	YES	3	5	3	2	2	1	1	0	YES	Leaf
10	NO	1	1	1	1	1	1	1	0	NO	Cotton

M	N	O	P	R	S	T	U	V	W	X	Y
Fiber Type	Wool - scales	Wool - oval shape	Wool - scale loss	Extent of change	Presence of New Features	Fiber Fractures	Short Fibers	Fiber Fragments	Surface Particulates	New Features	Fiber Quality
Wool	YES	YES	YES	3	YES	YES	YES	YES	YES	5	4
Leaf	NO	NO	NO	1	NO	NO	NO	NO	NO	1	1
Cotton	NO	NO	NO	0	NO	NO	NO	NO	NO	0	0
Wool	YES	YES	NO	1	NO	NO	NO	NO	NO	1	1
Cotton	NO	NO	NO	2	YES	YES	NO	YES	YES	2	6
Wool	YES	YES	YES	4	YES	YES	YES	YES	YES	4	6
Linen / Bast	NO	NO	NO	3	YES	YES	YES	YES	YES	3	3
Linen / Bast	NO	NO	NO	1	NO	NO	NO	NO	NO	1	1
Silk	NO	NO	NO	5	YES	YES	YES	YES	YES	6	1
Leaf	NO	NO	NO	1	NO	NO	NO	NO	NO	1	1
Cotton	NO	NO	NO	1	NO	NO	NO	NO	NO	0	0

Dublin Core / FRIL Metadata Comparison

Dublin Core Metadata Elements

Element Name: Identifier
Label: Resource Identifier
An unambiguous reference to the resource within a given context.

Element Name: Date
Label: Date
A date of an event in the lifecycle of the resource.

Element Name: Source
Label: Source
A Reference to a resource from which the present resource is derived.

Element Name: Subject
Label: Subject and Keywords
A topic of the content of the resource.

Element Name: Coverage
Label: Coverage
The extent or scope of the content of the resource (will include spatial location -- a place name)

Element Name: Creator
Label: Creator
An entity primarily responsible for making the content of the resource.

Element Name: Publisher
Label: Publisher
An entity responsible for making the resource available

Element Name: Rights
Label: Rights Management
Information about rights held in and over the resource.

Element Name: Contributor
Label: Contributor
An entity responsible for making contributions to the content of the resource.

FRIL Metadata Standard

1. Data Set **Identifier**: a unique identification number; used to reference the image and its associated metadata

2. **Date**: date of creation of the fiber image in year, month, date.
3. Date of Object: Historic date of creation of the textile from which the fiber was obtained, or the best approximate date

4. **Source**: Name or description of source textile object from which the fiber was obtained, using current collection catalog title, if available.

4.1. **Subject & Keywords**: Description of textile object type from which the fiber was obtained, using standard nomenclature (with current catalog text).

5. Place of Origin: Location where textile from which the fiber was obtained was manufactured

6. Creator Entity: Identification of type of manufacturer of the textile from which the fiber was obtained
6.1. **Creator**: Name of maker of the textile from which the fiber was obtained

7. **Publisher**: Organization sponsoring the image and associated data set

8. **Rights** Management: Organization holding the rights to the fiber image, associated data and images, and restrictions on data sharing

9. **Contributor**: Name and title of individual(s) performing fiber analysis, image collection or study

WTC Standards

- **To optimize preservation data as an effective tool in determining best environment for an item and reduce risk**
- **Balanced and standardized set of metadata elements based on the DC Metadata Element Set**
- **In development based on the *Dublin Core Metadata Element Set***
  - To support broad cross section of users
- **Range of requirements**
  - Environmental conditions for storage and exhibition
  - Condition and display potential based on fragility and treatment

9/11 World Trade Center Archive

Dublin Core - Metadata Challenges

- **Diverse range of objects from Ground Zero**
  - Immense size and complex items including:
    - 30-60 ton rusting steel columns and building sections
    - 15-30 ton composites
    - Crushed emergency vehicles
    - Photo and paper covered “Last Column.”
  - Structurally and environmentally fragile.
- **Categorized and prioritized for treatment, storage and display by *risk***
  - Based on inherent characteristics & condition of object
  - Preservation requirements for storage and/or display conditions and environment.

WTC Archive Dublin Core Elements

Metadata Standard Elements

1. Identification Information

Basic information about the objects and images (the data set); domain must be in accordance with Dublin Core Metadata Element definitions.

2. Sample Reference Information

Details about the original object from which the data set is derived.

3. Imaging and Spectral Data Reference Information

Information describing the conditions used to acquire image objects.

4. Data Type Information

Information about the technical format and protocols for the images and data elements.

5. Object Description Information

Information about the object.

6. Deterioration Information

Information about the object and any changes or deterioration observed.

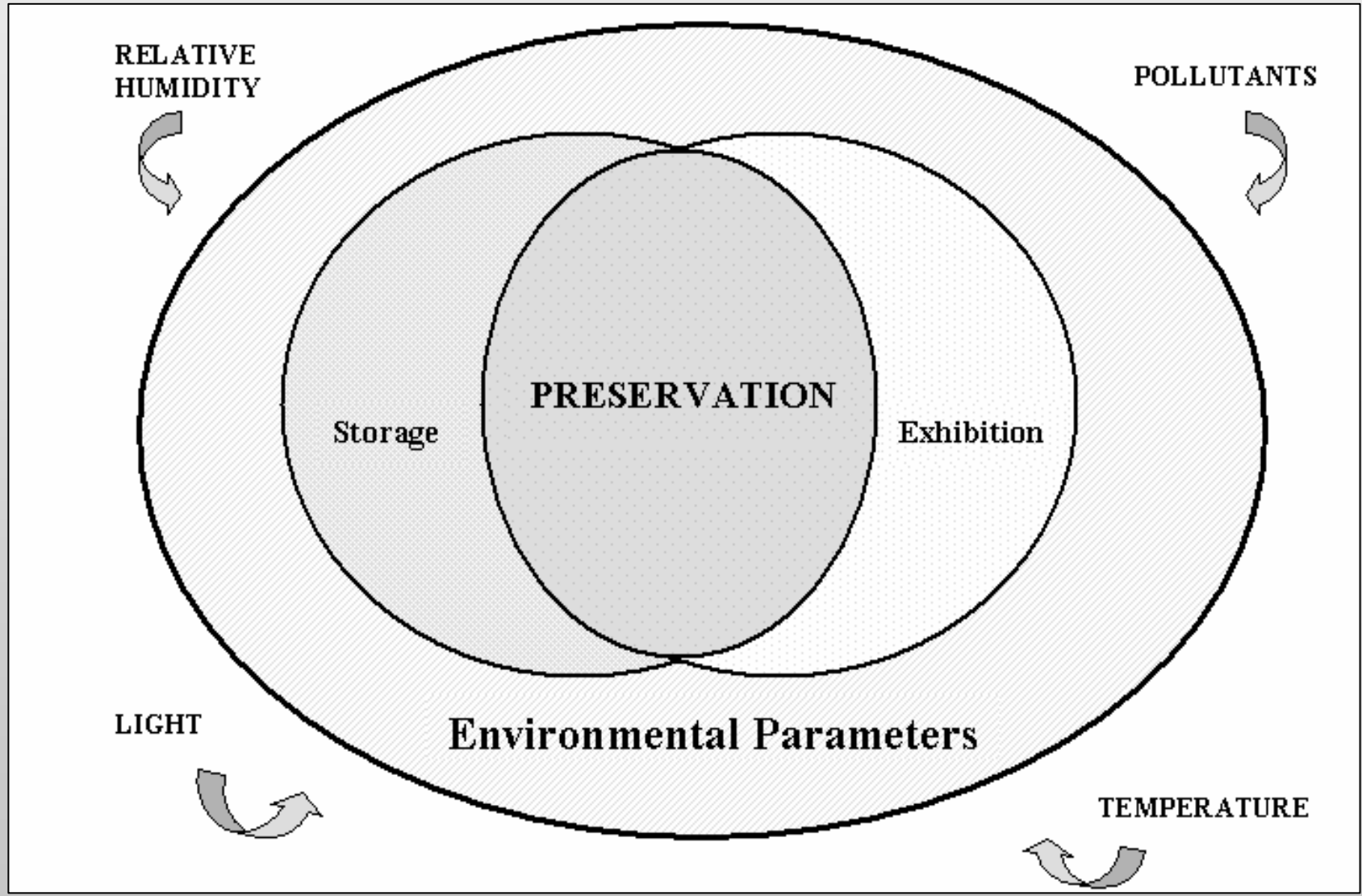
7. Metadata Reference Information

Information about the status of the metadata information, and the responsible party.

WTC Database Complex Object Descriptors

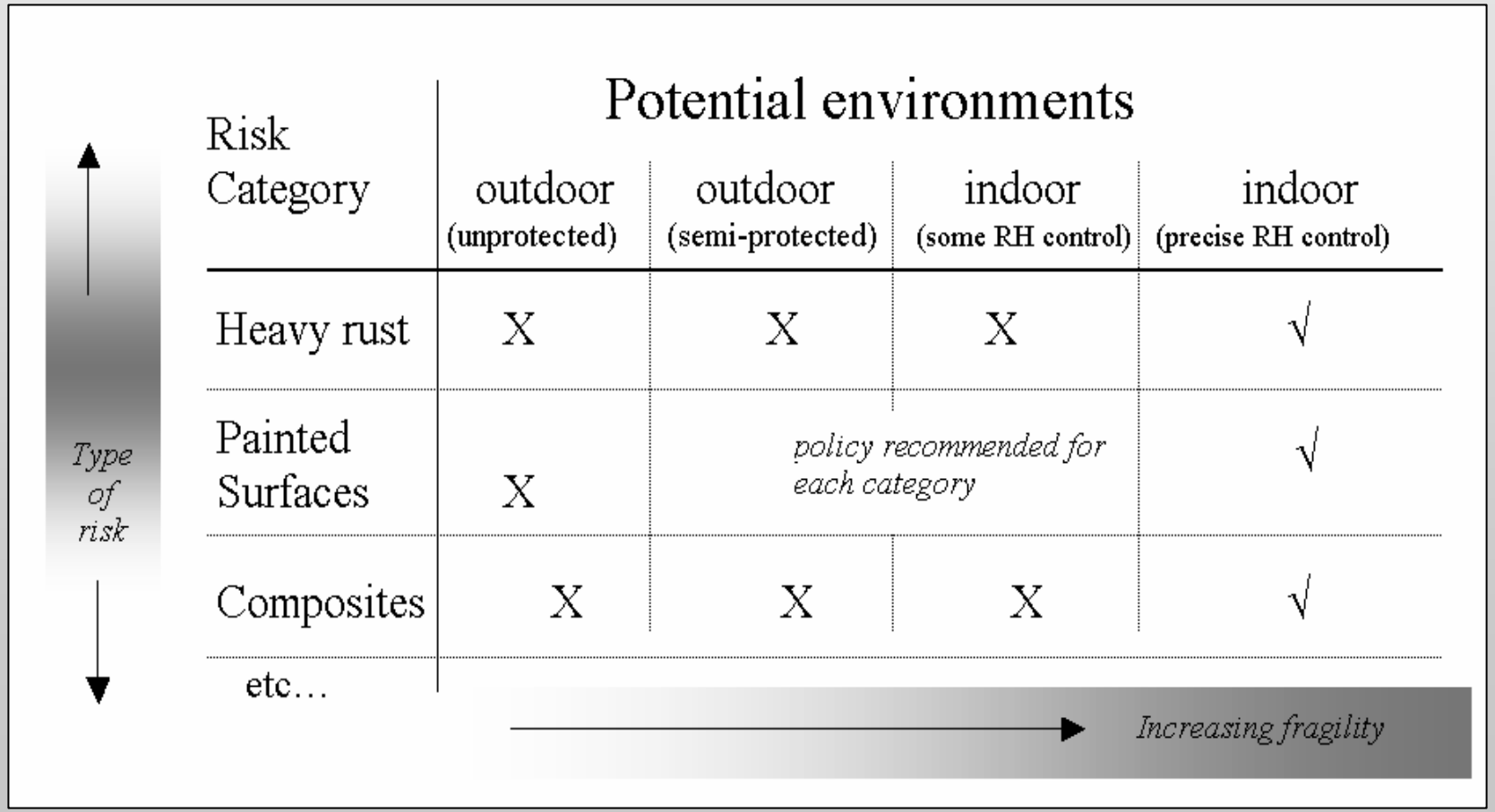
Description	Material	Notes
Column	Steel	Due to axial overloading, this column **bent into a "U" shape**. A built-up steel section, no buckling of steel on compression side of the bend, one tear on tension side of the bend.
North Tower Antenna	Steel	This part of the antenna is the highest accessible point of the North Tower. A steel pipe stair ladder extended through the interior of the antenna and ended at a hatch at the top of the 3.5 ft. x 3.5 ft. platform 325 ft. above roof.
Structural Triad	Steel	North Tower façade structure. Located at an elevation of approx. 70 ft above the concourse level. Sections of stainless steel mullions attached to the sides of the column.
Exterior Column with Spandrel	Steel	North Tower façade structure. Located at an elevation of approximately between the first and second floors. The following text is painted on the steel: "SAVE" and "5 NORTH" in orange spray paint.
Beam	Steel	Steel beam with connection plates at one end. The other end has been cut for removal. The beam has folded near its mid-point. No visible identification markings on the steel.

Effect of the Environment on Preservation



Categorization of Risk vs Environment

Standardization of Risk and Potential Environmental Deterioration



Ongoing WTC Archive Development

- Challenge of integrating existing classification systems
- Standardized terminology essential for object description, database searching, and linking to WTC site location information
- Without Dublin core identification elements, controlled vocabulary becomes meaningless
- Continued development of rigorous consistent vocabulary to define deterioration for widely disparate objects
- Links to environmental information to track changes and levels of degradation

Conclusions

- **Dublin Core can serve as an effective common information standard for object preservation databases with images and text**
  - Use for storage, management, access & sharing of critical preservation information
  - Continued integration of Dublin Core elements critical to utilization and management of large and complex databases
- **Dublin Core offers tremendous potential to meet needs of museums and preservation databases worldwide**
- **Enhanced with controlled vocabulary to allow ease of analysis and integration of preservation data from various sources**
  - Accurately document changes in artifact and environment

Conclusions

- **Expanded focus of preservation databases requires integration of dynamic environmental preservation information**
  - Effectively capitalizing on *Dublin Core Metadata Element Set*
- **Web accessibility allows international collaboration with global access to preservation information**
  - Ensures comparative study of artifacts from similar materials, eras, and conditions with images and metadata to make informed preservation and conservation decisions
- **Ensures effective stewardship of our cultural heritage for future generations**