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A Framework for Contextual Metadata Used in the Digital Preservation of Cultural Objects

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Abstract The quality and the quantity of contextual information found in the descriptive metadata associated with digital representations of cultural objects are frequently inadequate for assuring that users will understand the nature of both the original object that has been digitally preserved, and the digital representation itself. This paper proposes and defines a framework for ensuring that relevant contextual metadata is easily collected and maintained. After identifying and describing eight important dimensions of context, the paper shows how implementing the framework, through a series of questions and prompts, results in a descriptive metadata record that accommodates the important aspects of an object's context. Using two very different cultural objects as examples, an Etruscan tomb painting and a 19th century bridge, the framework demonstrates that sufficient contextual information can be recorded in a metadata schema to enable effective future search, retrieval, examination, use, management, and preservation interactions.

Introduction

Understanding as much about the context of an object as possible, such as its history, composition, purpose, authenticity, ownership and utility, is critical to a meaningful understanding of that object. This holds true for appreciating all types of cultural objects — a work of art, a sound recording, a monument of historic significance, or a digital photograph of that historic monument. Unfortunately, the metadata captured during digital preservation that is necessary for providing a good understanding of an object is often fragmentary and incomplete. In an effort to remedy this situation, this paper identifies the kind of information that needs to be captured and presents a framework for recording this metadata. Digital

surrogates of cultural objects were chosen as the focus of this project as they are primarily non-textual in nature, and so the contextual information recorded about these items is particularly important.

An analysis of the various kinds of context found in the digital preservation literature was undertaken to develop the framework presented below. This literature review, also published in *D-Lib Magazine*[1], served to identify and investigate the various forms of context believed to be useful in digital preservation efforts surrounding cultural objects. The main themes found in the literature were then used to develop the basic dimensions of the framework. Each dimension speaks to an aspect of context distinct from the others and suggests the richness of the data that needs to be recorded. As each dimension of the framework encompasses a specific set of qualities, definitions of the dimensions would be highly useful here.

Definitions of the Dimensions of Context

Broadly speaking, the **technical** dimension surrounding context concerns digitization processes and techniques. This includes aspects such as file formats, hardware, software, operating systems, migration, emulation, storage, data loss, encapsulation of technical information, and compatibility issues. It identifies the processes completed, the individual(s) who performed the work, and the dates when the work was completed. Furthermore, this dimension includes information about the various versions of files, file names and storage locations, the software used, and the equipment upon which the work is to be displayed.

The next dimension, readily recognizable as critical to understanding an item's contextual information, is **utilization**. This dimension of context speaks to the needs of users. It includes audience needs, task support, tools required for interactions with the item, accessibility, audience characteristics, and the types of analyses to be supported. Additional issues described within this dimension concern the use setting of the original and the digital item. This includes the political, social, and organizational environment of its use, and details about the digital content's accessibility and persistence over time.

Those characteristics of a work that are dependent upon a direct, tangible interaction with items are addressed in the **physical** dimension of

context. This includes features of analog and digital items which are sensory in nature. Issues relating to how an object is experienced (e.g., scale, materials, texture, arrangement, sound, brightness, smell, etc.) are recorded within this dimension. As the material nature of an item is changed in the analog to digital transformation, and also in the mediated interactions which result from the software and hardware used, the details recorded here can be critical to understanding the original object.

Other aspects lost in the analog to digital transition have to do with determining an item's extent, how the parts of a single item, or several items, are related to one another, impermanent relationships between digital content, the various paths that can be taken through an object, and network linkages between items. Based on the unclear boundaries and the sometimes mutable relationships which exist with digital items, this dimension of context is named **intangible**.

Another dimension to be identified as useful to contextual information concerns the reasons why a digital item is preserved and identifies specific decisions about its preservation, storage and handling. This dimension, **curatorial**, identifies the individual(s) who requested that an item be preserved, and provides background information concerning the motivation for preservation efforts. Also recorded within this dimension is information concerning additional files representing the same object and/or the same digital item. This information is useful in making informed decisions about the uniqueness of digital files and the coverage of a single object. Finally, aspects concerning the care and handling of the digital file are addressed within this dimension.

The next dimension of context, **authentication**, is closely related to that of curatorial, as it concerns the verification of the digital content. This dimension includes how the content has been maintained and it addresses security issues. For example, this dimension asks who has had access to the digital data and who has been responsible for its protection. It also records information pertaining to any modifications made to the data after deposit and explains any changes that have been made to the data.

Authorization is the dimension of context which records information concerning the intellectual property rights surrounding the digital content. This dimension identifies the copyright holder and delves into aspects surrounding rights management such as legal agreements regarding the specifics of access, use and exchange.

The final dimension, **intellectual**, is concerned with the significance of the original cultural object and, by proxy, its digital surrogate(s). This dimension contains information that is typically understood to be the scholarly record of an item. Information pertaining to an object's meaning, function, technique of manufacture, historical import, cultural narratives and the communication of ideas are addressed in this dimension.

Each dimension of context highlights a unique aspect important to future interactions with, and knowledge concerning, digital content. Some dimensions speak to an item's physical manifestation, several examine the digital expression and yet others deal with aspects that reflect the intellectual history surrounding an object. The variability seen in the dimensions' basic characteristics helps to highlight the complexities involved in recording contextual information about digital content, and point to the need for a framework within which to capture the critical information.

Cultural materials in a non-textual form are particularly challenging items to bring forward in time via digitization. In the case of these cultural objects lost knowledge about the original item and its digital surrogate is not easily recreated through a close reading of the object-surrogate itself. This situation means that a critical evaluation must be made of the kinds of data being recorded for cultural materials lest we run the risk of saving content that has no real useful future.

Development of the Dimensions of Context

As each dimension of context identified above is a somewhat abstract concept, a series of questions and prompts was developed to aid in the practical application of the framework. The questions and prompts presented here are not meant to be all-inclusive or applicable to every situation. However, in their current form they help to point out the breadth of information that needs to be accounted for within each dimension. For example, the questions and prompts in the Technical dimension clearly address many areas; the format of the original and the digitized items, the digitization process, who performed the work, the size of the digital item, the hardware and software used in the creation of the item, what technologies will be needed for future access, naming of the archived file, file locations, and the names of associated files. Making each

data collection point explicit in this way helps ensure that important contextual information is recorded for future use and understanding of the item.

Collecting useful contextual metadata for non-textual, cultural objects was the focus of this project. The framework was developed for this specific category of objects. How well this framework would support text-based object metadata collection, or metadata for objects in domains outside of the cultural heritage sector, is not clear.

Technical Dimension

Format of original: What format is the original item?

Digitization date: When was the item digitized?

Digitized by: Who digitized the item?

Digitization format (image, audio, video, animation file type): What format is the item?

Digital file format: What file type was used to create the digitized item?

Digital dimensions: Each question asks about the dimensions of the archival version of the digital file.

> **Resolution:** What is the resolution for the archival file?
>
> **Bit Depth:** What is the bit depth for the archival file?
>
> **File size:** What storage space is required to save the archival file?
>
> **File dimensions as displayed/ played:** What is the extent of the file? This may be recorded as pixels high and wide, length of playback, etc.

Digitization equipment (scanner, digital recorder, digital camera): What digitization device was used to create the digital file?

Post-digitization processes (cropping, corrections, data cleaning): What post-digitization processes were completed to ready the item for use or preservation in the digital archive?

> **Software used:** What software was used for each process?
>
> **Date completed:** When was each process completed?

Completed by: Who completed each process?

Archival file named: What is the name of the file used for preservation purposes?

Archival file located: Where is the file used for preservation purposes located?

Derivative file(s) named: What is the name for each derivative file created from the archival file?

Derivative file(s) located: Where is each derivative file located?

Equipment needed for playback: What hardware/device is needed to interact with the digital file?

Software needed for playback: What software is needed to interact with the digital file?

Other technical concerns: Are there additional technical issues associated with this item? If so, please describe these.

Utilization Dimension

Audience needs of original item (educational, leisure, legal, medical, youth, etc.): What is the primary need addressed by this item? What is the original impetus to add or preserve the item?

Audience needs of digital item (educational, leisure, legal, medical, youth, etc.): What is the primary need addressed by this item?

Diversity of original audience (homogenous or heterogeneous): What is the basic type of audience for this item?

Diversity of digital audience (homogenous or heterogeneous): What is the basic type of audience for this item?

Social, political, organizational setting for original item's use: What is the typical setting for the item?

Social, political, organizational setting for digital item's use: What is the typical setting for the item?

Audience task support, analyses and interactions for original item: How would past, current, and future audiences use the item? What task(s) would it support? What analyses would be carried out? What

interaction(s) between the user and the item would exist? What tools are necessary to interact with the digital content?

Audience task support, analyses and interactions for digital item: How would past, current, and future audiences use the item? What task(s) would it support? What analyses would be carried out? What interaction(s) between the user and the item would exist? What tools are necessary to interact with the digital content?

Accessibility of original item (non-technical restrictions): How accessible is this item? Is only the surrogate of the item available? Is there a particular aspect of the item that is restricted?

Accessibility of digital item (non-technical restrictions): How accessible is this item? Is only the surrogate of the item available? Is there a particular aspect of the item that is restricted?

Persistence of original item (importance of future access): How critical is lasting access to the original item? Why should access to the item be maintained? At what point can this content be discarded?

Persistence of digital item (importance of future access): How critical is lasting access to the digital item? Why should access to the item be maintained? At what point can this content be discarded?

Physical Dimension

Format of original: What is the physical form of the original item?

Scale of original: What are the dimensions of the original item?

Material(s) of original: What materials were used in the creation of the original item?

Technique(s) used in creation of original: What techniques were used in the creation of the original item?

Surface/textural/auditory/olfactory characteristics: What sensory characteristics are present in the original item?

Behavior or functionality of original: How does the physical item behave/function?

Relationship(s) and, or arrangement of parts or items: How is the original item arranged or related to its parts, or other items?

Creator's intention: What was the creator's intention in the creation of this item? How was the original item meant to be experienced?

Intangible Dimension

Object boundaries: What is the boundary of the digital file? How can the boundary of the digital file be identified and clarified?

Relationships and links: How does this digital file relate to other digital files of the same item or related items? Is the file an exact copy of another file, is it an earlier or later version of the file, are there alternate views of the same item available, does this file show a detail of an item? Does the file show a view of one item in a set of items (e.g., chess set, coffee service, etc.) and can these relationships between items and files be made explicit?

Curatorial Dimension

Preservation requestor and background: Who was responsible for requesting the material being preserved? What background information about this individual or group useful to the curatorial context?

Preservation reason for digital item: Why did this digital file become part of the preservation record?

Decisions of note: Additional decisions of note that were made concerning the preservation of the materials?

Special storage needs: Do the files require specialized storage needs?

Special handling needs: Do the files required specialized handling needs?

Multiple surrogates: Do multiple representations of this work exist?

> **List multiple surrogates, different view:** If multiple surrogates exist, please note files.
>
> **Multiple surrogates of same view:** Are there multiple surrogates of the same view?
>
> **List multiple surrogates, same view:** If multiple surrogates exist, please note files.

Authentication Dimension

Provenance: How has the digital content been maintained and who has had responsibility for the item(s)? Where has the item been stored? How secure is the storage at each location? How long has the content been stored?

Digital file change tracking: Has the file been modified? How has the file been modified?

> **Date of change:** When was the change made?
>
> **Changes made:** What changes were made?
>
> **Changes made by:** Who made the change?
>
> **Additional versioning information:** Why was the change made? Are there additional aspects of the change needing explanation?

Authorization Dimension

Copyright holder: Who holds intellectual and legal copyright over the item?

Copyright holder's contact information: What is the copyright holder's contact information?

Rights management: Is there a written copyright agreement between the copyright holder and the institution holding the digital file? Can the item digitized according to copyright law and, or any agreement(s) made with the copyright holder? How can the digital item be accessed, used and exchanged according to copyright law?

Copyright expiration: When does the current copyright expire?

Intellectual Dimension

Meaning: What was the artist expressing, or alternatively, what has the item come to signify? This is probably the closest contextual facet to traditional cataloging for cultural materials since it is a parallel idea to subject indexing. Subject terms applied to cultural objects tend to be what the item is, or what it is a representation of, rather than what it is about, however.

Function: What was the object's intended purpose?

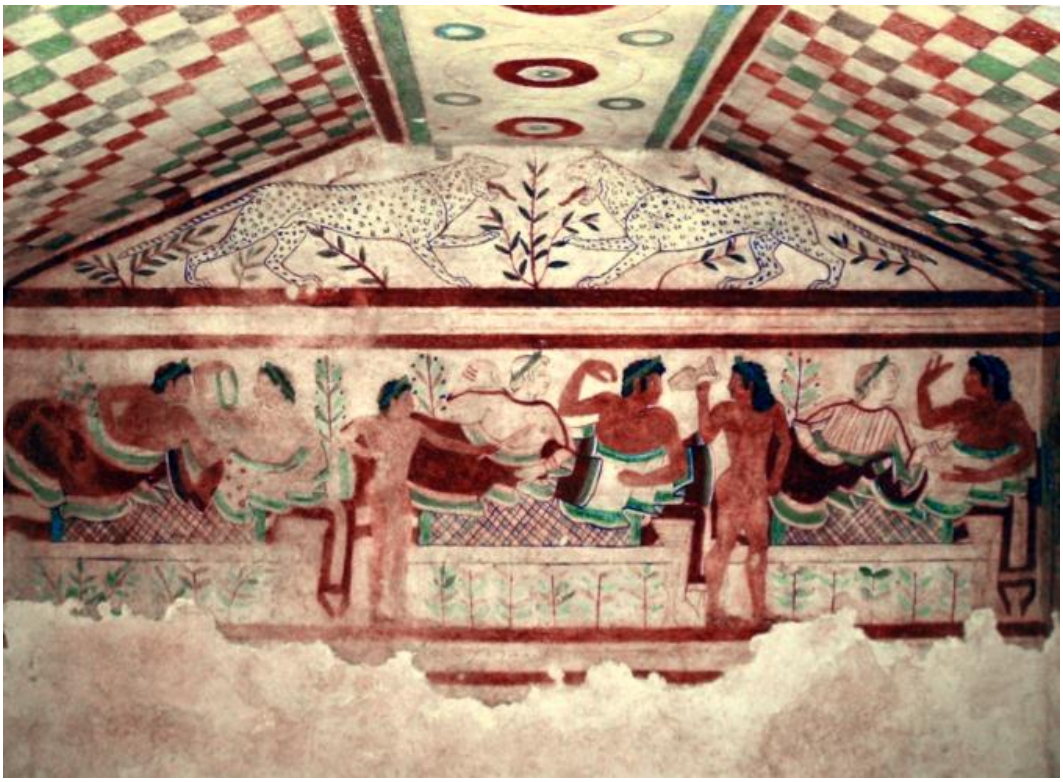
Technology: What technologies were used in the creation of the object? How were the materials manipulated to create the object?

Historical or cultural import: Why is the original object important?

Cultural narratives: What is the story behind the object?Utilization Dimension

Application of the Dimensions

Even across non-textual cultural objects, practical application of the framework is likely to vary according to the needs and availability of institutional resources, as well as the specific items being preserved. For example, contextual information recorded in the framework for a scholarly research collection of items concerning Pre-Columbian pottery is likely to take a different form than that recorded for a limited number of items on the same topic held in a public library. The following examples, images of cultural objects chosen at random, show a practical application of the framework. Note that while the data recorded for many of the questions is factual, some of the entries were simulated to protect the privacy of individuals and institutions.



Example 1: *Tomb of the Leopards*. Tarquinia, Italy. c. 480 B.C. (Image credit: Al Mare)

Technical Dimension

Format of original: analog

Digitization date: digital photograph, June 16, 2001

Digitized by: Al Mare

Digitization format (image, audio, video, animation file type): image

Digital file format: jpg

Digital dimensions:

Resolution: 300 dpi

Bit Depth: 24

File size: 91.5 MB

File dimensions as displayed/ played: 1544 x 1131

Digitization equipment (scanner, digital recorder, digital camera): digital camera - Canon Digital IXUS 300

Post-digitization processes (cropping, corrections, data cleaning): Auto-contrast, image rotation, auto-color balance carried out on derivative files

Software used: PhotoShop 7.0

Date completed: June 17, 2001, color balance adjusted on derivative files Jan. 12, 2012

Completed by: Diana Romano

Archival file named: Mare_2001_00206.tif

Archival file located: Drive: 2001_2 Folder: Mare

Derivative file(s) named: Mare_2001_00206L, Mare_2001_00206M, Mare_2001_00206S

Derivative file(s) located: Drive: 2001_2 Folder: Mare_Derivatives

Equipment needed for playback: standard computer and monitor

Software needed for playback: image viewer capable of displaying tif and jpg files

Other technical concerns: Color adjusted on all derivative files on Jan. 12, 2012 by Diana Romano.

Utilization Dimension

Audience needs of original item (educational, leisure, legal, medical, youth, etc.): cultural

Audience needs of digital item (educational, leisure, legal, medical, youth, etc.): educational

Diversity of original audience (homogenous or heterogeneous): homogeneous - familial

Diversity of digital audience (homogenous or heterogeneous): homogeneous - academic

Social, political, organizational setting for original item's use: funerary

Social, political, organizational setting for digital item's use: educational

Audience task support, analyses and interactions for original item: viewing paintings in situ, lighting is required as this is an interior space

Audience task support, analyses and interactions for digital item: knowledge construction, visual analyses, visual comparisons to other items, ability to zoom and pan image would be useful

Accessibility of original item (non-technical restrictions): The original painting is located in a tomb in the necropolis of Monterozzi, also known as the Etruscan necropolis at Tarquinia, Italy and as of the date of this record this tomb can be visited.

Accessibility of digital item (non-technical restrictions): no accessibility restrictions, beyond those associated with copyright of digital image by photographer

Persistence of original item (importance of future access): As this painting is an important example of Etruscan funerary art, access to the item and its surrogates should be maintained. The painting has historical, technological and cultural significance.

Persistence of digital item (importance of future access): The digital image should be maintained in perpetuity.

Physical Dimension

Format of original: wall painting

Scale of original: wall height at highest point, approximately 2.5 meters

Material(s) of original: lime plaster and pigments

Technique(s) used in creation of original: fresco secco

Surface/textural/auditory/olfactory characteristics: Wall surfaces have applied lime plaster. Painted decoration was created through the use of natural pigments.

Behavior or functionality of original: stationary, painted representation used for funerary purposes

Relationship(s) and, or arrangement of parts or items: The walls and ceiling of the tomb have been painted. The painting represents a single

scene of feasting within a tent in an outdoor setting, as can be seen by the plant life illustrated behind and beneath the couches and figures. A patchwork painted ceiling is found above the scene. Two confronting leopards with plants are painted in the pediment area above the main scene opposite the entrance.

Creator's intention: Although the exact intent behind the creation of this painting is unknown, the painting in this tomb represents Etruscans feasting within a tent. Images of feasting found in funerary contexts are thought to be a reflection of the feast which took place at the time of interment of the deceased.

Intangible Dimension

Object boundaries: The digital image records the wall of the tomb opposite the entrance. The left corner of the tomb has been cropped slightly and is outside of the frame. The right corner of the tomb is just visible on the right. The top boundary is cropped within the second ring of the third central circle from the back wall. The bottom boundary is unclear and within the poorly preserved section of the lower wall. Its boundary lies above where the wall meets the floor.

Relationships and links: An image taken at the same time shows a detail of the couple in the left corner of the wall opposite the entrance - Mare_2001_00207.tif.

Curatorial Dimension

Preservation requestor and background: Dr. Katz, an archaeologist associated with the university, is currently examining the Etruscan tomb paintings at Tarquinia for a scholarly article.

Preservation reason for digital item: This image should be preserved since the wall paintings' condition is in danger of deteriorating and this will likely increase with the further passage of time.

Decisions of note: Dr. Katz noted that the color of the digital image is slightly green when compared to the original painting. Although the derivative files have been color corrected, future images derived from the archival image should have their color adjusted when created.

Special storage needs: none

Special handling needs: none

Multiple surrogates: yes

> **List multiple surrogates, different view:** Detail of wall opposite entrance: Mare_2001_00207.tif, Details of musicians and dancers on the right wall when entering tomb: Mumford_2007_00034, Mumford_2007_00035, Mumford_2007_00036, Details of servants on the left wall when entering the tomb: Mumford_2007_00037, Mumford_2007_00038.
>
> **Multiple surrogates of same view:** no
>
> **List multiple surrogates, same view:** not applicable

Authentication Dimension

Provenance: The digital file was uploaded to the hard drive of Al Mare's personal computer on June 16, 2001. It was uploaded to the Wikimedia site on December 12, 2011 by the photographer. Diana Romano copied the digital image received from the photographer on an external drive onto the networked drive named 2001_2 on June 17, 2001. The file can be found on the 2001_2 drive in the folder titled Mare. The 2001_2 drive is accessible and modifiable by staff in the Digital Media Department only. The drive and its contents are maintained by the Information Technology Department and they oversee the security and perform routine back-ups and data analysis checks of the data stored on the drive.

Digital file change tracking: The derivative image files have been color balanced.

> **Date of change:** Jan. 12, 2012
>
> **Changes made:** color balance adjusted
>
> **Changes made by:** Diana Romano
>
> **Additional versioning information:** Dr. Katz noted the image had a greenish cast that was not found in the original painting. The archival file has not been changed from its original state.

Authorization Dimension

Intellectual Dimension

Meaning: This scene is interpreted as a composite of actual events and underworld activities. The painting represents a funeral complete with banquet, music and games. We know from other Etruscan tombs that Hades and Persephone, both underworld goddesses, partake in similar activities. One of the male figures shown in the image holds an egg, a common symbol in Mediterranean art which may have connections to the theme of renewal. The colorful ceiling of the tomb, with its checkerboard and concentric circle design, indicates that the event takes place under a tent. That the scene is set outdoors can be noted by the shrubs represented beneath and behind the couches. This event is believed to represent a funerary banquet which would have taken place just over a tomb's entrance at the time of the deceased person's interment.

Function: Comforting the tomb's patron and the family and friends of the deceased.

Technology: Carving of the tufa to form the tomb, choice of and processing of pigments, fresco painting technique.

Historical or cultural import: This is fairly complex work for historical and cultural reasons. The lively figures represented are uniquely Etruscan, yet the artist of the central banquet scene also shows the influence of Greek art. The women's clothing is similar to those worn by their Greek counterparts, although there are distinctly Etruscan aspects to them. The men's mantles are purely Etruscan, however. An additional Etruscan aspect to the painting concerns the interaction taking place between the men and women. Here women and men are shown banqueting together, and this is in contrast to Greek scenes where women were excluded — unless they were hetairai (courtesans). This may suggest that the role of

women in Etruscan society was different than what was found among the Greeks at that same time. The rendering of women as light-skinned, while men are showed as dark-skinned is supported by a long artistic tradition. It speaks of women who do not spend time outside and all the cultural implications that go along with sheltering, protecting, and, or hiding women. Musical instruments represented are also noteworthy and they too have been borrowed from their Greek neighbors.

Cultural narratives: A family gathering with eating, drinking, and music with a funerary purpose. This scene does not contain explicit imagery associated to the underworld. The scene provides us with a sense that the Etruscans had a refined and pleasant lifestyle. Interestingly, this joie de vivre is not present in all Etruscan funerary art. Other Etruscan tombs depict themes that are decidedly more violent and morbid. Although the variation in themes found in Etruscan tomb paintings is not well understood, it is believed that the themes may indicate political and familial dealings.

Example 2: Roebling and Roebling. *Brooklyn Bridge*. (Image credit: Steve W. Lee © 2005)

Technical Dimension

Format of original: analog

Digitization date: January 1, 2005

Digitized by: Steve W. Lee

Digitization format (image, audio, video, animation file type): image

Digital file format: jpeg

Digital dimensions:

Resolution: 300 dpi

Bit Depth: 24

File size: 200.7 MB

File dimensions as displayed/ played: 2816 x 2112

Digitization equipment (scanner, digital recorder, digital camera): digital camera - Canon Powershot SD600

Post-digitization processes (cropping, corrections, data cleaning): no post-digitization processes

Software used: not applicable

Date completed: not applicable

Completed by: not applicable

Archival file named: Lee_2005_02317.tif

Archival file located: Drive: 2005_5 Folder: Lee

Derivative file(s) named: Lee_2005_02317L, Lee_2005_02317M, Lee_2005_02317S

Derivative file(s) located: Drive: 2005_5 Folder: Lee_Derivatives

Equipment needed for playback: standard computer and monitor

Software needed for playback: image viewer capable of displaying tif and jpg files

Other technical concerns: none

Utilization Dimension

Audience needs of original item (educational, leisure, legal, medical, youth, etc.): functional structure used for travel, transportation and commerce

Audience needs of digital item (educational, leisure, legal, medical, youth, etc.): educational, research

Diversity of original audience (homogenous or heterogeneous): heterogeneous

Diversity of digital audience (homogenous or heterogeneous): homogeneous - academic

Social, political, organizational setting for original item's use: civic structure for travel, transportation and commerce

Social, political, organizational setting for digital item's use: educational

Audience task support, analyses and interactions for original item: allows travel over East River between the New York City boroughs of Manhattan and Brooklyn, supports movement of goods and people

Audience task support, analyses and interactions for digital item: knowledge construction, visual analyses, ability to zoom and pan image needed for close examination of architectural systems

Accessibility of original item (non-technical restrictions): Fully accessible structure, which currently carries non-commercial motor vehicles, pedestrians and bicycles. In its earlier history it was also used by horse-drawn vehicles, streetcars and elevated trains

Accessibility of digital item (non-technical restrictions): Fully accessible image, with no copyright or technical restrictions for usage.

Persistence of original item (importance of future access): The bridge plays an important role in allowing people to travel over the East River between the two boroughs of Manhattan and Brooklyn. There are several other bridges that span the East River currently. However, the bridge is a culturally significant landmark for both New York City boroughs.

Persistence of digital item (importance of future access): This image

offers a general view of the bridge from Manhattan. This item should be maintained indefinitely, with its destruction allowable only after the accessioning of another image with similar levels of quality and accessibility.

Physical Dimension

Format of original: architecture

Scale of original: length of span 1595.5 feet (486.3 m); width: 85 feet (26 m); height above mean high water: 135 feet (41.2 m)

Material(s) of original: limestone, granite, cement, cast iron, steel

Technique(s) used in creation of original: masonry caissons and towers, suspended steel deck with steel cable stays

Surface/textural/auditory/olfactory characteristics: Crossing the Brooklyn Bridge is often a communal experience, as many tourists make the passage from Manhattan to Brooklyn for the famous pizza served up by Grimaldi's and the ice cream by the Brooklyn Ice Cream Factory. The crossing is often an exciting experience thanks to the cars passing by beneath the upper deck, the ships slowly plying the East River, passing cyclists and pedestrians, and the fluttering of flags atop the towers.

Behavior or functionality of original: Functional structure providing passage over a body of water.

Relationship(s) and, or arrangement of parts or items: The bridge has a separate deck for pedestrians and bicyclists that is located above the deck for motorized vehicular traffic. The pedestrian/cyclist deck runs along the center of the bridge and allows for close inspection of the Manhattan and Brooklyn towers.

Creator's intention: John A. Roebling, who designed this, the longest spanning bridge in the world at the time of its opening in May of 1883, created a lasting monument that attests to the ingenuity of humankind.

Intangible Dimension

Object boundaries: View of bridge from East River Bikeway southeast towards Brooklyn. Both towers are visible in this image. Complete view of

Brooklyn side of bridge. Manhattan end of bridge truncated. Northwest end of bridge and Manhattan outside of the frame to left of image, as viewed.

Relationships and links: View of bridge taken on the same day, by the same photographer, using the same equipment. View of bridge from Brooklyn northwest toward Manhattan Lee_2005_02318.tif; detail of northwest (Manhattan) tower Lee_2005_02319.tif; close-up of deck and cables at northwest (Manhattan) tower Lee_2005_02320.tif; view of traffic crossing bridge as seen from southeast (Brooklyn) tower towards Manhattan Lee_2005_02321.tif

Curatorial Dimension

Preservation requestor and background: Stephanie Lapeer, historian who is working on a book which examines how the Brooklyn Bridge has been illustrated across time.

Preservation reason for digital item: This high quality image provides a clear view of the bridge in 2005.

Decisions of note: none

Special storage needs: The archived file is large and so accommodations may need to be made for its copying and storage for preservation purposes.

Special handling needs: none

Multiple surrogates: yes

> **List multiple surrogates, different view:** Grossman_2006_00010.tif (aerial view); Grossman_2006-000011.tif (entire from the northwest); Grossman_2006-000012.tif (entire from the southeast); Richards_2003-44567.tif (detail of southeast (Brooklyn) tower); Lee_2005_02318.tif (view of bridge from Brooklyn northwest toward Manhattan); Lee_2005_02319.tif (detail of northwest (Manhattan) tower); Lee_2005_02320.tif (close-up of deck and cables at northwest (Manhattan) tower); Lee_2005_02321.tif (view of traffic crossing bridge as seen from southeast (Brooklyn) tower towards Manhattan).
>
> **Multiple surrogates of same view:** none

List multiple surrogates, same view: not applicable

Authentication Dimension

Provenance: The image was stored on Steve W. Lee's (photographer) password protected personal computer prior to being copied to Drive: 2005_5 Folder: Lee by Diana Romano on March 2, 2005. The 2005_5 drive is accessible and modifiable by staff in the Digital Media Department only. The drive and its contents are maintained by the Information Technology Department and they oversee the security and perform routine back-ups of the drive.

Digital file change tracking: no modifications made to the original file

Date of change: not applicable

Changes made: not applicable

Changes made by: not applicable

Additional versioning information: not applicable

Authorization Dimension

Copyright holder: Steve W. Lee

Copyright holder's contact information: SWLee@mail.com

Rights management: Copyright agreement with photographer allows the free use and exchange of the digital image. No restrictions.

Copyright expiration: Life of the photographer plus 70 years.

Intellectual Dimension

Meaning: although not overt, the work expresses the power and ingenuity of humankind. It is a powerful symbol of human accomplishment as the majority of the work was completed with basic hand tools and devices.

Function: Bridge allows people and goods to pass over the East River between Brooklyn, New York and Manhattan, New York.

Technology: Considered an important feat of engineering. John A.

Roebling is credited with developing a massive twisted steel cable consisting of multiple strands of wire wrapped within an outer layer of wire. This cable became a standard material used in suspension bridges. The design of this bridge created the longest suspension bridge in the world at the time of its construction. Its colossal masonry towers and high, arching suspended deck, rising to 135 feet above the high mean water mark of the East River at its midpoint, were designed so that the many ships navigating the busy salt waters of the tidal straight would not be impeded. The 135 foot clearance of this bridge became the standard for future bridge construction. Roebling designed the bridge to withstand structural loads 5 times what it would be required to carry. These careful calculations have meant that the bridge has been able to withstand the heavier loads of modern vehicles and traffic and any potential weaknesses of materials. The bridge was widened from 4 to 6 lanes of traffic, with its deck trusses and approaches redesigned by David Steinman, between 1944 and 1954 after trolley cars no longer used the bridge to cross the East River.

Historical or cultural import: Beyond its technological importance to the history of bridge building and engineering in general, is the fact that the bridge allows easy access between Brooklyn and Manhattan. As Brooklyn's population was roughly 400,000 at the time the bridge was completed and the borough contained many rural areas, its construction helped ease the overcrowding in Manhattan and ushered in the development of Brooklyn.

Cultural narratives: While the bridge has become an iconic symbol for the New York metropolitan area, it has had its share of misfortunes associated to it. Its architect, John A. Roebling, died as a result of an accident which occurred while he was examining a location for the Brooklyn tower of the bridge. Washington Roebling, who took over the position of chief engineer for the bridge after his father's demise, was paralyzed as a result of working in the caissons of the bridge. Emily (Warren) Roebling, Washington Roebling's wife, oversaw the completion of the bridge after his paralysis. Interestingly, she is not frequently acknowledged in the construction record for the bridge. In total, twenty individuals died as a result of the bridge's construction. Another twelve were killed within weeks of its opening in 1883 after a woman's scream panicked pedestrians who believed the bridge was going to collapse.

Future Work

Testing of the framework in a practical setting with collections of digital cultural objects is needed in order to judge its usefulness to the preservation process. Testing the dimensions with various collections and in different settings would help determine their clarity and practicality in practice and so a prototype will be developed and tested by individuals in the cultural heritage sector. An additional analysis will be undertaken of the metadata associated with cultural objects in current practice and how what is found maps to the dimensions presented here.

Conclusion

The work presented here sought to discover a means of alleviating the contextual gap which exists in the metadata recorded for cultural objects digitized for preservation purposes. Contextual information is fundamental to understanding many aspects about digital content. The framework presented here was developed to accommodate recording this critical information. Through the development of eight dimensions of context a fuller record of digital content is posited. As keepers of our cultural heritage, it is our responsibility to ensure that our digital preservation efforts include recording contextual information about each object to enable future retrieval, assessment, management, access, and use.

Notes

[1] For the review of the literature undertaken to reveal the various kinds of context described in the digital preservation literature, see Joan E. Beaudoin. (2012). Context and its role in the digital preservation of cultural objects *D-Lib Magazine*, November 2012, 18(11/12). http://dx.doi.org/10.1045/november2012-beaudoin1

About the Author

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