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SIGNIFICANT PROPERTIES

A. INTRODUCTION

Transformations

NARA's mission is to preserve and make available the permanently valuable records of the Federal Government. In determining the best strategies for providing electronic records for researchers, NARA will employ several different strategies, including providing access to records in their original formats, emulating the original environment, and transforming records to different digital file formats. Because we expect there to be costs associated with transformations, NARA will probably not perform transformations on a routine basis. For this reason, then, NARA will need to decide when electronic records need to be transformed. In any case NARA will always retain the version of the electronic record that it received from the creating entity. In creating transformations, NARA can use either the original record or a later transformation, depending on which will provide its users with the most desirable results. The decision to transform records is driven by either one of two events, or the combination of both:

- That the digital file format is at risk of obsolescence, or
- That NARA's research community requires an enhanced level of access.[1]

Authenticity

When transforming electronic records, the goal is to produce an "authentic version" that is usable to NARA's research community. The ERA Requirements Document defines "authentically preserved" thusly: "To maintain a record over time in such a manner that its identity is unquestionable and it is not corrupted."

In order for versions that NARA creates for whatever purpose to be considered "authentic," they must:

1. Be free of corruption,
2. Effectively reproduce the significant properties of all records that were transformed,
3. Capture the attributes and relationships detailed in the Archival Information Package (AIP) of each record for the new version, and
4. Have documentation of the processes and decisions by which transformations took place to satisfy the needs of official bodies that may need NARA to authenticate records.

This conforms to NARA electronic records Preservation Principle 1: "The goal of NARA's electronic records preservation program is to be able to produce authentic

[1] For a fuller development of these themes, see the Transformations White Paper on.

versions of electronic records that meet the needs of its research communities, including official bodies that require authentic versions."[2]

B. ARCHIVAL INFORMATION PACKAGE (AIP)

As noted above one of the features of an authentic transformation is that it captures the elements of an Archival Information Package (AIP), a concept that NARA has borrowed from the Open Archival Information System (OAIS) Reference Model. To the greatest extent possible, the ERA preservation framework adheres to the OAIS Reference Model.[3] The OAIS developed several useful concepts, such as "information packages," that define the relationships between a digital object and the contextual metadata that allow it to be understandable to users. The AIP, for example, is a logical concept that identifies the relationships between the digital object itself, the software that interprets the object and the contextual and provenance information that enables users to fully understand the record. The AIP is the lowest level unit that ERA must manage; in effect these are the "records" or "aggregates of records."[4] Authenticity then can only be maintained in transformed versions of a record when all of the relationships and attributes identified in the AIP of the original record are captured in the new transformed version.

So in practice this means that each of the elements of the AIP must be captured in the AIP for the transformed version of the record as indicated in Figures 1 and 2 below. All of this AIP metadata is mandatory for all transformations. This differs from the discussion of Significant Properties, which follows this section, in that the Significant Properties relate to those properties that may or may not be persisted over time. The significant properties that are selected for persistence, however, are also captured in the AIP of the transformed version.[5] Figures 1 and 2 indicate the relationship between the AIP information in the original digital file relate to the AIP information that must be captured in the transformed digital file.

For Content Information the following must be captured.

Type of Information	Information Required in the Transformed Record
Digital Object	Technical information about the transformed object(s).
Representation Information	Information about the internal relationships within the object, such as compound documents or attachments and the software needed to render the object.

[2] See NARA Preservation Conceptual Framework, v 1.0 for a fuller discussion of the Preservation Principles.
[3] See http://public.ccsds.org/publications/archive/650x0b1.pdf.
[4] See Appendix A for a full description of the AIP.
[5] Refer to the work of the Asset Catalogue Entry (ACE) re-design team for details on where and how the metadata will be stored.

Figure 1. Content Information Required in Transformed Objects.

For Preservation Description Information the following types of information must be captured.

Type of Information	Information Required in the Transformed Record
Reference Information	Capture the unique identifiers of the new version, as well as cross references to the original object.
Provenance Information	Capture the provenance information related to the original record.
Fixity Information	Capture the authentication mechanisms that were used to create the transformed copy, such as the integrity seal.
Context Information	Capture the context information related to the original record.

Figure 2. Preservation Description Information Required in Transformed Objects.

C. LITERATURE REVIEW

Essential Characteristics

As noted above in the section on authenticity, NARA must be able to reproduce the significant properties (or essential characteristics) of transformations of electronic records in order for them to be considered "authentic" so that the research community can use them effectively. The discussion of "essential characteristics" then begins with an acknowledgment that in any transformation something is always changed. In some cases things are added to the transformed version and in other cases things are subtracted. The question that the essential characteristics discussion focuses on then is whether we care about what was added or subtracted from the original. Some things are inconsequential ("non-essential"), while others are critical ("essential") for a researcher to fully understand the record. The ERA Requirements Document defines "essential characteristics" as: "Those properties/characteristics of electronic records that must remain unchanged through transfer, ingest, storage, and presentation or output of records." The issue becomes how best to apply this concept to NARA's electronic records program in a way that is scalable and extensible.

Several years ago, NARA appointed an Essential Characteristics (EC) Team to explore this issue. The EC Team concluded that the essential characteristics of a series of records "are found at the intersection of the record type, data type, and the series context in which they are created."[6]

[6] EC Team, "Essential Characteristics (And Attributes) of Electronic Records," p. 1.

The EC Team defined the "record type" as: "The intellectual form of the documentary material, such as a textual record (letter, memo, greeting card), digital photograph, and web record." The EC Team used the following list of "record types" on which to develop their analysis of characteristics that they deemed essential for electronic records. They began their analysis with the formats for which NARA had developed transfer guidance.[7]

Digital Record Types
Email
Databases
Digital Photography
Geographical Information Systems (GIS)
Textual (products of office automation software)
Web Records

Figure 3. EC Team's List of Digital Record Types.[8]

More recently the Technical Analysis Team (TAT) team developed draft essential characteristics analyses for the following additional records types:

Digital Record Types
Sound Recordings
Moving Images

Figure 4. TAT Team's additions to Digital Records Types List.[9]

The EC Team then developed an Essential Characteristics framework in which they defined general characteristics about any electronic record. These characteristics are listed below. The full set of sub-characteristics under each of these four headings can be found in Appendix C.

Characteristic	Definition
Appearance	Characteristics related to the visual presentation of records.
Behavior	Characteristics that allow interaction with the records.

[7] For the full text of the transfer guidance, see http://www.archives.gov/records-mgmt/initiatives/erm-guidance.html.
[8] See Appendix B for the full definitions for each Record Type.
[9] See Appendix B for the full definitions for each Record Type.

Characteristic	Definition
Context	The organizational, functional, and operational circumstances surrounding materials' creation, receipt, storage, or use, and its relationship to other materials. Most of these characteristics are not intrinsic to the records themselves but include a collection of information that is both internal and external to the records.
Structure	The characteristics that define how record elements are organized and interrelated. Note: While embedded or hyperlinked content may be found across record types, we may not know much about its structure, data type, or record type. We cannot capture every possible structural nuance of the records.

Figure 5. EC Team's Definitions of Each Essential Characteristic.

For each Digital Record Type, the EC Team developed an analysis and a template in which they identified the core (i.e., mandatory) and conditional (i.e., optional) sub-characteristics for that Digital Record Type. So, for example, appearance characteristics are far more important (core) for digital photography than for textual materials, where they are listed as optional (conditional). A full list of characteristics and sub-characteristics is provided in Appendix D.

Significant Properties

While NARA's EC Team was developing its framework, The National Archives (UK), assigned a team to explore a similar concept they called "significant properties." In a report sponsored by the Arts and Humanities Data Service (AHDS), project director Gareth Knight defined "significant properties" as "the characteristics of digital objects that must be preserved over time in order to ensure their continued accessibility, usability, and meaning of the records."[10] The UK Team grounded their work in the PREMIS Data Dictionary Model, which is the model that NARA will be using in Increment 3 for managing metadata in its Asset Catalogue Entry (ACE). PREMIS defines significant properties as: "Characteristics of a particular object subjectively determined to be important to maintain through preservation actions."[11] The UK Team identified five categories of significant properties, as shown in Figure 6 below.

[10] Gareth Knight, *Framework for Definition of Significant Properties*, 3/12/2009, InSPECT Project document, AHDS.
[11] PREMIS Data Dictionary for Preservation Metadata, March 2008, version 2.0, pp. 39-40.

Property	Characteristic
Content	Content is the abstract term to describe the expression of intellectual work. In a digital environment, Content may describe text, still and moving images, audio, and other intellectual products. EX: logical properties, duration, character count.
Context	Context may be applied to any information contained in the digital record that describes the environment in which the Context was created or that affects its intended meaning. Ex: Creator name, date of creation, description of the intellectual work, computer environment in which the Source was created (possibly).
Structure	Structure refers to any information that describes the relationship between two or more types of content, as required to reconstruct its performance. It may be applied to the intrinsic or extrinsic relationships contained in the performance. Ex: E-mail with attachments.
Rendering	The rendering category refers to any information that contributes to the re-creation of the performance. For example, it may be applied to the visual or audible Component. Ex: font type, color and size, and bit depth.
Behavior	Behavior is applicable to any information that describes the method in which the Content interacts with other stimuli. Stimuli may include the interaction of the user with the software, or interaction with other sources of information, such as an external resource that affects the content, context, structure, or appearance of the resources. Behavior is considered to be the most difficult characteristic to preserve - it is often tied to the capabilities of a particular software applications and may be difficult to translate. It is also difficult to define all behavioral characteristics in a quantitative manner. Ex: hyperlinks.

Figure 6. TNA's Definitions of Significant Properties.

In their initial report, the UK Team went on to apply their methodology to the following Digital Record Types: structured text, raster images, digital audio, and email.

D. UTILIZING THESE CONCEPTS IN ERA

As can be seen from the brief analysis presented above, there is a high degree of overlap between these two groups in terms of what properties must be persisted over time and in how to apply the concepts to archival electronic records. How can these concepts be employed effectively by NARA?

Terminology

We propose to use the phrase "significant properties," instead of "essential characteristics," because it seems to have wider usage in the digital preservation community and because it is what is used in PREMIS, the metadata model that NARA has adopted to manage metadata about its ERA's assets.

Definition

We propose to use the definition that the UK Team developed for significant properties: "The characteristics of digital objects that must be preserved over time in order to ensure their continued accessibility, usability, and meaning of the records." This definition's stress on the usability of digital records to the research community seems more in line with ERA's goal in determining when to transform records: "Are members of the research community who are likely to want to use a record, reasonably able to render and use it to meet their research needs?"[12]

Specific Significant Properties

The EC and UK Teams independently produced almost identical lists of significant properties/essential characteristics, as can be seen in the matrix presented in Figure 7 below. We propose that NARA use the list of characteristics and definitions developed by the EC Team.

EC Team Characteristics	UK Team Properties	Comparison
Appearance	Rendering	Virtually identical
Behavior	Behavior	Virtually identical
Context	Context	Virtually identical
Structure	Structure	Virtually identical
	Content	Not included in the EC Team list.

Figure 7: Comparison of Specific Significant Properties/Essential Characteristics.

When are Properties Significant?

[12] See Transformations White Paper.

The EC Team noted that what made a characteristic "essential" depended on elements such as the "record type, data type, and the series context in which they are created."[13] The UK Team came to similar conclusions. To ignore the Digital Record Type, series, and digital type in employing the concept would be to adopt a one size fits all approach where appearance or behavior, for example, is always significant regardless of the Digital Record Type or intellectual content of the material. We believe that this position is untenable.

The two teams agreed that some properties of digital files were significant in some cases and not significant or inconsequential in others. They also agreed that the Digital Record Type was a useful discriminator in deciding when a property was significant or not. Finally, they both came to the conclusion that appearance, behavior, and structure could be significant in some cases and not significant in others, but that context and content were always significant. so there is no need for archivists to make any further judgments about these properties. So we propose that NARA implement a significant properties approach in preserving electronic records. But is the concept scalable and extensible in the real world?

Scalable and Extensible?

Scalable. How can a concept that is sensitive to individual variation be applied to the holdings of an institution that has so much diversity in its holdings such as NARA?

Applying the concept of trying to decide which properties must be persisted at the digital file level is clearly not scalable. NARA expects to receive millions of digital files in the coming years, so this option, even if it were desirable, is simply not practical. NARA can clearly use its staff resources to better advantage. But if NARA developed default significant properties templates for each Digital Record Type and applied the concept at the record type and transfer group/series level, the amount of human involvement in the process could be doable with existing staff resources. This may be more difficult in aggregates that are not homogenous with respect to Digital Record Type. NARA will need to run some paper tests on the concept to assure itself that the concept will work in this area.

We propose that NARA ask the significant properties question about the series or transfer group at the point at which NARA is considering transforming a record. Archivists would review information about the transfer group or series, confirm the Digital Record Type, and decide if the default significant properties for that Digital Record Type will apply to the body of records in question. If not, then they would change a property from being optional to being mandatory or vice versa. This would help inform the transformation plan that would be worked out between Records Preservers and Reference Archivists.[14] If not, the archivist could revise the template for that particular transfer group/series.

[13] EC Team, "Essential Characteristics (And Attributes) of Electronic Records," p. 1.
[14] See the Transformation white paper for a full discussion of the development of transformation plans.

Extensible. How can NARA apply this concept to the wide variety of digital file formats and Digital Record Types that NARA currently has among its holdings and expects to accession in the near future?

The EC Team has already developed templates for six Digital Record Types and the Technical Analysis Team (TAT) has developed draft significant property templates for two additional ones (sound recordings and moving images). Based on the General Record Type list from NARA 1301 of the Record Types that might be electronic, excluding things like bound volumes and artifacts, the only Digital Record Type for which NARA has not developed a Digital Record Type template is architectural and engineering drawings. In reviewing the list of electronic records that the Accessioning and Ingest Team found that NARA has currently among its holdings, the existing Digital Record Type templates will cover all of them, except for architectural and engineering drawings. Aside from developing a template for architectural and engineering drawings, the only Digital Record Type that NARA will need to develop is Office Automation files, where a creator transferred to NARA digital files from typical office automation products, such as Word, Excel, and PowerPoint. The list of Digital Record Types and the status of templates is presented in Figure 8 below.

Digital Record Types	Status
Email	Completed
Databases	Completed
Digital Photographs	Completed
GIS Records	Completed
Textual Records	Completed
Web Pages	Completed
Sound Recordings	TAT draft completed
Moving Images	TAT draft completed
Architectural and Engineering Drawings	Not done
Office Automation Files	Not done

Figure 8: List of Digital Record Type Templates and Status

Conclusions

We propose the following:

- NARA archivists make significant properties determinations about aggregates of electronic records (series and transfer groups) and only rarely about individual files.

- In making significant properties determinations, NARA archivists take into account the intellectual content and Digital Record Type of the records that are to be transformed.
- NARA will use the templates developed by the EC Team as default templates for the Digital Record Types that have been defined by the EC Team. NARA will refine those templates as they gain experience using the tools.
- If NARA archivists encounter new Digital Record Types, they will develop new Significant Properties Templates.
- Archivists make significant properties determinations at the point at which for whatever reason, NARA determines that a transformations is necessary.
- Archivists make significant properties decisions about appearance, behavior, and structure properties, based on the definitions and methodology that the EC Team developed.
- NARA always considers context and content properties, as defined by the EC and UK Teams to be significant and therefore the metadata related to content and context are always incorporated into the AIP of the transformed version, based on the guidance provided in Figures 1 and 2 above.
- Once archivists make significant properties determinations, they are recorded in the Transformation Plan for the aggregate. If determinations are made at the digital file level, then that is where they are recorded.
- Once archivists make significant properties determinations about a series of records, records preservers work with archivists to determine how the properties can be implemented in a transformation. So for example, if an archivist determines that color is important to a faithful rendering of a color photograph, records preservers will work with archivists on the correct the color palette for that series of digital photographs.
- Records preservers, as part of their research, explore the characteristics of transformation tools to learn what elements are added or subtracted from digital files during transformations. This is stored in a knowledge management system for use by other records preservers and eventually for the international community of records preservers. In instances when Records Preservers determine that a format that is obsolete or highly obsolescent, and in need of transformation and no transformation path is yet available that meets the significant properties requirements of NARA, they will work with the Records Processors to determine appropriate fallback strategies, while NARA awaits a solution that will meet all of its needs.
- Regardless of what is decided concerning transformations, the metadata about the transformed version is captured in the AIP for each transformed record. See the AIP discussion above.

E. TRANSFORMATION SCENARIOS

The following examples are meant to give practical illustrations of how the concept might be applied to NARA's records. NARA transforms records as part of a broad strategy that addresses issues of digital file format obsolescence and meeting the needs of

user communities.[15] Regardless of whether the proposed transformation is done for preservation or reference purposes, Records Preservers and Reference Archivists collaborate in developing a Transformation Plan.

At the time of a proposed transformation, Reference Archivists review the records and the documentation NARA received about the records being considered for transformation to gain insights into how the records are structured and how they are and might be used by the research community. They also consult with members of the research community as appropriate. Based on their review, Archivists confirm the Digital Record Type(s) and digital file formats of the target series. If the Digital Record Type(s) are in error, the Archivists make the necessary corrections. Archivists then refer to the Significant Properties Digital Record Type Templates that correspond to the Digital Record Type(s) in the target series. Archivists review the questions in the template for appearance, behavior, and structure and determine whether the default properties in the template should be accepted or changed. The following examples are meant to be illustrative of how the process might work.

1. One Series with one Digital Record Type on one format. NARA determines that a series of 50,000 digital photographs that are all JPEGs need to be transformed. An archivist reviews the digital files and confirms that the Digital Record Type for the series is in fact Digital Photography and that the digital file format is JPEG. The default significant properties for photographs are as follows:

Digital Photography

Significant Properties	Core	Conditional
Appearance	Layout/Size	
Appearance	Layout/Orientation	
Appearance	Color	
Behavior	Display	
Structure	Compression	
Structure	Bit Depth	
Structure	Resolution	

Figure 9. Significant properties for Digital Photographs

The archivist examines the photographs, as well as the documentation related to the accession and determines that the default settings for the Appearance, Behavior, and Structure properties are appropriate. In other words it is critical that the size, orientation of the photograph, and its colors must be faithfully rendered in the transformation in order to ensure that researchers can make sense of the records. Likewise for Behavior, the user must be able to have the photograph displayed. Finally the Structure properties,

[15] See the Transformations white paper for a fuller discussion of the transformation process.

such as bit depth, compression, and resolution are critical to making sense of the photography. This decision is recorded in the Transformation Plan and the AIP for each transformed record in the series.

2. One series with one Digital Record Type and more than one format. NARA determines that a series of web pages needs to be transformed. The web series of 100 files, which are in the following digital file formats: html, GIF, and PDF. An archivist reviews the files and the accessioning documentation and confirms that the Digital Record Type for this series is web pages and that the digital file format types are correct. The default significant properties for web pages are as follows:

Web Pages

Significant Properties	Core	Conditional
Appearance	Layout	
Appearance	Text	
Structure	Schema - Is the website dynamic and database driven? Then refer to EC for database Record Type	
Structure		Schema/Linkage If there is linked content from different domain it should be redirected and considered an EC if associated with a formal agreement (see NARA Web Record Guidance)
Structure	Sequence	

Figure 10. Significant Properties for Web Pages

The accessioning archivist examines the web pages. In the case of the conditional property "structure/schema/linkages," the documentation from the transferring entity indicates that there was no formal agreement between NARA and the transferring entity to maintain these links. The archivist determines that it is not worth the effort to maintain these external links. The external links in this case are, therefore, deemed not significant. The archivist determines, however, that the research community would benefit from maintaining links internal to the web pages that were transferred and that the documentation of the links and the manner in which they were executed would make the task of preserving the links feasible. So the archivist recommends that the links internal to the web site become significant for this accession. This decision is recorded in the Transformation Plan and it the AIP for each transformed record in the series.

Next Steps/Follow Up

1. Where would the information about significant properties be recorded? We have talked about using the LMP in the past, but the LMP concept cannot be used for presidential, congressional, Supreme Court, donated, or surrogates, and we clearly want to use these concepts for all of NARA electronic records holdings.
2. NARA needs to review the EC Team's Significant Properties Templates and decide if they are correct.
3. Review the UK Team's work and see if we can use any of their findings to enhance our analyses of Digital Record Type templates.
4. Review the list of digital format types and Digital Record Types from the ERA Accessioning & Ingest IPT. Can the current Digital Record Type Templates cover them all?
5. We need to define the Digital Record Types.
6. We should run some paper experiments on this against know series to be sure we are right. How well will our model work on heterogeneous aggregates? Need to run some paper tests on this.

Appendix A. The OAIS Definition of the Archival Information Package (AIP)

According to OAIS each AIP is composed of Content Information and Preservation Descriptive Information. A graphical depiction is also provided.

Content information - The set of information that is the original target of preservation. It is an Information Object comprised of its Content Data Object and its Representation Information. An example of Content Information could be a single table of numbers representing, and understandable as, temperatures, but excluding the documentation that would explain its history and origin, how it relates to other observations, etc.

- Content Data Object: The Data Object that together with associated Representation Information is the original target of preservation.
- Representation information - The information that maps a Data Object into more meaningful concepts.

Preservation Description Information (PDI): The information which is necessary for adequate preservation of the Content Information and which can be categorized as Provenance, Reference, Fixity, and Context information.

- Provenance information - The information that documents the history of the Content Information. This information tells the origin or source of the Content Information, any changes that may have taken place since it was originated, and who has had custody of it since it was originated.
- Reference information - The information that identifies, and if necessary describes, one or more mechanisms used to provide assigned identifiers for the Content Information. It also provides identifiers that allow outside systems to refer, unambiguously, to a particular Content Information.
- Fixity information - The information which documents the authentication mechanisms and provides authentication keys to ensure that the Content Information object has not been altered in an undocumented manner
- Context information - The information .that documents the relationships of the Content Information to its environment. This includes why the Content Information was created and how it relates to other Content Information objects.

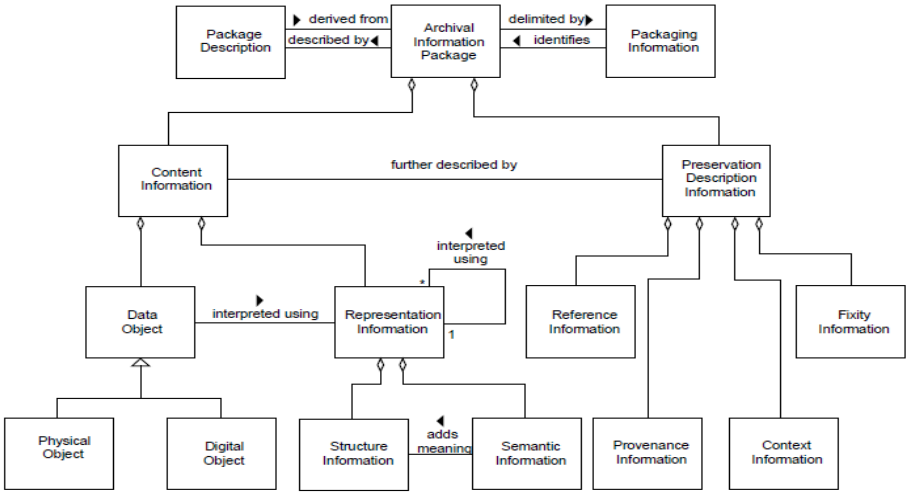

Figure 4-18: Archival Information Package (Detailed View)

Appendix B. EC Team's List of Digital Record Types with Definitions, Plus TAT's Team's Additions

EC Team's List of Record Types

- Email. "A document created or received via an electronic mail system, including brief notes, formal or substantive narrative documents, and any attachments, such as word processing and other electronic documents, which may be transmitted with the message."[16]
- Databases. "Information that is accessed and updated through software (a database management system) that has been organized, structured, and stored so that it can be manipulated and extracted for various purposes.

  For purposes of identifying characteristics for Increment One and Two, we will be analyzing databases as a traditional schedule item and not associated with large institutional data repositories and associated data mining techniques."[17]
- Digital Photography. "Digital photography, as opposed to film photography, uses electronic devices to record the image as binary data."[18]
- GIS. "A geographic information or geographical information system (GIS) is a system for creating, storing, analyzing and managing spatial data and associated attributes. In the strictest sense, it is a computer system capable of integrating, storing, editing, analyzing, sharing, and displaying geographically-referenced information. In a more generic sense, GIS is a tool that allows users to perform queries, analyze the spatial information, and present data in a variety of ways."[19]
- Textual (products of office automation). "Examples: minutes of meetings, organizational charts, diaries, calendars, correspondence, reports, briefing books, legal opinions, directives, and publications. Textural Records may be in electronic form, as in the case of some email records or word processing documents."[20]
- Web. "Identification of essential characteristics for Web Records addresses Web content records only. For management and operation web records see other record types.

  Web Content Record. A collection of information, documents, or database that is sent from a server to a browser via Hypertext Transfer Protocol (HTTP), when a URL has been activated and meets the definition of Federal record and is provided via an agency's web site. Web content can be static or

[16] EC Team, "Essential Characteristics – Email," p. 1
[17] EC Team, "Essential Characteristics – Databases," p. 1
[18] EC Team, "Essential Characteristics – Digital Photography," p. 1
[19] EC Team, "Essential Characteristics – GIS," p. 1
[20] EC Team, "Essential Characteristics – Textual (products of Office Automation," p. 1

dynamic. (If dynamic, you may encounter another record type, such as a database)."[21]

TAT Team's additions to the list of Digital Record Types.

- Sound recordings. "Like moving images, sound recordings are time-based, meaning that they are dependant upon technology and have duration as a dimension. They are basically a moving waveform expressed in binary data. Digital sound represents the analogue waveforms using sampling methods that convert the shape of the wave over time into a series of numbers."[22]
- Moving Images. "Moving images consist of a succession of still images and may also include a sound component. They are time-based, meaning that they are dependant upon technology and have duration as a dimension. Moving image and sound recordings have significantly more complex characteristics than most other digital resources. Digital moving images use electronic devices to record the sequence of images and audio waveforms as binary data. Playing back these images at particular speeds conveys the illusion of movement while bit rate controls the audio speed."[23]

[21] EC Team, "Essential Characteristics – Web," p. 1
[22] TAT, "Essential Characteristics – Sound Recordings," p. 1
[23] TAT, "Essential Characteristics – Moving Images," p. 1

Appendix C: EC Team's Definitions of Characteristics

Appearance

Definition: Characteristics related to the visual presentation of records.

General questions

- Is the record's appearance fixed or mutable?
- Would a change in the record's appearance alter its meaning?
- Does changing the record's appearance diminish its value?

Behavior

Characteristics that allow interaction with the records.

General questions

- Are there elements of the user interface or system behaviors that must be maintained in order to understand how the agency used the records?
- Are there elements of the user interface or system behaviors that must be maintained in order to use the records as the agency did?
- Which, if any, of these elements are intrinsic to the record?

Context

The organizational, functional, and operational circumstances surrounding materials' creation, receipt, storage, or use, and its relationship to other materials. Most of these characteristics are not intrinsic to the records themselves but includes a collection of information that is both internal and external to the records.

General questions

- Will the context characteristic affect other characteristics of the record type?
- Do the answers to the context questions affect the preservation of other appearance or behavior characteristics? For example, if the records have been appraised as permanent for their informational value, and not evidential, then appearance characteristics may not need preserved.

Structure

The characteristics that define how record elements are organized and interrelated. Note: While embedded or hyperlinked content may be found across record types, we may not know much about its structure, data type, or record type. We cannot capture every possible structural nuance of the records.

General questions

- Would a change in the record's technical structure alter its appearance?
- Would a change in the record's technical structure affect its possible behaviors?"[24]

[24] EC Team, "Essential Characteristics (And Attributes) of Electronic Records," pp. 1-4.

Appendix D: Essential Characteristics (EC) for Digital Record Types

Summary Document

(For background refer to five EC Definitions Documents)

Record Type	Characteristic	Core	Conditional	Questions
Database				
	Behavioral	Manipulate		
	Behavioral		Query	Does the query demonstrate how the agency used/interpreted the data for decision-making, legal use, or general accountability. Is it a reflection of how an agency made a decision? If yes, then determine if the results display was saved to some other format for reporting purposes. If no, then, query is an EC.
	Behavioral		Display of report of graph from query	Is the display in the form of a report? See other record type such as textual records (.pdf, .doc) or web record for EC. Is the display in a GIS, then graph and plot are EC. Also see GIS record type (map) for other functionalities that are essential.
	Context	Series		
	Context		Descriptive Metadata	If present, then essential.
	Structure	Schema		
	Structure	Character Encoding		
Digital Photography				
	Appearance	Layout/Size		
	Appearance	Layout/Orientation		
	Appearance	Color		
	Behavioral	Display		
	Context	Series		
	Context		Descriptive Metadata	If present, then essential.
	Structure	Compression		
	Structure	Bit Depth		
	Structure	Resolution		
Email				
	Appearance		Text/Font	Essential if the text displayed in message body bears meaning through formatting.
	Appearance		Text/Orientation	Essential if the text

				displayed in message body bears meaning through formatting.
	Appearance		Text/Color	Essential if the text displayed in message body bears meaning through formatting.
	Appearance		Layout	Are there any overall visual layout characteristics or structure of highly recognizable email "formats" such as State Department cables, EOP ARMS email, or Defense Messaging System? Then this visual layout/structure is an EC.
	Context	Series		
	Context		Series/Original Order	Is the email transferred in distinct folders or directories that reflect a clear operational structure? Or segregated and transferred by blocks of time, such as by week or month? Then this structure is an EC.
	Context		Descriptive Metadata	If present, then essential. Includes transactional metadata such as read receipts, rules, message tracking, threading, etc. that may be essential if needed for evidential value.
	Structure	Schema		
	Structure		Schema/Linkage	If present, does the linkage provide a complete record; if a reference to an attachment is present in email, both the reference and the attachment must be preserved as essential.
	Structure		Schema/Lists	If distribution lists are used, they must be preserved to provide a complete record.
GIS				
	Appearance	Layout		
			Text Formatting	Is the formatting evidence of

				how the maps were used or displayed by the creator?
			Color	Are there distinctions between colors that are necessary to understand the attributes and overlays?
	Behavior	Query		As to which queries or what querying capabilities are essential: Is the GIS used for decision making in specific cases? If yes, preserve particular queries and displays. Is the GIS used for analytic purposes? If yes, preserve *ad hoc* querying capability.
			Manipulate	Is the GIS's meaning and value found in how map attributes are manipulated? If yes, these behaviors are essential.
	Context	Series		
	Context		Descriptive Metadata	If present, then essential.
	Structure	Layers		
		Linkage		
Web				
	Appearance	Layout		
	Appearance	Text		
	Context	Series		
	Context		Descriptive Metadata	If present, then essential.
	Structure	Schema		Is the website dynamic and database driven? Then refer to EC for database record type.
	Structure		Schema/Linkage	If there is linked content from different domain it should be redirected and considered an EC if associated with a formal agreement (see NARA Web Record Guidance)
	Structure	Sequence		

Essential Characteristics (EC) for Textual Records

Summary Document

Record Type	Characteristic	Core	Conditional	Questions
Text				
	Appearance		Layout/Size	Is appearance fixed (as in a publication)?
	Appearance	Layout/Sequence		

	Appearance		Layout/Pagination	
	Appearance		Layout/Proportion	Is appearance fixed (as in a publication)?
	Appearance	Layout/Orientation		
	Appearance		Text/Font	Is appearance fixed (as in a publication)?
	Appearance	Text/Orientation		
	Appearance		Text/Color	Is appearance fixed (as in a publication)?
	Appearance		Color	Is appearance fixed (as in a publication)
	Context	Series		
	Context		Descriptive Metadata	If present, then essential.
	Structure		Schema/Linkage	If links to other text records are present, then essential.
	Structure		Schema/Template	If needed to generate record, then essential
	Structure		Character Encoding	Is the encoding scheme the only one that can manifest the special characters?
	Structure		Compression	If record is a scanned image (e.g. TIFF), then could be essential
	Structure		Bit Depth	If record is a scanned image (e.g. TIFF), then could be essential
	Structure		Resolution	If record is a scanned image (e.g. TIFF), then could be essential