

	<b>Montana Operations Manual</b>  <b>Standard</b>	Category	Information Technology, Infrastructure
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Issuing Authority	<b>Department of Administration</b> <b>State Information Technology Services Division</b>		
<b>STD-Electronic Compatibility and Interchange Technical Standard (Interim)</b>			

### I. Purpose

The purpose of this Interim Standard provides Electronic Compatibility & Interchange format guidance for state agencies. This interim standard is intended to provide high level guidance to State of Montana Executive branch agencies, to ensure compatibility of electronic information and record systems used to electronically capture, store, or retrieve public records on systems supported in the State of Montana Data Centers and State-wide network.

### II. Scope

This interim standard applies to all Executive branch agencies and independent contractors, excluding the university system, who have access to, use, or manage state government-controlled information systems. This guidance proposes element and format requirements for electronic records equipment and systems to be used in the management of information assets as records. However, this interim standard is neither complete nor sufficient to define all specific needs for every agency. These formats are not written to address sensitive records, Freedom of Information Act (FOIA) or the Privacy Act, but they are applicable and can be used in support of those requirements.

### III. Standard Statement

This “Interim” standard provides guidance for identifying electronic compatibility and information exchange formats that may be used when capturing, retrieving, storing and transferring electronic records and information.

Specifically, it covers electronic compatibility for information and records that are created, used, and managed on computer systems and which can be moved between computer file systems without alteration of the original method of encoding. It applies to records that originated electronically, such as word processing files or digitally recorded sound, as well as those that are digital representations of records which originated in a non-electronic form such as paper or film.

For storing public records throughout their life cycle, agencies shall select appropriate electronic records storage media and systems which meet the following requirements:

1. Agencies shall select appropriate media and equipment for storing state records or converting from one medium to another throughout their life cycle, which:
  - a) Provide sufficient storage space for storing records with related record indexes, and maintaining associated audit logs
  - b) Permit seamless and accurate retrieval in a timely manner
  - c) Retain the records in a usable format until their authorized disposition date
  - d) Maintenance necessary to retain the records
  - e) Cost of storing and retrieving the records
  - f) Accessibility of records over time due to software and hardware requirements
  - g) Portability of the medium - selecting a medium that will run on equipment offered by multiple manufacturers
  - h) Ability to transfer the information from one medium to another
  - i) Provide Write Once, Read Many (WORM) capabilities
  
2. For all records, regardless of media, the electronic record system shall uniformly create and maintain indexes (Metadata), but not limited to the following information:

Index (label)	Description
Creator	Indicates the agency that supplied the data
Date	When data set (or metadata) is created and/or modified.
Description	A brief description of the data set
Format	Method of export, open file format that is platform independent, machine readable, and made available to the public without restrictions that would impede the re-use of that information.
Identifier	Generally a 9-character identifier (i.e. xxxx-xxxx)
Sequence number	If the file is part of a multi-data set
Source (location)	Identifies the name of the source system
Title	The brief descriptive name of the data set
Type	The category of the data set identified by the list of possible values. If a data set can fall into multiple categories, select the one which is most significant. This list will be subject to change on an ongoing basis.

3. Agencies will ensure that information is not lost due to changing technology or deterioration of storage media by converting storage media to provide compatibility with the agency's current hardware and software. Before conversion of information to a different media, agencies must determine that authorized disposition of the electronic records can be implemented after conversion.
4. System Backup and Recovery. The purpose of this requirement is to specify the capabilities which must be included to reduce exposure to loss of records due to system failure, operator error, disaster, or willful destruction. The capability shall be provided to produce periodic backup copies of all records managed by the system at intervals specified by authorized administrators. The capability shall be provided to create and maintain an audit trail of changes to the records repository.

The system shall produce audit trails as a minimum on physically different devices. The audit shall contain all changes made to any records and all control information necessary to provide the recovery capabilities. Following any system failure, the backup and recovery procedures shall provide the capability to full functionality (records and any control information such as indexes required to access the records).

5. Records Management Administrators, IT managers, agency Security managers, and their designees that are part of the Executive branch who are responsible for the management of and reporting on agency security controls must be aware of this standard.

This interim standard requirement is applicable to any arrangement with third parties that handle, store, or transfer *government records*.

6. Electronic records do not have to be records of only one interchange or file format. This guidance assumes that records will be permanent records and will include files that are encoded in a format identified as acceptable by the National Archive & Records Administration (NARA), Library of Congress, National Information Exchange Model (NIEM), International Organization for Standardization (ISO), International Telecommunications Union (ITU), International Working Groups and World Wide Web Consortium (W3C) to name a few.

### **Electronic Record Compatibility Formats**

<b>Format</b>	<b>Description</b>
TIFF	<p>Tagged Image File Format (TIFF). A tag-based file format for storing and interchanging raster images. The different encodings may represent different compression schemes and different schemes for color representation.</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000024.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000024.shtml</a></p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000022.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000022.shtml</a></p>

JPEG	<p>JPEG Image Encoding Family. Family of image compression codecs specified in the various parts of ISO/IEC 10918 and ISO/IEC 14495 (and in the parallel ITU-T.81, 83, 84, 86, and 87 standards). ISO/IEC 10918-1 covers both lossy and lossless compression in several "modes of operation,"</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000017.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000017.shtml</a></p>
PDF	<p>Portable Document Format (PDF). A digital form for representing electronic documents to enable users to exchange and view electronic documents independent of the environment in which they were created or the environment in which they are viewed or printed.</p> <p><a href="http://www.iso.org/iso/catalogue_detail.htm?csnumber=51502">http://www.iso.org/iso/catalogue_detail.htm?csnumber=51502</a></p>
PDF/A-1	<p>ISO 19005— Document management—Electronic document file format for long-term preservation of electronic documents. PDF/A-1 (PDF version 1.4) is intended to be suitable for long-term preservation of page-oriented documents for which PDF is already being used in practice. The ISO standard was developed by a working group with representatives from government, industry, and academia and Adobe Systems Incorporated.</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000125.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000125.shtml</a></p>
PDF/A-2	<p>[ISO 19005-1:2005] Document management—Electronic document file format for long-term preservation of electronic documents- Part 2: Use of ISO 32000-1 (PDF 1.7). It is for preserving the static visual representation of page-oriented electronic documents over time.</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000319.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000319.shtml</a></p>
PDF/E	<p>Document management—Engineering document format using PDF using the Portable Document Format (PDF) Version 1.6 for the creation of documents used in engineering workflows.</p> <p><a href="http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=42274">http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=42274</a></p>
PDF/UA	<p>Document management applications—Universal Access—Electronic document file format enhancement for accessibility for People with disabilities, IT managers in government.</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000350.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000350.shtml</a></p>
U3D	<p>Universal 3D (U3D). An extensible format for downstream 3D CAD repurposing and visualization, useful for many mainstream business applications.</p> <p><a href="http://www.ecma-international.org/publications/standards/Ecma-363.htm">http://www.ecma-international.org/publications/standards/Ecma-363.htm</a></p>

CSV	<p>Comma Separated Values (CSV), RFC 4180, is a simple format for representing a rectangular array (matrix) of numeric and textual values. It is an example of a "flat file" format. It is a delimited data format that has fields/columns separated by the comma character %x2C (Hex 2C) and records/rows/lines separated by characters indicating a line break.</p> <p><a href="http://tools.ietf.org/html/rfc4180">http://tools.ietf.org/html/rfc4180</a></p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000323.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000323.shtml</a></p>
ODF	<p>The OpenDocument Format (ODF) is an open XML-based document file format for office applications to be used for documents containing text, spreadsheets, charts, and graphical elements. The file format makes transformations to other formats simple by leveraging and reusing existing standards wherever possible.</p> <p><a href="https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=office">https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=office</a></p>
DOC	<p>A filename extension for word processing documents, most commonly in the Microsoft Word Binary File Format..</p> <p><a href="http://msdn.microsoft.com/en-us/library/cc313153%28v=office.12%29.aspx">http://msdn.microsoft.com/en-us/library/cc313153%28v=office.12%29.aspx</a></p>
DOCX	<p>DOCX is the default document format of Word 2007 and 2010. The Microsoft Office system introduces a new file format based on XML.</p> <p><a href="http://msdn.microsoft.com/en-us/library/ee908652%28v=office.12%29">http://msdn.microsoft.com/en-us/library/ee908652%28v=office.12%29</a></p>
GIF	<p>Graphics Interchange Format. A bitmapped image format widely used on the Web.</p> <p><a href="http://www.w3.org/Graphics/GIF/spec-gif89a.txt">http://www.w3.org/Graphics/GIF/spec-gif89a.txt</a></p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000133.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000133.shtml</a></p>
PNG	<p>PNG (Portable Network Graphics), an extensible file format for the lossless, portable, well-compressed storage of raster images. PNG is designed to work well in online viewing applications, such as the World Wide Web, so it is fully streamable with a progressive display option. ISO/IEC 15948:2003 (E)</p> <p><a href="http://www.libpng.org/pub/png/">http://www.libpng.org/pub/png/</a></p> <p><a href="http://www.w3.org/TR/REC-png-multi.html">http://www.w3.org/TR/REC-png-multi.html</a></p>

### Streaming Media/Video Formats

MPEG2	<p>Generic coding of moving pictures and associated audio information (formal name); MPEG-2 (common name). The video or picture encoding defined by the MPEG-2 family of specifications. ISO/IEC 13818. Information technology.</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000028.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000028.shtml</a></p>
MP3	<p>MPEG Audio Layer III (MP3). MP3 (common name). MPEG Layer III audio encoding is defined in two ISO/IEC specification families (MPEG-1: 11172-3 and MPEG-2: 13818-3).</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000012.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000012.shtml</a></p>
MPEG-4	<p>The second MPEG-4 file format developed by the Motion Picture Experts Group (MPEG). The format's object-based design defines a set of tools that present binary coded representation of individual audiovisual objects, text, graphics, and synthetic objects. ISO/IEC 14496-14:2003. Information technology -- Coding of audio-visual objects -- Part 14: MP4 File Format (formal name); MPEG-4 file format, version 2 (common name).</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000155.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000155.shtml</a></p>
H.264	<p>H.264 is a video compression format, and is currently one of the most commonly used formats for the recording, compression, and distribution of video content.</p> <p><a href="http://www.itu.int/rec/T-REC-H.264-201304-S">http://www.itu.int/rec/T-REC-H.264-201304-S</a></p> <p><a href="http://www.itu.int/rec/T-REC-H.264-201402-P">http://www.itu.int/rec/T-REC-H.264-201402-P</a></p>
H.323	<p>H.323 uses the Internet Protocol (IP) to transmit packets over an IP network and can be achieved on any data network that uses IP, like Internet, Intranets and Local Area Networks (LAN). Here the signal is digitized, compressed and converted to IP packets and then transmitted over the IP network.</p> <p><a href="http://www.itu.int/rec/T-REC-H.323/en">http://www.itu.int/rec/T-REC-H.323/en</a></p>
F4V/FLV	<p>Adobe Flash supports a number of media formats. These include two core open container formats for delivering synchronized audio and video streams: F4V and FLV. F4V builds on the open standard ISO/IEC 14496-12:2008 (MPEG-4 Part 12) ISO base media file format and supports H.264/AAC–based content. It has a flexible structure and defines specific supported codecs and extensions, facilitating simplified interoperability across tools, services, and clients.</p> <p><a href="http://download.macromedia.com/f4v/video_file_format_spec_v10_1.pdf">http://download.macromedia.com/f4v/video_file_format_spec_v10_1.pdf</a></p>

ACC	<p>Advanced Audio Coding (ACC). Audio encoding format designed for efficient distribution of sound files over moderate bandwidth connections; may be used at higher data rates for better fidelity. ISO/IEC 14496-3:2001. Information technology -- Coding of audio-visual objects -- Part 3: Audio.</p> <p><a href="http://standards.ieee.org/findstds/standard/1857.2-2013.html">http://standards.ieee.org/findstds/standard/1857.2-2013.html</a></p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000114.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000114.shtml</a></p>
ASF	<p>The Advanced Systems Format (ASF) is an extensible file format designed primarily for storing and playing synchronized digital media streams and transmitting them over networks. ASF is the container format for Windows Media Audio and Windows Media Video-based content. Data types can include audio, video, script command, JPEG-compressed still images, binary, and other streams defined by developers.</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000067.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000067.shtml</a></p>
RTC	<p>Real-Time Communication (RTC) supports voice and video applications for voice calling, video chat, and P2P file sharing without plugins</p> <p><a href="https://www.w3.org/standards/techs/webrtc#w3c_all">https://www.w3.org/standards/techs/webrtc#w3c_all</a></p> <p><a href="http://technet.microsoft.com/en-us/library/gg425865.aspx">http://technet.microsoft.com/en-us/library/gg425865.aspx</a></p> <p><a href="http://technet.microsoft.com/en-us/library/jj688132.aspx">http://technet.microsoft.com/en-us/library/jj688132.aspx</a></p>

### **Interchange Formats**

JSON	<p>JavaScript Object Notation (JSON) is a lightweight, text-based, language-independent data interchange format. It was derived from the ECMAScript programming language, but is programming language independent. JSON defines a small set of structuring rules for the portable representation of structured data.</p> <p><a href="http://www.ecma-international.org/publications/standards/Ecma-404.htm">http://www.ecma-international.org/publications/standards/Ecma-404.htm</a></p> <p><a href="http://tools.ietf.org/html/rfc7159">http://tools.ietf.org/html/rfc7159</a></p>
XML	<p>Extensible Markup Language (XML) is a simple, very flexible text format derived from SGML (ISO 8879). Originally designed to meet the challenges of large-scale electronic publishing, XML is also playing an increasingly important role in the exchange of a wide variety of data on the Web.</p> <p><a href="http://www.w3.org/2002/xmlspec/">http://www.w3.org/2002/xmlspec/</a></p> <p><a href="http://www.w3.org/TR/2006/REC-xml11-20060816/">http://www.w3.org/TR/2006/REC-xml11-20060816/</a></p>

NIEM	<p>NIEM is a community-driven, government- wide, standards-based approach to exchanging information.</p> <p><a href="https://www.niem.gov/technical/Pages/version-3.aspx">https://www.niem.gov/technical/Pages/version-3.aspx</a></p> <p><a href="https://www.niem.gov/technical/Pages/current-release.aspx">https://www.niem.gov/technical/Pages/current-release.aspx</a></p>
NIEM UML	<p>NIEM UML Object Management Group-Unified Modeling Language: NIEM-UML is an extension of a subset of Unified Modeling Language that is specific to NIEM. NIEM-UML generates 100% NIEM-conformant information exchanges and provides a visual representation of those exchanges that is understandable to both technical and business users. This enables organizations to align their information exchanges with their business requirements.</p> <p><a href="http://niem-uml.org/wpniem/">http://niem-uml.org/wpniem/</a></p>
GML	<p>The Geography Markup Language (GML) is an XML encoding in compliance with ISO 19118 for the transport and storage of geographic information modelled in accordance with the conceptual modelling framework used in the ISO 19100 series of International Standards and including both the spatial and non-spatial properties of geographic features.</p> <p>Reference: OGC 10-129r1 <a href="http://www.opengeospatial.org/standards/gml">http://www.opengeospatial.org/standards/gml</a></p>
KML	<p>Key Markup Language is used to encode and transport representations of geographic data for display in an earth browser, such as a 3D virtual globe, 2D web browser application, or 2D mobile application. A KML instance is processed in much the same way that HTML (and XML) documents are processed by web browsers. Like HTML, KML has a tag-based structure with names and attributes used for specific display purposes.</p> <p>Reference: OGC 07-147r2 <a href="http://www.opengeospatial.org/standards/kml">http://www.opengeospatial.org/standards/kml</a></p>
X3D	<p>Extensible 3D (X3D). Interactive web- and broadcast-based 3D content integrated with multimedia. Intended for use on a variety of hardware devices and in a broad range of application areas such as engineering and scientific visualization, multimedia presentations, entertainment and educational titles, web pages, and shared virtual worlds.</p> <p><a href="http://www.web3d.org/files/specifications/19775-1/V3.2/index.html">http://www.web3d.org/files/specifications/19775-1/V3.2/index.html</a></p>
JFIF	<p>JPEG File Interchange Format (JFIF). JFIF is a minimal file format that enables JPEG bitstream exchanges between a wide variety of platforms and applications.</p> <p><a href="http://www.digitalpreservation.gov/formats/fdd/fdd000018.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000018.shtml</a></p>



HL7	A framework (and related standards) for the exchange, integration, sharing, and retrieval of electronic health information. <a href="https://www.hl7.org/implement/standards/">https://www.hl7.org/implement/standards/</a>
HTML/ HTML5	HTML/HTML5 is an Open Web Platform for application development that enables developers to build data stores that on any device. HTML5 is considered to be the cornerstone, but the full strength of the platform relies on W3C technologies including CSS, SVG, WOFF, the Semantic Web stack, XML, and a variety of APIs. <a href="http://www.w3.org/standards/techs/html#w3c_all">http://www.w3.org/standards/techs/html#w3c_all</a> <a href="http://www.w3.org/TR/html5/">http://www.w3.org/TR/html5/</a>
WAI	WAI-ARIA, the Accessible Rich Internet Applications Suite, defines a way to make Web content and Web applications more accessible to people with disabilities. It especially helps with dynamic content and advanced user interface controls developed with Ajax, HTML, JavaScript, and related technologies. <a href="http://www.w3.org/TR/2014/REC-wai-aria-20140320/">http://www.w3.org/TR/2014/REC-wai-aria-20140320/</a>

#### **IV. References**

##### **A. Legislation**

MCA Code 2-6-214. Department of Administration – powers and duties:

<http://leg.mt.gov/bills/mca/2/6/2-6-214.htm>

MCA Code 2-17-505. Policy

<http://leg.mt.gov/bills/mca/2/17/2-17-505.htm>

MCA Code 2-17-512. Powers and duties of department.

<http://leg.mt.gov/bills/mca/2/17/2-17-512.htm>

MCA Code 2-17-534. Security responsibilities of department.

<http://leg.mt.gov/bills/mca/2/17/2-17-534.htm>

MCA Code 2-15-114. Security responsibilities of departments for data.

<http://leg.mt.gov/bills/mca/2/15/2-15-114.htm>

##### **B. Policies, Directives, Regulations, Rules, Procedures, Memoranda**

Procedure: [State of Montana Information Technology Policies](#)

##### **C. Standards, Guidelines, References**

DoD 5015.02-STD, Electronic Records Management Software Applications Design std.

<http://jitic.fhu.disa.mil/cgi/rma/downloads/p50152stdapr07.pdf>  
Health Information Exchange (HIE) Standards and Interoperability  
<http://www.healthit.gov/providers-professionals/standards-interoperability>

Health Level Seven International  
<https://www.hl7.org/>

[Health Information Technology for Economic and Clinical Health \(HITECH\) Act](http://www.hhs.gov/ocr/privacy/hipaa/administrative/enforcementrule/hitechenforcementifr.html)  
<http://www.hhs.gov/ocr/privacy/hipaa/administrative/enforcementrule/hitechenforcementifr.html>

[Information Sharing Environment](http://ise.gov/)  
<http://ise.gov/>

[Institute of Electrical and Electronics Engineers](http://www.ieee.org/index.html)  
<http://www.ieee.org/index.html>

International Organization for Standardization  
<http://www.iso.org/iso/home/standards.htm>

International Telecommunications Union  
<http://www.itu.int/en/ITU-T/Pages/default.aspx>

[Internet Engineering Task Force \(IETF\)](http://www.ietf.org/)  
<http://www.ietf.org/>

Library of Congress-Digital Preservation  
<http://www.digitalpreservation.gov/>

M-12-18, Presidential Memorandum – Managing Government Records:  
<http://www.whitehouse.gov/sites/default/files/omb/memoranda/2012/m-12-18.pdf>

National Archive and Records Administration Transfer Guidance Tables:  
<http://www.archives.gov/records-mgmt/policy/transfer-guidance-tables.html>

NARA Bulletin 2014-04: Guidance on File Format Transfer  
<http://www.archives.gov/records-mgmt/bulletins/2014/2014-04.html>

Nationwide Health Information Network (NwHIN)  
<http://www.healthit.gov/policy-researchers-implementers/nationwide-health-information-network-nwhin>

National Information Exchange Model  
<https://www.niem.gov/Pages/default.aspx>

[National Institute of Standards and Technology \(NIST\), Security and Privacy Controls for Federal Information Systems and Organizations.](http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r4.pdf)  
<http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r4.pdf>

Open Geospatial Consortium  
<http://www.opengeospatial.org/>

World Wide Web Consortium (W3C)  
<http://www.w3.org/Consortium/>

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