DICOM Change Log

In JSON

Jim Philbin

# Change Log

A Change Log records the changes made to a DICOM Study, Series, or Instance.

A Change Log is a JSON object that contains Metadata and one or more Change Records that record the changes to a DICOM object.

# Metadata

Each Change Log has the following metadata members:

"**\_**id": ObjectId("57f271c856a7152da8bad835"),**\_**

"@type": "ChangeLog",

"@level" : "study",

"@uid" : "2.16.840.1.114362.1.6.6.3.16506.10096152181.429219167.205.1",

"@timestamp": <Date>

All metadata members are prefixed with the "@" character, which indicates that they are metadata. The following metadata members are defined.

@type

Identifies the type of the JSON object.

@level

Identifies the highest Information Entity level of the Change Records contained in the Change Log.

@uid

The UID of the object that was modified

@timestamp

The date and time when the modifications where completed.

Note: this could be a @startTime and @endTime if the duration matters.

Each Change Record has a key that contains an Identifier, and a value that is an object with two members:

1. A member having a key that is the string "type" and a value that is one of: "insert", "delete", or "update".
2. A member having a key that is the string "values", and a value that is an array of values, where each value conforms to data type (VR and VM) requirements of the DICOM Element.

For example:

{

"\_id": ObjectId("57f271c856a7152da8bad835"),

"@type": "ChangeLog",

"@level": "study",

"@uid": "2.16.840.1.114362.1.6.6.3.16506.10096152181.429219167.205.1",

"@Date": <Date>

"StudyDate": {

"type": "update",

"value": ["20140131"]

},

"00080060": {

"type": "insert",

"value": ["CT"]

},

"RescaleSlope": {

"type": "delete",

"value": [1]

},

}

# Change Records

Each Change Record records a change that was made to one of the elements in the dataset. The format of the Change Record is:

{

<identifier>: {

"type": <type>,

"values": [ <value>\*]

}

}

Each Change Record has three fields: a Identifier, a Type of change, and the values contained in the Element before the change was made.

The Identifier must be either a DICOM Tag or Keyword. It must correspond to either:

* A valid Public Tag, defined in PS3.6, with an even Group Number.
* A valid Public keyword, defined in PS3.6
* A Private Tag, where the Group Number is a valid group number, i.e. an odd number between 0x0009 and 0xFFFD.
* A Private Keyword contained in the ACR Private Tag Dictionary.

The Type must be one of the three strings: "insert", "delete", or "update".

The old Values field contains the values the Element had prior to a Delete or Update operation. If the Record Type is "insert" the Values field must be empty.

# Types of Changes

There are three types of possible changes:

Insert

Requirements: The Element MUST NOT be present in the Dataset before the insertion, and it MUST be present with valid values after the insertion. The Tag value is required in the change entry.

Delete

Requirements: The Element MUST be present in the Dataset before the deletion, and it MUST NOT be present after the deletion. The Tag value is required in the change entry, along with the deleted values.

Update (Replace)

Requirements: The Element MUST be present in the Dataset before the replacement, and the same Element MUST be present with at least one of its values being different (but valid) after the Update. The Tag value is required in the change entry.

The Update record may be any of the following:

* An Element that was present in the Dataset without any values before the Update, and has one or more values after the Update.
* An Element that had one or more values before the Update, and has no values after the Update.
* An Element that had one or more values before the Update, and at least one of those values is different after the Update.

Open Issues:

1. Naming Change Types
   1. "insert" could be "create". I prefer "insert" because the Element is inserted into the Dataset, rather than being created by the dataset.
   2. "update" could be "replace", which might be clearer.
2. Should it be recorded if it is not possible to tell the difference between the before and after states of the Element, i.e. they are identical. This can happen if one or more values are updated with the equivalent.
3. The format of the Change Record could be more efficient. For example:

{ <identifier>: [<type>, <values>\* ] }

1. Are there other Metadata fields?
2. [Are there other issues? ]