

icobridge 4.x: Pseudonymisation

Incoming DICOM files are pseudonymised according to HIPAA standard. All fields containing private patient information are removed.

The following data is kept to be able to provide a correct analysis and compare the patient with a healthy population

- patient gender
- patient birth year: birth date is transformed to YYYY-01-01

Certain fields are encrypted and stored in the DICOM header. This allows us to decrypt these fields and restore the original ones before sending our results back to PACS. This is a requirement to match the icometrix result files to the original patient study in PACS.

Full overview of all DICOM tags and action taken can be found below. All tags not referenced below and private tags (uneven group number) are removed during pseudonymisation.

Hashed DICOM tags:

These DICOM tags are replaced with a SHA3 hash of the original value.

```
"0020,000d", // StudyInstanceUID
"0020,0052", // FrameOfReferenceUID
"0020,0200", // SynchronizationFrameOfReferenceUID
"0008,0018", // SOPInstanceUID
"0008,0014", // InstanceCreatorUID
"0008,1155", // RefSOPInstanceUID
"0010,0010", // PatientName
"0010,0020", // PatientID
"0010,0021", // IssuerOfPatientID
"0010,1000", // OtherPatientIDs
"0020,0010", // StudyID
"0020,000e", // SeriesInstanceUID
"0040,a124", // UID
"0070,031a", // FiducialUID
"0088,0140", // StorageMediaFilesetUID
"3006,0024", // ReferencedFrameOfReferenceUID
"3006,00c2", // RelatedFrameOfReferenceUID
"300a,0013", // DoseReferenceUID
```

HIPAA standard DICOM tag:

The patient birth date is modified to YYYY-01-01. If the patient is older than 90 years the birth date is set so that the patient is 90 years old.

```
"0010,0030" // PatientBirthDate
```

DICOM time tags:

The following time related fields are changed to 000001

```
"0008,0013", // InstanceCreationTime
"0008,0030", // StudyTime
"0008,0031", // SeriesTime
"0008,0032", // AcquisitionTime
"0008,0033", // ContentTime
```

Kept DICOM tags:

The following DICOM tags are kept.

```
"0008,1030", // StudyDescription
"0008,103e", // SeriesDescription
```

Non HIPAA compliant kept DICOM tags:

The following DICOM tags are kept in order to perform a correct analysis of the data. Patient gender is used to compare against a healthy population. Study and acquisition date are used to determine time between follow up scans.

```
"0008,0020", // StudyDate
"0008,0021", // SeriesDate
"0008,0022", // AcquisitionDate
"0008,0023", // ContentDate
"0010,0040", // PatientSex
```

Optional non HIPAA compliant kept DICOM tags:

The following DICOM tags are kept in order to provide clear communication with hospital technicians and doctors. Although these ease communication, there is an option to also remove those if wanted.

```
"0008,0050", // AccessionNumber
"0008,0080", // InstitutionName
"0018,1030", // ProtocolName
```

Kept DICOM tags:

These DICOM tags relate to technical specifics of the DICOM file. By default those are encoded in groups 0008, 0018 and 0020. These tags do not contain PHI.

```

"0008,0005" , // SpecificCharacterSet
"0008,0008" , // ImageType
"0018,1310" , // AcquisitionMatrix
"0008,0016" , // SOPClassUID
"0008,0060" , // Modality
"0008,0070" , // Manufacturer
"0008,1090" , // ManufacturersModelName
"0018,5100" , // PatientPosition
"0018,0020" , // ScanningSeq
"0018,0021" , // SeqVariant
"0018,0022" , // ScanOptions
"0018,0023" , // MRAcquisitionType
"0018,0024" , // SequenceName
"0018,0080" , // RepetitionTime
"0018,0081" , // EchoTime
"0018,1000" , // DeviceSerialNumber
"0018,0082" , // InversionTime
"0020,0011" , // SeriesNumber
"0020,0012" , // AcquisitionNumber
"0020,0013" , // InstanceNumber
"0020,0032" , // ImagePosition
"0020,0037" , // ImageOrientation
"0020,1041" , // SliceLocation
"0018,0088" , // SpacingBetweenSlices
"0018,9087" ,
"0018,9089" ,
"5200,9229" , // SharedFunctionalGroupsSequence
"5200,9230" , // PerFrameFunctionalGroupsSequence
"0020,9056" ,
"0020,9057" ,

```

Vendor specific kept DICOM tags:

The following DICOM tags contain vendor specific details regarding the MR acquisition and are required to read the data correctly.

```

// Philips
"2001,0010" ,
"2001,0011" ,
"2001,100a" ,
"2001,1003" , // PHILIPS-DTI-BValue
"2001,105f" ,
"2001,100d" ,
"2005,100e" , // DiffusionDirections
"2005,10b0" , // DiffusionDirections
"2005,10b1" , // DiffusionDirections
"2005,10b2" , // DiffusionDirections
"2005,1402" ,
// Siemens
"0019,100c" ,
"0019,1029" , // MosaicRefAcqTimes
"0029,0011" ,
"0029,1008" ,
"0029,1009" ,
"0029,1010" , // Diffusion directions
"0029,1018" ,
"0029,1019" ,
"0029,1020" , // Diffusion directions
"0029,1160" ,
"0051,100b" ,
"0019,100e" ,
"0043,1039" ,
// GE
"0019,1024" , // MidScanTime
"0019,10bb" , // Diffusion directions
"0019,10bc" , // Diffusion directions
"0019,10bd" , // Diffusion directions
// Toshiba: http://www.toshiba-medical.co.jp/tmd/products/dicom/pdf/mius0016ea.pdf
"0029,0008" ,
"0029,0009" ,
"0029,0010" ,
"0029,0020" ,
"0029,0031" ,
"0029,0032" ,
"0029,0033" ,
"0029,0034" ,

```

Encrypted DICOM tags:

These DICOM tags are encrypted using the encryption key stored on the local system. These values are decrypted for the downloaded result DICOM files in order to match the result with the original patient study in PACS. The encrypted DICOM tags are stored in a private DICOM block 0015. Upon decryption this private block is removed.

```

{ "0010,0010" , "0015,1010" }, // PatientName
{ "0010,0020" , "0015,1011" }, // PatientId
{ "0010,0021" , "0015,1012" }, // IssuerOfPatientId
{ "0010,0030" , "0015,1013" }, // PatientBirthDate
{ "0010,1000" , "0015,1014" }, // OtherPatientIDs
{ "0020,000d" , "0015,1015" }, // StudyInstanceUID

```

```
{ "0020,0052", "0015,1016" }, // FrameOfReferenceUID
{ "0008,0060", "0015,1017" }, // Modality
{ "0008,0020", "0015,1018" }, // StudyDate
{ "0008,0021", "0015,1019" }, // SeriesDate
{ "0008,0022", "0015,1020" }, // AcquisitionDate
{ "0008,0030", "0015,1021" }, // StudyTime
{ "0008,0031", "0015,1022" }, // SeriesTime
{ "0008,0032", "0015,1023" }, // AcquisitionTime
{ "0010,0040", "0015,1024" }, // PatientSex
{ "0008,0050", "0015,1025" }, // AccessionNumber
{ "0008,0080", "0015,1026" }, // InstitutionName
{ "0020,0010", "0015,1027" }, // InstitutionName
{ "0010,1001", "0015,1028" } // OtherPatientNames
```