

Technical Publication

**DICOM Conformance Statement
Spine & Trauma 2D 3.1.0**

Document Revision 1

October 17, 2012

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1 Conformance Statement Overview

This is a conformance statement for the Brainlab navigation application Spine & Trauma 2D 3.1.0. The main purpose of this software is to intraoperatively receive fluoroscopic images from a C-arm and to make them available for planning and display in navigation. Among the different C-arm types integrated into the software, some are capable of sending the images in DICOM format over a network connection.

The DICOM import part of the application is

- Receive DICOM data from other DICOM nodes (e.g. on a C-arm) via the network and load it into the software.

| SOP Classes | User Of Service (SCU) | Provider Of Service (SCP) |
|----------------------|-----------------------|---------------------------|
| Transfer | | |
| Standard X-Ray Angio | No | Yes |
| Standard X-Ray RF | No | Yes |

Table 1-1: Services supported by Spine & Trauma 2D

The Brainlab software Spine & Trauma 2D is embedded in the Brainlab DICOM workflow infrastructure based on the DICOM Proxy (see [2] for more information). In this scope the Spine & Trauma 2D software supports more DICOM services like

- DICOM Query/Retrieve Service Class
- Brainlab Extended Instance Availability Notification Service Class

These service classes are not part of this DICOM Conformance Statement. It only describes the supported DICOM Storage SOP Classes.

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3 Introduction

3.1 Revision History

| Document Version | Date of Issue | Author | Description |
|------------------|-----------------------------|--------|-----------------|
| 1 | Oct 16 th , 2012 | MWE | Initial version |

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

3.3 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [1]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Brainlab and non–Brainlab equipment.
- This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.
- The DICOM standard will evolve to meet the users' future requirements. Brainlab reserves the right to make changes to its products or to discontinue its delivery.

3.4 Abbreviations

There are a variety of terms and abbreviations used in the document that are defined in the DICOM Standard. Abbreviations and terms are as follows:

| | |
|------|---|
| AE | DICOM Application Entity |
| AET | Application Entity Title |
| CD | Compact Disk |
| CD-R | Compact Disk Recordable |
| DVD | Digital Versatile Disc |
| FSC | File-Set Creator |
| FSU | File-Set Updater |
| FSR | File-Set Reader |
| HD | Hard Disk |
| IOD | (DICOM) Information Object Definition |
| ISO | International Standard Organization |
| MOD | Magneto Optical Disk |
| PDU | DICOM Protocol Data Unit |
| Q/R | Query and Retrieve |
| SCU | DICOM Service Class User (DICOM client) |
| SCP | DICOM Service Class Provider (DICOM server) |
| SOP | DICOM Service-Object Pair |

3.5 References

- [1] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.1-3.18 – 2006
- [2] DICOM Conformance Statement DICOM Proxy 3.1, Brainlab, Sep 13th, 2012

4 Networking

4.1 Implementation Model

The navigation application Spine & Trauma 2D is embedded in the Brainlab workflow infrastructure provided by the Brainlab DICOM Proxy (see [2] for more information). This service provides the DICOM Storage, Query/Retrieve and Worklist interfaces to communicate with the outside world. The Spine & Trauma 2D application communicates only with the DICOM Proxy.

In an abstract view the navigation application Spine & Trauma 2D is an implementation of a Storage SCP to receive DICOM instances of the supported SOP Classes.

4.1.1 Application Data Flow Diagram

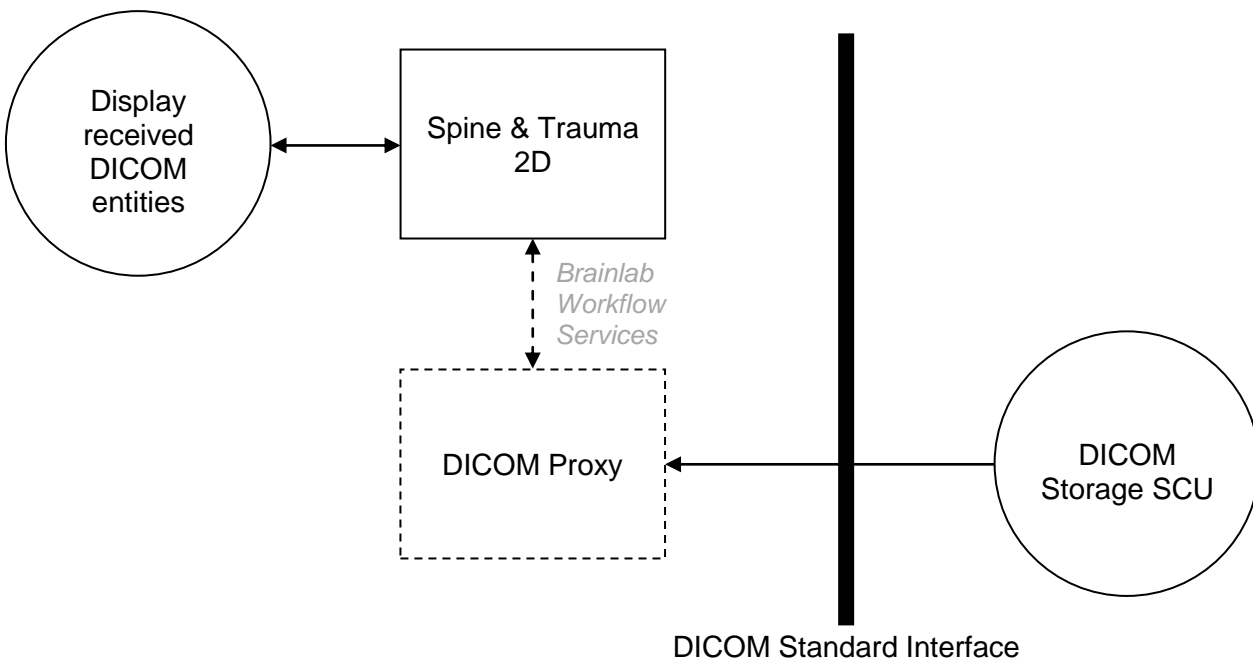


Figure 4-1: Spine Application flow diagram

4.1.2 Functional Definition of Application Entity (AE)

Some communications and data transfer with remote AEs are accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack.

- Storage SCP: If the navigation application Spine & Trauma 2D shall display DICOM instances from remote DICOM nodes, with the start of the image acquisition from an appropriate C-arm, a running DICOM Proxy is required. The DICOM Proxy accepts any Storage Service Class. Via the Brainlab workflow infrastructure the DICOM instances with supported SOP Classes will be transferred to the navigation application Spine & Trauma 2D.

4.1.3 Sequencing Of Real World Activities

Spine & Trauma 2D is embedded in a sequencing of real world activities as follows:

Scenario 1: User queries for Patients via Patient Browser.

1. Spine & Trauma 2D is started with workflow entries referencing the selected data (patient context only or demo data)
2. Patient Browser initiates a transfer of the selected data to the DICOM Proxy.
3. DICOM Proxy notifies Spine & Trauma 2D that selected data is available.
4. Spine & Trauma 2D initiates transfer of selected data to its Storage SCP

Scenario 2: DICOM Proxy receives images on AET "INTRAOP"

1. DICOM Proxy notifies Spine & Trauma 2D that the selected data is available
2. Spine initiates transfer of intra-op data to its Storage SCP

4.2 Application Entity Specifications

4.2.1 Spine & Trauma 2D

4.2.1.1 SOP Classes and Transfer Syntaxes

The navigation application Spine & Trauma 2D imports DICOM image data. It provides Standard Conformance to the following DICOM V3.0 SOP Classes:

| SOP Class Name | SOP Class UID | SCU | SCP | Transfer Syntax |
|----------------------|------------------------------|-----|-----|-----------------|
| Standard X-Ray Angio | 1.2.840.10008.5.1.4.1.1.12.1 | No | Yes | UNCOMP, COMP |
| Standard X-Ray RF | 1.2.840.10008.5.1.4.1.1.12.2 | No | Yes | UNCOMP, COMP |

Table 4-1: Supported Storage SOP Classes

The navigation application Spine & Trauma 2D supports, via DICOM Proxy, the following transfer syntax lists. In an association negotiation the syntaxes are proposed in the order of appearance in the list.

| Transfer Syntax Name | Transfer Syntax UID | SCU | SCP | Extended Negotiation |
|--|------------------------|-----|-----|----------------------|
| Uncompressed Transfer Syntax List (UNCOMP) | | | | |
| DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | Yes | Yes | None |
| DICOM Explicit VR Big Endian | 1.2.840.10008.1.2.2 | Yes | Yes | None |
| DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | Yes | Yes | None |
| Compressed Transfer Syntax List (COMP) | | | | |
| DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | Yes | Yes | None |
| DICOM Explicit VR Big Endian | 1.2.840.10008.1.2.2 | Yes | Yes | None |
| DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | Yes | Yes | None |
| JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) | 1.2.840.10008.1.2.4.70 | Yes | Yes | None |

Table 4-2: Supported Transfer Syntaxes

4.2.1.2 Association Policies

4.2.1.2.1 Implementation Identifying Information

The implementation information for this Application Entity is:

| | |
|-----------------------------|---------------------------|
| Implementation Class UID | 1.2.276.0.20.1.1.17.3.0.0 |
| Implementation Version Name | Spine & Trauma 2D |

4.2.1.3 Association Initiation Policy

The Spine & Trauma 2D navigation application never initiates an association.

4.2.1.4 Association Acceptance Policy

The Spine & Trauma 2D navigation application accepts no associations.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The Spine & Trauma 2D navigation application supports the DICOM upper layer using TCP/IP. The Spine & Trauma 2D navigation application is indifferent to the physical medium over which TCP/IP executes. It inherits this from the operating system upon which it executes.

4.3.2 Additional Protocols

The usage of DNS and DHCP is possible and is based on the network configuration of the operating system upon which the Spine & Trauma 2D navigation application executes.

4.4 Configuration

All configuration parameters are read out from an application settings file that only may be modified by the Brainlab support.

4.4.1 AE Title / Presentation Address Mapping

4.4.1.1 Local AE Titles

The local AET of the Spine & Trauma 2D navigation application is configurable:

| Application Entity | Default AE Title | Default TCP/IP Port |
|--|------------------|---------------------|
| Spine & Trauma 2D navigation application | INTRAOP | See DICOM Proxy |

Table 4-3: Local AE Titles.

5 Media Interchange

The Spine & Trauma 2D navigation application doesn't support Media Interchange.

6 Support Of Extended Character Sets

The Spine & Trauma 2D navigation application supports the

- ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

7 Security Profiles

No security profiles are supported.

8 Annexes

8.1 IOD Contents

No special behavior.

8.2 Data Dictionary Of Private Attributes

None supported.

8.3 Coded Terminology And Templates

None supported.

8.4 Grayscale Image Consistency

Not supported.

8.5 Standard Extended/Specialized/Private Sop Classes

None supported.

8.6 Private Transfer Syntaxes

None supported.

9 Indexes

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