GE Healthcare

Innova EPVision 2.0
Conformance Statement for DICOM

OPERATING DOCUMENTATION

5452193-1-8EN
Revision B

ATTENTION

LES APPAREILS A RAYONS X SONT DANGEREUX A LA FOIS POUR LE PATIENT ET POUR LE MANIPULATEUR SI LES MESURES DE PROTECTION NE SONT PAS STRICTEMENT APPLIQUEES

Bien que cet appareil soit construit selon les normes de sécurité les plus sévères, la source de rayonnement X représente un danger lorsque le manipulateur est non qualifié ou non averti.
Une exposition excessive au rayonnement X entraîne des dommages à l'organisme.
Par conséquent, toutes les précautions doivent être prises pour éviter que les personnes non autorisées ou non qualifiées utilisent cet appareil créant ainsi un danger pour les autres et pour elles-mêmes.
Avant chaque manipulation, les personnes qualifiées et autorisées à se servir de cet appareil doivent se renseigner sur les mesures de protection établies par la Commission Internationale de la Protection Radiologique, Annales 26 : Recommandations de la Commission Internationale sur la Protection Radiologique et les normes nationales en vigueur.

WARNING

X-RAY EQUIPMENT IS DANGEROUS TO BOTH PATIENT AND OPERATOR UNLESS MEASURES OF PROTECTION ARE STRICTLY OBSERVED

Though this equipment is built to the highest standards of electrical and mechanical safety, the useful x-ray beam becomes a source of danger in the hands of the unauthorized or unqualified operator.
Excessive exposure to x-radiation causes damage to human tissue.
Therefore, adequate precautions must be taken to prevent unauthorized or unqualified persons from operating this equipment or exposing themselves or others to its radiation.
Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection, contained in Annals Number 26 of the ICRP, and with applicable national standards.

ATENCION

LOS APARATOS DE RAYOS X SON PELIGROSOS PARA EL PACIENTE Y EL MANIPULADOR CUANDO LAS NORMAS DE PROTECCION NO ESTAN OBSERVADAS

Aunque este aparato está construido según las normas de seguridad más estrictas, la radiación X constituye un peligro al ser manipulado por personas no autorizadas o incompetentes. Una exposición excesiva a la radiación X puede causar daños al organismo.
Por consiguiente, se deberán tomar todas las precauciones necesarias para evitar que las personas incompetentes o no autorizadas utilicen este aparato, lo que sería un peligro para los demás y para sí mismas.
Antes de efectuar las manipulaciones, las personas habilitadas y competentes en el uso de este aparato, deberán informarse sobre las normas de protección fijadas por la Comisión Internacional de la Protección Radiológica, Anales No 26: Recomendaciónes de la Comisión Internacional sobre la Protección Radiológica y normas nacionales.

ACHTUNG

RÖNTGENAPPARATE SIND EINE GEFAHR FÜR PATIENTEN SOWIE BEDIENUNGSPERSONAL, WENN DIE GELTENDEN SICHERHEITSVORKEHRUNGEN NICHT GENAU BEACHTET WERDEN

Dieser Apparat entspricht in seiner Bauweise strengsten elektrischen und mechanischen Sichereitsnormen, doch in den Händen unbefugter oder unqualifizierter Personen wird er zu einer Gefahrenquelle.
Übermäßige Röntgenbestrahlung ist für den menschlichen Organismus schädlich.
Deswegen sind hinreichende Vorsichtsmaßnahmen erforderlich, um zu verhindern, daßunbefugte oder unqualifizierte Personen solche Geräte bedienen oder sich selbst und andere Personen deren Bestrahlung aussetzen können.
Vor Inbetriebnahme dieses Apparats sollte sich das qualifizierte und befugte Bedienungspersonal mit den geltenden Kriterien für den gefahrlosen Strahleneinsatz durch sorgfältiges Studium des Hefts Nr. 26 der Internationalen Kommission für Strahlenschutz (ICRP) vertraut machen: Empfehlungen der Internationalen Kommission für Strahlenschutz und anderer nationaler Normenbehörden.

Important Information

LANGUAGE

ПРЕДУПРЕЖДЕНИЕ (BG)

Това упътване за работа е налично само на английски език.

- Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод.
- Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа.
- Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациента в резултат на токов удар, механична или друга опасност.

警告 (ZH-CN)

本维修手册仅提供英文版本。

- 如果客户的维修服务人员需要非英文版本，则客户需自行提供翻译服务。
- 未详细阅读和完全理解本维修手册之前，不得进行维修。
- 忽略本警告可能对维修服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤 害。

警告 (ZH-HK)

本服務手冊僅提供英文版本。

- 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。
- 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。
- 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他的危險。

警告 (ZH-TW)

本維修手冊僅有英文版。

- 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。
- 請勿試圖維修本設備，除非 您已查閱並瞭解本維修手冊。
- 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。

UPOZORENJE (HR)

Ovaj servisni priručnik dostupan je na engleskom jeziku.

- Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod.
- Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik.
- Zanemarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.

VÝSTRAHA (CS)

Tento provozní návod existuje pouze v anglickém jazyce.

- V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka.
- Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah.
- V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.

ADVARSEL (DA)

Denne servicemanual findes kun på engelsk.

- Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse.
- Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual.
- Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.

WAARSCHUWING (NL)

Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar.

- Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan.
- Probeer de apparatuur niet te onderhouden alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is.
- Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de operator of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.

WARNING (EN)

This service manual is available in English only.

- If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services.
- Do not attempt to service the equipment unless this service manual has been consulted and is understood.
- Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.

HOIATUS (ET)

See teenindusjuhend on saadaval ainult inglise keeles.

- Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest.
- Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist.
- Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.

VAROITUS (FI)

Tämä huolto-ohje on saatavilla vain englanniksi.

- Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla.
- Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen.
- Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.

ATTENTION (FR)

Ce manuel d'installation et de maintenance est disponible uniquement en anglais.

- Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire.
- Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris.
- Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.

WARNUNG (DE)

Diese Serviceanleitung existiert nur in englischer Sprache.

- Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen.
- Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben.
- Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.

ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)

Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά.

- Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης.
- Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις.
- Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.

FIGYELMEZTETÉS (HU)

Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el.

- Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészíttetése.
- Ne próbálja elkezdeni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték.
- Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.

AÐVÖRUN (IS)

Þessi þjónustuhandbók er aðeins fáanleg á ensku.

- Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálaþjónustu.
- Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin.
- Brot á sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.

AVVERTENZA (IT)

Il presente manuale di manutenzione è disponibile soltanto in lingua inglese.

- Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione.
- Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto.
- Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.

警告 (JA)

このサービスマニュアルには英語版しかありません。

- サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。
- この警告に従わない場合、サービスを担当される方、操作員あるいは患者 さんが、感電や機械的又はその他の危険により負傷する可能性があります。

경고 (KO)

본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다.

- 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다.
- 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오.
- 본 경고 사항에 유의하지 않으면 전기 쇼크, 기계적 위험, 또는 기타 위험으로 인해 서비스 제공자, 사용자 또는 환자에게 부상을 입힐 수 있습니다.

BRĪDINĀJUMS (LV)

Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā.

- Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu.
- Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas.
- Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.

ĮSPĖJIMAS (LT)

Šis eksploatavimo vadovas yra tik anglų kalba.

- Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas.
- Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploatavimo vadovo.
- Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.

ADVARSEL (NO)

Denne servicehåndboken finnes bare på engelsk.

- Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse.
- Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått.
- Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.

OSTRZEŻENIE (PL)

Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.

- Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta.
- Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go.
- Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.

ATENÇÃO (PT-BR)

Este manual de assistência técnica encontra-se disponível unicamente em inglês.

- Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.

ATENÇÃO (PT-PT)

Este manual de assistência técnica só se encontra disponível em inglês.

- Se qualquer outro serviço de assistência técnica solicitar este manual noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.

ATENŢIE (RO)

Acest manual de service este disponibil doar în limba engleză.

- Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere.
- Nu încercați să reparați echipamentul decât ulterior consultării și înțelegerii acestui manual de service.
- Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.

ОСТОРОЖНО! (RU)

Данное руководство по техническому обслуживанию представлено только на английском языке.

- Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод.
- Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения.
- Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.

UPOZORENJE (SR)

Ovo servisno uputstvo je dostupno samo na engleskom jeziku.

- Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge.
- Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo.
- Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.

UPOZORNENIE (SK)

Tento návod na obsluhu je k dispozícii len v angličtine.

- Ak zákazníkov poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka.
- Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obluhu a neporozumiete mu.
- Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.

ATENCION (ES)

Este manual de servicio sólo existe en inglés.

- Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual.
- No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio.
- La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza.

VARNING (SV)

Den här servicehandboken finns bara tillgänglig på engelska.

- Om en kunds servicetekniker har behov av ett annat språk än engelska, ansvarar kunden för att tillhandahålla översättningstjänster.
- Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken.
- Om du inte tar hänsyn till den här varningen kan det resultera i skador på servicetekniker, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.

OPOZORILO (SL)

Ta servisni priročnik je na voljo samo v angleškem jeziku.

- Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod.
- Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli.
- Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.

DİKKAT (TR)

Bu servis kılavuzunun sadece ingilizcesi mevcuttur.

- Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer.
- Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz.
- Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.

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Revision History

Part / Rev	Date	Reason for change	Pages
5452193-1-8EN rev 1	25–Nov-2012	Initial release of direction 5452193-1-8EN	70

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Chapter 1 Conformance Statement Overview

1 Conformance Statement Overview

Innova EPVision 2.0 is post processing application that is installed on the same hardware platform as the base application, **Advantage Workstation**.

Innova EPVision 2.0 does not have an intrinsic DICOM Network feature. It does not directly invoke the DICOM Server AE and it uses the network services supported by the base application: Advantage Workstation.

Refer to the respective Conformance Statement - **Advantage Workstation** where Innova EPVision 2.0 application is running to understand the network services supported.

The Innova EPVision 2.0 application can be installed only on supported platform defined by Volume Viewer VS5 application (AW4.6 and above).

The application uses the following DICOM objects created in Innova system.

Table 1-1: (Input)

Sop Class Name	Sop Class UID
X-Ray Image Storage	1.2.840.10008.5.1.4.1.1.12.1

The application additionally uses the 3D model (3D volume can be saved in DICOM format) or 3D SaveState (a Volume Viewer object) that is created in AW Volume Viewer.

Table 1-2: (Input)

Sop Class Name	Sop Class UID
GEMS Private DICOM 3D Model	1.2.840.113619.4.26
Secondary Capture Image Storage (3D Save State)	1.2.840.10008.5.1.4.1.1.7

The application generates the derived instances of the following DICOM objects:

Table 1-3: (Output)

Sop Class Name	Sop Class UID
X-Ray Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

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Chapter 2 Introduction

1 Introduction

1.1 Overview

This DICOM Conformance Statement is divided into Chapters as described below:

- **Chapter 1 (Conformance Statement Overview)**, which describes the purpose of this Conformance Statement.
- **Chapter 2 (Introduction)**, which describes the overall structure, intent, and references for this Conformance Statement.
- **Chapter 3 (Network Conformance Statement)**, which specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Networking features.
- **Chapter 4 (Innova EPVision 2.0 Application Derived X-Ray Angiography (XA) Information Object Implementation)**, which specifies the GEMS equipment compliance to DICOM requirements for the implementation of a Derived XA Image Information Object.
- **Chapter 5 (Innova EPVision 2.0 Application Secondary Information Object Implementation)**, which specifies the GEMS equipment compliance to DICOM requirements for the implementation of a Secondary Capture Information Object.

The application uses the following DICOM objects created in Innova system. (For a complete description of the IOD, refer to the Innova DICOM conformance statement, direction *5394268-1-8EN*.)

Table 2-1:

Sop Class Name	Sop Class UID
X-Ray Image Storage	1.2.840.10008.5.1.4.1.1.12.1

The application additionally uses the 3D model (3D volume can be saved in DICOM format) or 3D SaveState (a Volume Viewer object) that is created in AW Volume Viewer. (For a complete description of the IODs, refer to the AW Volume Viewer DICOM conformance statement, direction 5344139-100.)

Table 2-2:

Sop Class Name	Sop Class UID
GEMS Private DICOM 3D Model	1.2.840.113619.4.26
Secondary Capture Image Storage (3D Save State)	1.2.840.10008.5.1.4.1.1.7

The application generates the derived instances of the following DICOM objects:

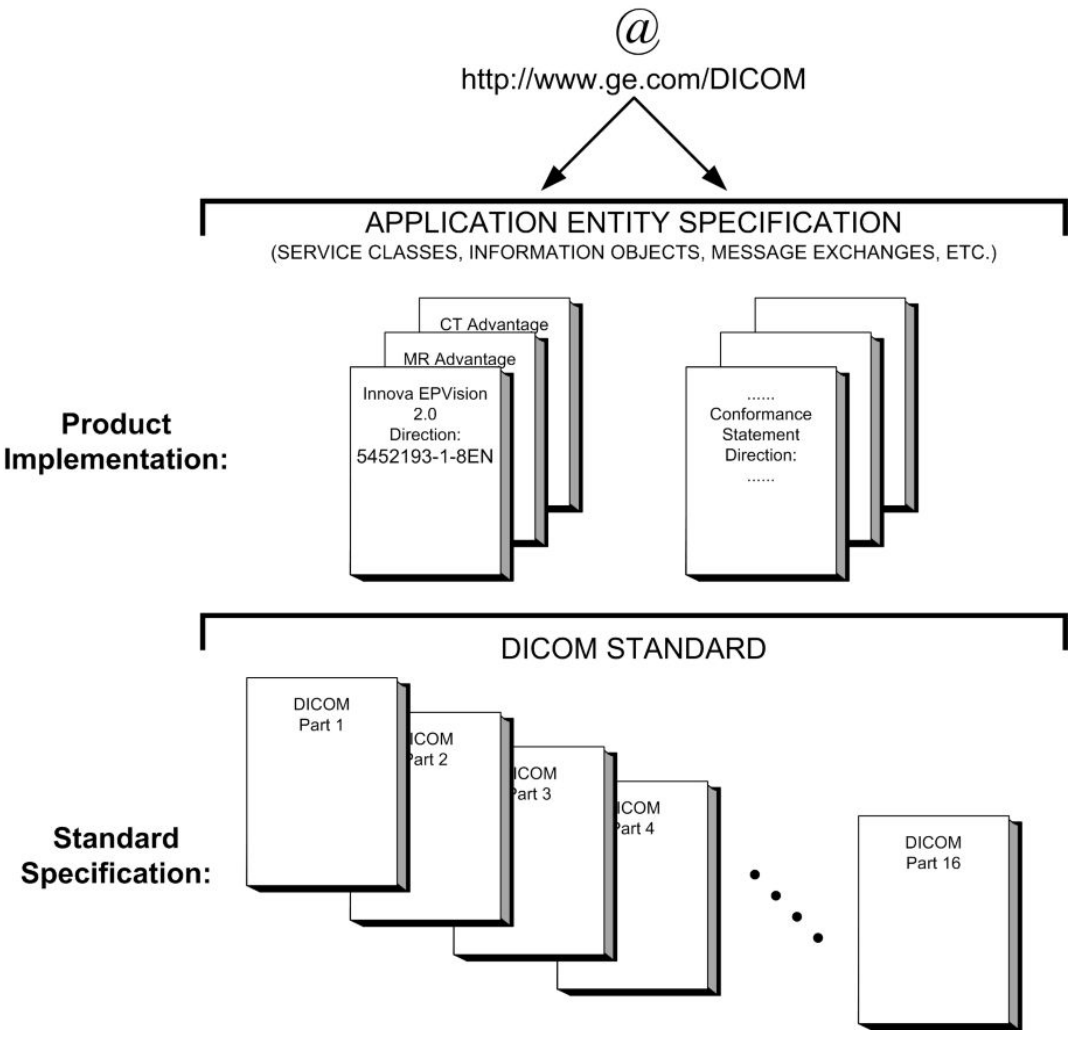
Table 2-3:

Sop Class Name	Sop Class UID
X-Ray Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

1.2 Overall Dicom Conformance Statement Document Structure

The Documentation Structure of the GEMS DICOM Conformance Statements is shown in the Illustration below.

Illustration 2-1: GEMS DICOM Conformance Statements



This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEMS network interface.

The GEMS Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 N. 17th Street, Suite 1752
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 Intended Audience

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts which are used in that Standard.

1.4 Scope and Field Application

It is the intent of this document to provide an unambiguous specification for GEMS implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEMS medical data exchanged using DICOM. The GEMS Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEMS devices are capable of using different Information Object Definitions. For example, a GEMS CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEMS implementation. If the user encounters unspecified private data elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEMS devices.

1.5 Important Remarks

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter–operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** – The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated

DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation** – Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.

  Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** – GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEMS protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements.** The **user** should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.

- **Interaction** – It is the sole responsibility of the **non–GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.6 References

NEMA PS3:

Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/.

1.7 Definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitons of these terms.

Abstract Syntax
The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE)

An end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title

The externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context

The specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association

A network communication channel set up between *Application Entities*.

Attribute

A unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD)

The specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG)

A set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile

The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs).

Module

A set of Attributes within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation

First phase of Association establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context

The set of DICOM network services used over an Association, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU)

A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile

A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.

Service Class Provider (SCP)

Role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity (Service Class User)*. Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU)

Role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).

Service/Object Pair (SOP) Class

The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance

An information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag

A 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element].

Transfer Syntax

The encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID)

A globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR)

The format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

1.8 Symbols and Abbreviations

AE
Application Entity

AET

Application Entity Title

DICOM

Digital Imaging and Communications in Medicine

DPPS

Data Points Per Second

IOD

Information Object Definition

PACS

Picture Archiving and Communication System

SC

Secondary Capture

SCP

Service Class Provider

SCU

Service Class User

SOP

Service-Object Pair

VR

Value Representation

VM

Value Multiplicity

XA

X-ray Angiography

Chapter 3 Network Conformance Statement

1 Network Conformance Statement

1.1 Introduction

This section of the DICOM Conformance Statement specifies the Innova EPVision 2.0 compliance to DICOM requirements for Networking features.

Innova EPVision 2.0 is a tool that is installed on the same hardware platform as the base application, **Advantage Workstation**. This base application is a Networked Medical Imaging Console dedicated to Examination Review and Diagnosis. The workstation uses DICOM services to import acquisition images for possible further analysis or processing, and to export images and radiotherapy data to other vendors.

Innova EPVision 2.0 does not have an intrinsic DICOM Network feature. It does not directly invoke the DICOM Server AE. For some detailed information on DICOM features of Advantage Windows, refer to the respective Conformance Statement – Advantage Workstation where the Innova EPVision 2.0 application is running.

Innova EPVision 2.0 is a post processing application and it creates DERIVED XA SOP Instances of X-Ray Image SOP Class.

The application uses the following DICOM objects created in Innova system. (For a complete description of the IOD, refer to the Innova DICOM conformance statement, direction *5394268-x-8EN*.)

Table 3-1:

Sop Class Name	Sop Class UID
X-Ray Image Storage	1.2.840.10008.5.1.4.1.1.12.1

The application additionally uses the 3D model (3D volume can be saved in DICOM format) or 3D SaveState (a Volume Viewer object) that is created in AW Volume Viewer. (For a complete description of the IODs, refer to the AW Volume Viewer DICOM conformance statement, direction 5344139-100.)

Table 3-2:

Sop Class Name	Sop Class UID
GEMS Private DICOM 3D Model	1.2.840.113619.4.26
Secondary Capture Image Storage (3D Save State)	1.2.840.10008.5.1.4.1.1.7

The application generates the derived instances of the following DICOM objects:

Table 3-3:

Sop Class Name	Sop Class UID
X-Ray Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

1.2 Implementation Model

1.2.1 Application Data Flow Diagram

Refer to the respective Conformance Statement - **Advantage Workstation** where the Innova EPVision 2.0 application is running.

1.2.2 Presentation Context Table

Refer to the respective Conformance Statement - **Advantage Workstation** where the Innova EPVision 2.0 application is running.

1.2.3 Real-World Activities

The user can load 3D model from AW Volume Viewer SaveState (with a DLO) object and start the Innova Vision application.

The user can request to store the reformatted series of X-Ray images (XA). Upon this users request, Innova Vision Applications XA Model SOP Instance is created and saved into Advantage Windows database.

The user can also request to store the single frame secondary capture of the reformatted X-Ray images. This creates the Innova Vision Applications SC Model SOP Instance and saved into Advantage Windows database.

The user can create a map. This creates an Innova EPVision 2.0 Application SC Model SOP Instance and saved into Advantage Windows database.

The user can add a point to the map. This creates an Innova EPVision 2.0 Application SC Model SOP Instance and saved into Advantage Windows database.

The **goal of this document** is to give a detailed description of:

- Innova EPVision 2.0 XA Model DICOM IOD
- Innova EPVision 2.0 SC Model DICOM IOD

1.2.4 SOP Instance UID

Implementation UID assigned to Innova EPVision 2.0 is: **1.2.840.113619.6.328**

An UID generated by a product has 2 parts : <root>.<suffix>.

For a GE product root is 1.2.840.113619 where

- 1 identifies ISO

- 2 identifies the ISO member body branch
- 840 identifies the country code. Innova EPVision 2.0 Conformance Statement for DICOM GE Healthcare Direction 5392762-6-8EN, Revision 1
- 28 1 Network Conformance Statement.
- 113619 identifies GEMS as a specific organization.

For a Study , Series , Instances created in GE suffix is 2.Imp.id where

- Imp identifies a specific implementation and is registered by GCC
- id is an number or a substring (i.j or i.j.l...) defined by the implementation. In our implementation it means get UID from Advantage Windows (Conformance Statement - **Advantage Workstation** Conformance Statement for DICOM.)

Innova EPVision 2.0 will generate UIDs for the following instance: **1.2.840.113619.2.328**

1.2.5 Support of Extended Character Sets

The Innova EPVision 2.0 applications can only process the Extended Char Set ISO_IR 100 (Latin alphabet Number 1 supplementary set).

The product user interface will allow the user to enter characters from the console keyboard that are within the Extended Char Set ISO_IR 100 character set.

The Innova EPVision 2.0 applications can only generate images with the Extended Char Set ISO_IR 100 (Latin alphabet Number 1 supplementary set).

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Chapter 4 Innova EPVision 2.0 Derived X-Ray Angiography (XA) Information Object Implementation

1 Introduction

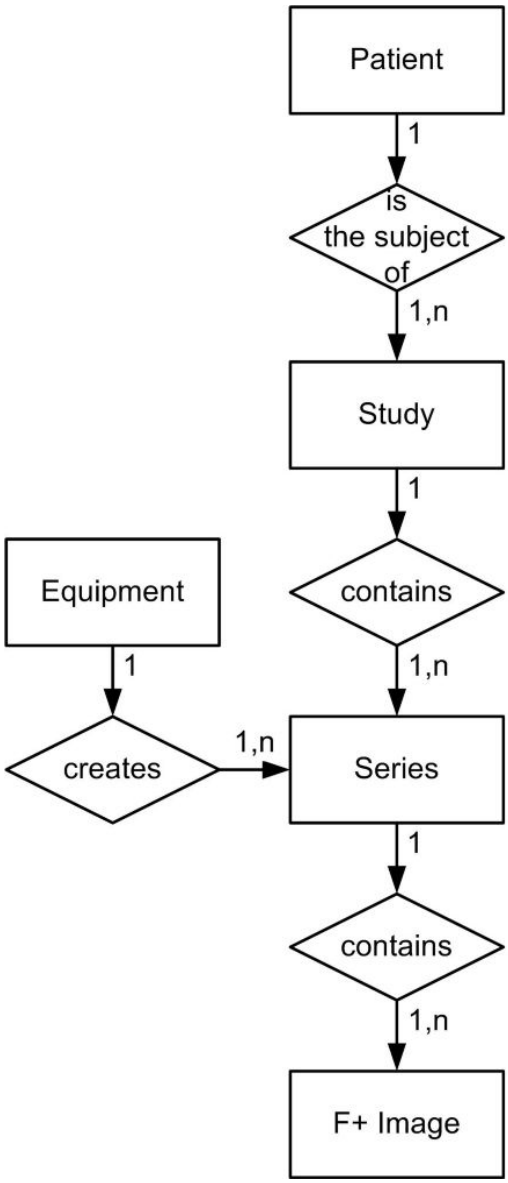
This section specifies the requirements for Derived XA IOD that is generated by the DICOM Innova EPVision 2.0.

2 Innova EPVision 2.0 Derived X-Ray Image IOD Implementation

This section defines how X-Ray Image attributes are used within the implementation, and whether these attributes are mandatory or optional for the correct operation of the application.

3 Innova EPVision 2.0 X-Ray Image IOD Entity-Relationship Model

Illustration 4-1: Innova EPVision 2.0 Derived X-Ray Image Entity Relationship Diagram



The Entity-Relationship diagram is shown in Fig above. In this figure, the following convention is established to represent the information organization:

Each entity is represented by a rectangular box

Each relationship is represented by a diamond shaped box

The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. See DICOM Part 3 Section for explanation of the entity-relationship notation.

4 Entities Description

Refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities contained within the X-Ray Image information object.

5 Mapping of DICOM Entities

DICOM entities map to the *Innova EPVision 2.0 Derived XA IOD* entities in the following manner:

Table 4-1: Mapping of DICOM Entities

DICOM	Innova Vision Applications Derived XA
Patient Entity	Patient Entity (Advantage Workstation)
Study Entity	Exam Entity (Advantage Workstation)
Series Entity	Series Entity (Advantage Workstation)
Equipment Entity	Equipment Entity (Advantage Workstation)
Image Entity	Image Entity (Advantage Workstation)

6 IOD Module Table

The Innova EPVision 2.0 XA Information Object Definitions comprise the modules of the following tables and the Private Attributes.

Table 4-2: Innova Vision Applications Derived XA Image IOD Modules

Entity Name	Module Name	Usage	Reference
Patient	Patient	Mandatory	Section 7.2, Patient Entity
Study	General Study	Mandatory	Section 7.3.1, General Study Module
	Patient Study	User Option	Section 7.3.2, Patient Study Module
Series	General Series	Mandatory	Section 7.4, Series Entity
Equipment	General Equipment	Mandatory	Section 7.5, Equipment Entity
Frame of Reference	Synchronization	Not Used	N/A
Image	General Image	Mandatory	Section 7.6.1, General Image Module
	Image Pixel	Mandatory	Section 7.6.2, Image Pixel Module
	Contrast/Bolus	Not Used	N/A
	Cine	C - Required if pixel Frame Cine data	Section 7.6.3, Cine Module
	Multiframe	C - Required if pixel data is Multi- Frame Cine data	Section 7.6.4, Multi Frame Module
	Frame Pointers	User Option	Section 7.6.5, Frame Pointers Module
	Mask	Not Used	N/A
	Display Shutter	Not Used	N/A
	Device	Not Used	N/A
	Intervention	Not Used	N/A
	X-Ray Image	Mandatory	Section 7.6.6, X-Ray Image Module
	X-Ray Acquisition	Mandatory	Section 7.6.7, X-Ray Acquisition Module
	X-Ray Collimator	Not Used	N/A
	X-Ray Table	C - Required if Image is created with table motion, may be present otherwise	Section 7.6.8, X-Ray Table Module
	XA Positioner	Mandatory	Section 7.6.9, XA Positioner Module
	DX Detector	Not Used	N/A
	Overlay Plane	Not Used	N/A
	Multi-frame Overlay	Not Used	N/A
	Modality LUT	Not Used	N/A

Entity Name	Module Name	Usage	Reference
	VOI LUT	User Option	Section 7.6.10, VOI LUT Module
	SOP Common	Mandatory	Section 7.6.11, SOP Common Module

7 Information Module Definitions

Please refer to DICOM v3.0 Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the XA Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM v3.0 Standard Part 3 (Information Object Definitions).

7.1 Common Information Module Definitions

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the XA Information Objects.

7.2 Patient Entity

Patient Module

Table 4-3: Patient Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Copied from the 3D model without change or same as Patient's name in the original XA image that resulted in this series if generic 3D heart model is used
Patient ID	(0010,0020)	2	Copied from the 3D model without change or same as Patient ID in the original XA image that resulted in this series if generic 3D heart model is used
Patient's Birth Date	(0010,0030)	2	Copied from the 3D model without change or same as Patient's Birth Date in the original XA image that resulted in this series if generic 3D heart model is used
Patient's Sex	(0010,0040)	2	Copied from the 3D model without change or same as Patient's Sex in the original XA image that resulted in this series if generic 3D heart model is used
Other Patient ID	(0010,1000)	3	Copied from the 3D model without change or same as Other Patient ID in the original XA image that resulted in this series if generic 3D heart model is used

7.3 Study Entity

7.3.1 General Study Module

Table 4-4: General Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
study date	(0008,0020)	2	Date the Innova EPVision 2.0 exam is started in AW
study time	(0008,0030)	2	Time the EPVision 2.0 exam is started in AW
accession number	(0008,0050)	2	EMPTY
referring physician name	(0008,0090)	2	EMPTY
study description	(0008,1030)	3	Hardcoded "EPVision 2.0"

Attribute Name	Tag	Type	Attribute Description
study instance uid	(0020,000D)	1	Uniquely generated for each EPVision 2.0 exam started
study id	(0020,0010)	2	Hardcoded to “1”

7.3.2 Patient Study Module

Table 4-5: Patient Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient's Age	(0010,1010)	3	Copied from the 3D model without change. Patient's Age attribute is not used if generic 3D heart model is used.
Patient's Size	(0010,1020)	3	Copied from the 3D model without change. Patient's Size attribute is not used if generic 3D heart model is used.
Patient's Weight	(0010,1030)	3	Copied from the 3D model without change. Patient's Weight attribue is not used if generic 3D heart model is used.

7.4 Series Entity

General Series Module

Table 4-6: General Series Module Attributes

Attribute Name	Tag	Type	Attribute Description
series date	(0008,0021)	3	same as acquisition date of the original XA image that resulted in this series
series time	(0008,0031)	3	same as acquisition time of the original XA image that resulted in this series
series description	(0008,103E)	3	Hardcoded “EPVision 2.0”
modality	(0008,0060)	1	"XA"
protocol name	(0018,1030)	3	Hardcoded “EPVision 2.0”
patient position	(0018,5100)	2C	Copied from the original XA image without change
Series Instance UID	(0020,000E)	1	Generated uniquely in AW
series number	(0020,0011)	2	Generated in AW. Unique within the given Innova Vision Applications exam.
Related Series Sequence	(0008,1250)	3	One item only, to reference the Innova Series where X-Ray image (Fluoro or Record) was acquired
>Study Instance UID	(0020,000D)	1C	Copied from the original XA image without change
>Series Instance UID	(0020,000E)	1C	Copied from the original XA image without change
>Purpose of Reference Code Sequence	(0040,A170)	2	One item only, to describe the purpose of this reference - DCID 7210 that specifies the purpose "Simultaneously Acquired
>>Code Value	(0008,0100)	1C	“122400”
>>Coding Scheme Designator	(0008,0102)	1C	“DCM”
>>Code Meaning	(0008,0104)	1C	"Simultaneously Acquired"

7.5 Equipment Entity

General Equipment Module

Table 4-7: General Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Hardcoded to "GE MEDICAL SYSTEMS"
Institution Name	(0008,0080)	3	Institution where the equipment is located that produced the fused images (i.e, the AW system).
Station Name	(0008,1010)	3	User defined name identifying the machine that produced the fused images, typically the AETitle of the AW
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model name of the equipment, which is the Innova Vision Applications application name used to generate this image
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of the equipment, which is the Serial Number of the AW machine
Software Version(s)	(0018,1020)	3	Has 2 values. Manufacturer's designation of the software version of the AW and the Innova Vision Applications application.

7.6 Image Entity

7.6.1 General Image Module

Table 4-8: General Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
image type	(0008,0008)	3	"DERIVED\PRIMARY\AUGFLUORO"
Acquisition Date	(0008,0022)	3	Same as acquisition date of the original XA image
Acquisition Time	(0008,0032)	3	Same as acquisition time of the original XA image
content date	(0008,0023)	2C	The date the F+ image pixel data creation started in AW.
content time	(0008,0033)	2C	The time the F+ image pixel data creation started in AW.
Referenced Instance Sequence	(0008,114A)	3	Sequence of one Item providing the referenced 3D model (3D image, planning information, markers) that is used for the fusion.
>Referenced sop class uid	(0008,1150)	1C	SOP Class UID of the referenced 3D model
>Referenced sop instance uid	(0008,1155)	1C	SOP Instance UID of the referenced 3D model
>Purpose of Reference Code Sequence	(0040,A170)	1	One item only, to describe the purpose of this reference
>>Code Value	(0008,0100)	1C	"INNOVA-001" - GE private Code value that specifies the purpose "Corresponding volumetric presentation"
>>Coding Scheme Designator	(0008,0102)	1C	"99GEMS" - GE private Code Scheme Designator that specifies the purpose "Corresponding volumetric presentation"
>>Code Meaning	(0008,0104)	1C	"Corresponding volumetric presentation" - GE private Code Meaning that specifies the purpose "Corresponding volumetric presentation"

Attribute Name	Tag	Type	Attribute Description
instance number	(0020,0013)	2	starting at 1. Unique within a series
patient orientation	(0020,0020)	2C	sent as a zero-length empty field
image comments	(0020,4000)	3	User-defined comments about the image

7.6.2 Image Pixel Module

Table 4-9: Image Pixel Module Attributes

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	"1"
Photometric Interpretation	(0028,0004)	1	"MONOCHROME2"
Rows	(0028,0010)	1	"1024"
Columns	(0028,0011)	1	"1024"
Bits Allocated	(0028,0100)	1	"8"
Bits Stored	(0028,0101)	1	"8"
High Bit	(0028,0102)	1	“7”
Pixel Representation	(0028,0103)	1	“0”
Pixel Data	(7FE0,0010)	1	A data stream of the pixel samples which comprise the Image

7.6.3 Cine Module

Table 4-10: Cine Module Attributes

Attribute Name	Tag	Type	Attribute Description
start trim	(0008,2142)	3	“1”
stop trim	(0008,2143)	3	The frame number of the last frame of the Multiframe image to be displayed
recommended display frame rate	(0008,2144)	3	Copied from the original XA image without change
cine rate	(0018,0040)	3	Copied from the original XA image without change
frame time vector	(0018,1065)	1C	Values derived from the original XA image
frame delay	(0018,1066)	3	“0”

7.6.4 Multi Frame Module

Table 4-11: Multi Frame Module Attributes

Attribute Name	Tag	Type	Attribute Description
number of frames	(0028,0008)	1	Number of frames in a Multi-frame Image
frame increment pointer	(0028,0009)	1	"(0018,1065)"

7.6.5 Frame Pointers Module

Table 4-12: Frame Pointers Module Attributes

Attribute Name	Tag	Type	Attribute Description
representative frame number	(0028,6010)	3	The frame number selected for use as a pictorial representation (e.g. icon) of the Multi-frame Image

7.6.6 X-Ray Image Module

Table 4-13: X-Ray Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
pixel intensity relationship	(0028,1040)	1	"DISP"
Image Type	(0008,0008)	1	Refer to Section 7.6.1
Samples per pixel	(0028,0002)	1	Refer to Section 7.6.2
Photometric Interpretation	(0028,0004)	1	Refer to Section 7.6.2
Bits Allocated	(0028,0100)	1	Refer to Section 7.6.2
Bits Stored	(0028, 0101)	1	Refer to Section 7.6.2
High Bit	(0028,0102)	1	Refer to Section 7.6.2
Pixel Representation	(0028, 0103)	1	Refer to Section 7.6.2

7.6.7 X-Ray Acquisition Module

Table 4-14: X-Ray Acquisition Module Attributes

Attribute Name	Tag	Type	Attribute Description
Kvp	(0018,0060)	2	EMPTY
exposure	(0018,1152)	2C	EMPTY
radiation setting	(0018,1155)	1	"GR" OR "SC"
intensifier size	(0018,1162)	3	Copied from the original XA image without change
field of view shape	(0018,1147)	3	"RECTANGLE"
field of view dimension(s)	(0018,1149)	3	Copied from the original XA image without change

7.6.8 X-Ray Table Module

Table 4-15: X-Ray Table Module Attributes

Attribute Name	Tag	Type	Attribute Description
table motion	(0018,1134)	2	"STATIC" OR "DYNAMIC"
table vertical increment	(0018,1135)	2C	Values derived from the original XA image
table lateral increment	(0018,1136)	2C	Values derived from the original XA image
table longitudinal increment	(0018,1137)	2C	Values derived from the original XA image
Table Angle	(0018,1138)	3	Values derived from the original XA image

7.6.9 XA Positioner Module

Table 4-16: XA Positioner Module Attributes

Attribute Name	Tag	Type	Attribute Description
distance source to detector	(0018,1110)	3	Copied from the original XA image without change
distance source to patient	(0018,1111)	3	Copied from the original XA image without change
positioner motion	(0018,1500)	2C	"STATIC" OR "DYNAMIC"
positioner primary angle	(0018,1510)	2	Values derived from the original XA image
positioner secondary angle	(0018,1511)	2	Values derived from the original XA image
positioner primary angle increment	(0018,1520)	2C	Values derived from the original XA image
positioner secondary angle increment	(0018,1521)	2C	Values derived from the original XA image

7.6.10 VOI LUT Module

Table 4-17: VOI LUT Module Attributes

Attribute Name	Tag	Type	Attribute Description
window center	(0028,1050)	3	"128"
window width	(0028,1051)	3	"256"

7.6.11 SOP Common Module

Table 4-18: SOP Common Module Attributes

Attribute Name	Tag	Type	Attribute Description
specific character set	(0008,0005)	1C	"ISO_IR 100"
sop class uid	(0008,0016)	1	"1.2.840.10008.5.1.4.1.1.1 2.1"
sop instance uid	(0008,0018)	1	Uniquely identifies the SOP Instance.
Contributing Equipment Sequence	(0018,A001)	3	One item shall be present for Innova equipment
>Purpose of Reference Code Sequence	(0040,A170)	1	Describes the purpose for which the related equipment is being reference.
>>Code Value	(0008,0100)	1C	"109101"
>>Coding Scheme Designator	(0008,0102)	1C	"DCM"
>>Code Meaning	(0008,0104)	1C	"Acquisition Equipment"
>Manufacturer	(0008,0070)	1	"GE MEDICAL SYSTEMS"
>Manufacturer's Model Name	(0008,1090)	3	"DL"
>Contribution Description	(0018,A003)	3	"X-Ray Acquisition equipment"

7.7 Standard Extended and Private Data Attributes

The Product supports the Standard and Private Attributes defined in the following sections in Standard Extended X-Ray SOP Instances as Type 3 data elements.

7.7.1 Standard Attributes

The Product supports the following attributes in SOP Instances as Type 3 data elements.

Table 4-19: Standard Extented Attributes

Attribute Name	Tag	Information Entity Name - Image	Use
Curve Dimensions	(5000,0005)	3	"2"
Number of Points	(5000,0010)	3	Number of data points in this Curve
Type of Data	(5000,0020)	3	"ECG"
Data Value Representation	(5000,0103)	3	"0000H"
Curve Data Descriptor	(5000,0110)	3	"0\1"
Axis Units	(5000,0030)	3	"DPPS\NONE"
Coordinate Start Value	(5000,0112)	3	"0"
Coordinate Step Value	(5000,0114)	3	"250"
Curve Data	(5000,3000)	3	Curve Data points in the curve, each dimension for the first point, followed by dimensions for second point

7.7.2 Private Group DLX_SERIE_01

Private Group DLX_SERIE_01 is modeled as part of the Image (X-Ray Table and X-Ray Positioner) Information Entity.

Table 4-20: Private Group DLX_SERIE_01

Attribute Name	Tag	VR	VM	Attribute Description and Use
Angle value 1	(0019,xx01)	DS	1	Copied from the original XA image without change
Angle value 2	(0019,xx02)	DS	1	Copied from the original XA image without change
Angle value 3	(0019,xx03)	DS	1	Copied from the original XA image without change
Table Vertical Position	(0019,xx21)	DS	1	Copied from the original XA image without change
Table Longitudinal Position	(0019,xx22)	DS	1	Copied from the original XA image without change
Table Lateral Position	(0019,xx23)	DS	1	Copied from the original XA image without change

7.7.3 Private Group GEMS_DL_IMG_01

Private Group GEMS_DL_IMG_01 is modeled as part of the Image (General Image, X-Ray Positioner, X-Ray Table and Curve) Information Entity.

Table 4-21: Private Group GEMS_DL_IMG_01

Attribute Name	Tag	VR	VM	Attribute Description and Use
patient position per image	(0019,xxC7)	CS	1	Patient position descriptor relative to the equipment. Defined terms are: HFP = Head First-Prone HFS = Head First-Supine HFDR = Head First-Decubitus Right HFDL = Head First-Decubitus Left FFDR = Feet First-Decubitus Right FFDL = Feet First-Decubitus Left FFP = Feet First-Prone FFS = Feet First-Supine Values derived from the original XA image
fov dimension double	(0019,xx0B)	DS	1-2	Value in floating point resolution, whose truncature is (0018,1149). Possible values are "400\400" OR "320\320" OR "300\300" OR "200\200" OR OR "172.8\172.8" OR "170\170" OR "160\160" OR "150\150" OR "147.2\147.2" OR "121.6\121.6" OR "120\120" Values derived from the original XA image.
image detector rotation angle	(0019,xx92)	DS	1	mage rotation at the detector reading, before image flip. Values derived from the original XA image
image flip	(0019,xx95)	CS	2	Contain two defined terms, First value: • YES if horizontal flip • NO else Second value : • YES if vertical flip • NO else Values derived from the original XA image
can downscan 512	(0019,xxAA)	CS	1	Indicates the possibility to downscan the pixel data to 512x512 for exchange purposes: • YES • NO Values derived from the original XA image
Acquisition Mode Description	(0019,xxB1)	LO	1	The precise description of the “numerical code” (Adx acq mode). Values derived from the original XA image
Acquisition Mode Display Label	(0019,xxB2)	LO	1	Label that shall be displayed on the AW browser, for each sequence Values derived from the original XA image
Acquisition Region	(0019,xxBA)	CS	1	Coded String to determine whether the acquisition is Cardiac or Angio. Defined terms are CARDIAC, ANGIO and UNKNOWN Values derived from the original XA image
Acquisition SUB mode	(0019,xxBB)	CS	1	Coded String to determine whether the acquisition mode was designed for a subtracted or Non-subtracted review. Defined terms are SUB, NOSUB and UNKNOWN. Values derived from the original XA image

Attribute Name	Tag	VR	VM	Attribute Description and Use
table head tilt angle	(0019,xxEE)	FL	1	Angle of the head-feet axis of the table in degrees relative to the horizontal plane. Zero is defined when the head-feet axis is in the horizontal plane. Positive values are when the head of the table is upwards the horizontal plane. The valid range is from -45 to +45. Contains the value of the first frame. Values derived from the original XA image
table rotation angle	(0019,xxEA)	FL	1	Rotation angle in degrees of the table in the horizontal plane (clockwise when looking from above the table). The value of this attribute applies to the first frame of the multiframe image. Values derived from the original XA image
table cradle angle	(0019,xxBC)	FL	1	Angle of the left-right axis of the table in degrees relative to the horizontal plane. Positive values indicate that the left of the table is upwards. The value of this attribute applies to the first frame of the Multi-frame image. Values derived from the original XA image
table rotation status vector	(0019,xxBD)	CS	1-N	Status of the rotation of the table in the horizontal plane: • YES • NO This is a multi-valued attribute that contains the Table Rotation Status for each frame. Values derived from the original XA image
table rotation angle increment	(0019,xxC3)	FL	1-N	Incremental change in the rotation of the table in the horizontal plane (clockwise when looking from above the table) relative to the first frame of the Multi-frame image. Contains as many values as number of frames. Required if Table Motion is DYNAMIC. Values derived from the original XA image
Table X Position to Isocenter	(0019,xxEB)	FL	1	X position of the Table Reference Point with respect to the Isocenter (mm). Positive values are towards the LAO direction of the Isocenter. The value of this attribute applies to the first frame of the Multi-frame image. Values derived from the original XA image
Table Y Position to Isocenter	(0019,xxEC)	FL	1	Y position of the Table Reference Point with respect to the Isocenter (mm). positive values are downwards the horizontal plane in the vertical direction. The value of this attribute applies to the first frame of the Multi-frame image. Values derived from the original XA image
Table Z Position to Isocenter	(0019,xxED)	FL	1	Z position of the Table Reference Point with respect to the Isocenter (mm). Positive values are towards the CRA direction of the Isocenter. The value of this attribute applies to the first frame of the Multi-frame image. Values derived from the original XA image

Attribute Name	Tag	VR	VM	Attribute Description and Use
Table X Position to Isocenter increment	(0019,xxD7)	FL	1-N	Incremental change in X position of the Table Reference Point with respect to the Isocenter (in mm), relative to the first frame of the Multi-frame image. Positive values are towards the LAO direction of the Isocenter. Contains as many values as number of frames. Required if Table Motion is DYNAMIC. Values derived from the original XA image
Table Y Position to Isocenter increment	(0019,xxD8)	FL	1-N	Incremental change in Y position of the Table Reference Point with respect to the Isocenter (in mm), relative to the first frame of the Multi-frame image. Positive values are downwards the horizontal plane in the vertical direction. Contains as many values as number of frames. Required if Table Motion is DYNAMIC. Values derived from the original XA image
Table Z Position to Isocenter increment	(0019,xxD9)	FL	1-N	Incremental change in Z position of the Table Reference Point with respect to the Isocenter (in mm), relative to the first frame of the Multi-frame image. Positive values are towards the CRA direction of the Isocenter. Contains as many values as number of frames. Required if Table Motion is DYNAMIC. Values derived from the original XA image
Table Head Tilt Angle increment	(0019,xxDA)	FL	1-N	Incremental change in the angle of the headfeet axis of the table in degrees with respect to the horizontal plane, relative to the first frame of the Multi-frame image. Zero means when the headfeet axis is in the horiwontal plane. Positive values are when the head of the table is upwards the horizontal plane. Contains as many values as number of frames. Required if Table Motion is DYNAMIC. Values derived from the original XA image
angle 1 increment	(0019,xx97)	DS	1-N	Incremental change in angle_value_1, sent if positioner motion is dynamic. Values derived from the original XA image
angle 2 increment	(0019,xx98)	DS	1-N	Incremental change in angle_value_2, sent if positioner motion is dynamic. Values derived from the original XA image
angle 3 increment	(0019,xx99)	DS	1-N	Incremental change in angle_value_3, sent if positioner motion is dynamic. Values derived from the original XA image
SID vector	(0019,xxBE)	FL	1-N	Distance in mm from source to detector center. This is a multi-valued attribute that contains the SID for each frame Values derived from the original XA image
SOD vector	(0019,xxE9)	FL	1-N	Distance in mm from source to the system isocenter. This is a multi-valued attribute that contains the SOD for each frame Values derived from the original XA image
Number of Points_before acq	(0019,xx60)	US	1	Number of data points in the ECG Curve before the acquisition.
Curve Data_before acq	(0019,xx61)	OW	1	Curve Data points in the curve before the XA acquisition

Attribute Name	Tag	VR	VM	Attribute Description and Use
Number of Points_trigger	(0019,xx62)	US	1	Number of data points of QRS trigger values in ECG data.
Curve Data_trigger	(0019,xx63)	OW	1	Curve Data points in the curve that describes the QRS trigger values.
ECG Synchronization	(0019,xx64)	SH	1	ECG synchronization ON / OFF
ECG Delay Mode	(0019,xx65)	SH	1	Prospective / Retrospective gating method used
ECG Delay vector	(0019,xx66)	IS	1-N	ECG % (integer value between 0 and 100) applied at frame acqusition time.
Table Vertical Position with respect to RIRP	(0019,xx67)	DS	1	Table Top Vertical position with respect to RIRP of the equipment in (mm). Table motion downwards is positive. The value of this attribute applies to the first frame of the Multi-frame image. Value derived from the original XA image.
Table Longitudinal Position with respect to RIRP	(0019,xx68)	DS	1	Table Top Longitudinal position with respect to RIRP of the equipment in (mm). Table motion towards CRA is positive assuming that the patient is positioned supine and its head is in normal position. The value of this attribute applies to the first frame of the Multi-frame image. Value derived from the original XA image.
Table Lateral Position with respect to RIRP	(0019,xx69)	DS	1	Table Top Lateral position with respect to RIRP of the equipment in (mm). Table motion towards LAO is positive assuming that the patient is positioned supine and its head is in normal position. The value of this attribute applies to the first frame of the Multi-frame image. Value derived from the original XA image.
Table Vertical Position with respect to RIRP increment	(0019,xx6A)	DS	1-n	Incremental change in Vertical position of the table relative to RIRP versus first frame of Multi-frame image given in mm. Available only if Table Motion is dynamic. Values derived from the original XA image.
Table Longitudinal Position with respect to RIRP increment	(0019,xx6B)	DS	1-n	Incremental change in Longitudinal position of the table relative to RIRP versus first frame of Multi-frame image given in mm. Available only if Table Motion is dynamic. Values derived from the original XA image.
Table Lateral Position with respect to RIRP increment	(0019,xx6C)	DS	1-n	Incremental change in Lateral position of the table relative to RIRP versus first frame of Multi-frame image given in mm. Available only if Table Motion is dynamic. Values derived from the original XA image.
ISO x versus RIRP	(0019,xx7A)	DS	1	Position in mm of the Frontal (respectively Lateral) Isocenter in the RIRP referential, along the X axis. Positive values are towards the X direction of the Isocenter Coordinate System (LAO direction). The value of this attribute applies to the first frame of the Multi-frame image. Value derived from the original XA image.

Attribute Name	Tag	VR	VM	Attribute Description and Use
ISO y versus RIRP	(0019,xx7B)	DS	1	Position in mm of the Frontal (respectively Lateral) Isocenter in the RIRP referential, along the Y axis.Positive values are downwards the horizontal plane in the vertical direction. The value of this attribute applies to the first frame of the Multi-frame image. Value derived from the original XA image.
ISO z versus RIRP	(0019,xx7C)	DS	1	Position in mm of the Frontal (respectively Lateral) Isocenter in the RIRP referential, along the Z axis. Positive values are towards the CRA direction of the Isocenter. The value of this attribute applies to the first frame of the Multi-frame image. Value derived from the original XA image.
ISO x versus RIRP increment	(0019,xx7D)	DS	1-n	Increment vector of ISO x versus RIRP versus the first frame. Available if positioner motion is dynamic. Values derived from the original XA image.
ISO y versus RIRP increment	(0019,xx7E)	DS	1-n	Increment vector of ISO y versus RIRP versus the first frame. Available if positioner motion is dynamic. Values derived from the original XA image.
ISO z versus RIRP increment	(0019,xx7F)	DS	1-n	Increment vector of ISO z versus RIRP versus the first frame. Available if positioner motion is dynamic. Values derived from the original XA image.

7.7.4 Private Group GEMS_XR3DCAL_01

Table 4-22: Private Group GEMS_XR3DCAL_01

Attribute Name	Tag	VR	VM	Attribute Description and Use
Generalized calibration	(0021,xx20)	LT	1	Augmented calibration string of Innova system

7.7.5 Private Group GEMS_3D_INTVL_01

Table 4-23: Private Group GEMS_3D_INTVL_01

Attribute Name	Tag	VR	VM	Attribute Description and Use
X-Ray Marker Sequence	(0023,xx01)	SQ	1	Sequence of markers
> Marker Id	(0023,xx02)	SH	1	Id of the Marker. Alphanumeric, limited to 16 characters
> Marker Type	(0023,xx03)	CS	1	Defined terms: POINTS, LINE (can be extended)
> Marker Size	(0023,xx04)	FL	1	Size of the marker as provided by the user. Float number.
> Marker Color CIELab Value	(0023,xx05)	US	3	A color that is choosen by the user. It is a triplet value , units in PCS-Values and values in CIELab
> Marker Label	(0023,xx06)	LO	1	Displayed (translated) label. Alphanumeric, limited to 64 characters

Attribute Name	Tag	VR	VM	Attribute Description and Use
> Marker Visible State	(0023,xx07)	CS	1	Visible state as choosen by the user during the store of F+ image. Enumerated terms (non extensible): • YES • NO
> Marker Description	(0023,xx08)	LO	1	Alphanumeric, limited to 64 characters
> Marker Points Sequence	(0023,xx10)	SQ	1	If present shall contain one or more items, each item is a point in the marker
>> Marker Point Id	(0023,xx11)	SH	1	Id of the point. Alphanumeric, limited to 16 characters
>> Marker Point Position	(0023,xx12)	FL	3	Float coordinates x,y,z of the point
>> Marker Point Size	(0023,xx13)	FL	1	Size of marker. Float number.
>> Marker Point Color CIELab Value	(0023,xx14)	US	3	A color triplet value, units in PCSValues and values in CIELab
>> Marker Point Visible State	(0023,xx16)	CS	1	Visible state as choosen by the user during the store of F+ image. Enumerated terms (non extensible): • YES • NO
>> Marker Point Order	(0023,xx17)	IS	1	Order in the list of points. Integer.
Volume Manual Registration	(0023,xx18)	FL	3	Float coordinates x,y,z of the translation
Volumes Threshold	(0023,xx20)	IS	1-N	list of volume rendering thresholds in the augmented fluoro object (in mm) as set by user.
CutPlane activation flag	(0023,xx25)	CS	1	Enumerated values • YES • NO Indicates if the clipping plane is activated by the user or not.
CutPlane position Value	(0023,xx26)	IS	1	Clipping plane cursor position (selected by the user)
CutPlane normal Value	(0023,xx27)	FL	3	Clipping plane normal coordinates (Float co-ordinates x,y.z)
Volume scaling factor	(0023,xx28)	FL	1	Default value = 1 (no scaling). Magnification factor for the volume linked to the F+ sequence.
ROI to TableTop Distance	(0023,xx29)	FL	1	Estimated distance between the center of the anatomy / region of interest to the table top. Set by the user during storing Innova Vision Applications image.
DRR Threshold	(0023,xx30)	IS	1-N	list of DRR rendering thresholds in the augmented fluoro object
Volume Table position	(0023,xx31)	FL	3	Float coordinates x,y,z of the table position configured for the volume

Attribute Name	Tag	VR	VM	Attribute Description and Use
Rendering mode	(0023,xx32)	IS	1	The rendering mode that was set by user. Values can be 0,1 or 2. Volume = 0, Surface = 1, DRR = 2.
3D Object Opacity	(0023,xx33)	IS	1	Set by the user. Value can range from 0-100.
Invert Image	(0023,xx34)	IS	1	Set by the user. 0 - Normal, 1 - Inverted
Enhance Full	(0023,xx35)	IS	1	Set by the user. 0 - Masked, 1 - Full
Zoom	(0023,xx36)	FL	1	Set by the user. Any positive value.
Roam	(0023,xx37)	IS	2	Set by the user. Horizontal and vertical direction Roam. Value depends on zoom factor and can be any integer value.
window level	(0023,xx38)	IS	1	Set by the user. Value range from - 1024 to 1023
window width	(0023,xx39)	IS	1	Set by the user. Value range from 1 to 2047
BMC Setting	(0023,xx40)	CS	1	Set by User: • ON • OFF
Back View Setting	(0023,xx41)	CS	1	Set by User: • ON • OFF
Sub Volume Visibility	(0023,xx42)	CS	1-N	Set by User: • YES • NO
3D Landmarks Visibility	(0023,xx43)	CS	1	Set by User: • YES • NO
Ablation Point Visibility	(0023,xx44)	CS	1	Set by User: • YES • NO .

Chapter 5 Innova EPVision 2.0 Secondary Information Object Implementation

1 Introduction

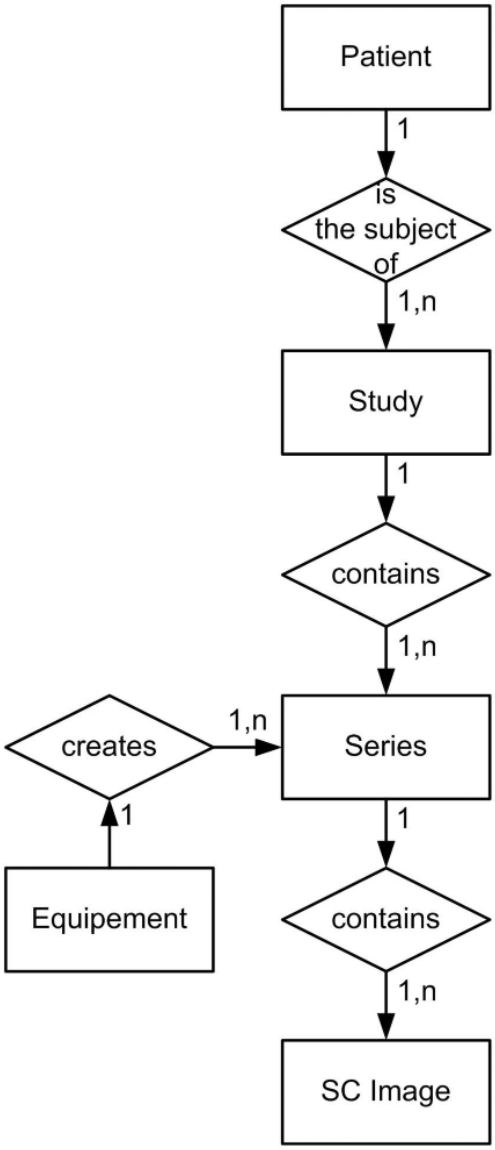
This section specifies the requirements for Secondary Capture IOD that is generated by the EPVision2.0.

2 Innova EPVision 2.0 Secondary Image IOD Implementation

This section defines how X-Ray image attributes are used within the implementation, and whether these attributes are mandatory or optional for the correct operation of the application.

3 Innova EPVision 2.0 Secondary Image IOD Entity - Relationship Model

Illustration 5-1: Innova EPVision 2.0 Secondary Image Entity Relationship Diagram



The Entity-Relationship diagram is shown in Figure above. In this figure, the following convention is established to represent the information organization:

Each entity is represented by a rectangular box.

Each relationship is represented by a diamond shaped box.

The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. See DICOM Part 3 Section for explanation of the entity-relationship notation.

4 Entities Description

Refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities contained within the Seconday Image information object.

5 Mapping of DICOM Entities

DICOM entities map to the Innova Vision Applications Secondary IOD entities in the following manner:

Table 5-1: Mapping of DICOM Entities

DICOM	Innova Vision Applications Secondary
Patient Entity	Patient Entity (Advantage Workstation)
Study Entity	Exam Entity (Advantage Workstation)
Series Entity	Series Entity (Advantage Workstation)
Equipment Entity	Equipment Entity (Advantage Workstation)
Image Entity	Image Entity (Advantage Workstation)

6 IOD Module Table

Innova EPVision 2.0 Secondary Information Object Definitions comprise the modules of the following tables and the Private Attributes.

Table 5-2: Innova EPVision 2.0 Secondary Image IOD Modules

Entity Name	Module Name	Usage	Reference
Patient	Patient	Mandatory	Section 7.2, Patient Entity
Study	General Study	Mandatory	Section 7.3.1, General Study Module
	Patient Study	User Option	Section 7.3.2, Patient Study Module
Series	General Series	Mandatory	Section 7.4, Series Entity
Equipment	General Equipment	Mandatory	Section 7.5.1, General Equipment Module
	SC Equipment	Mandatory	Section 7.5.2, SC Equipment Module
Image	General Image	Mandatory	Section 7.6.1, General Image Module
	Image Pixel	Mandatory	Section 7.6.2, Image Pixel Module
	SC Image	Mandatory	Section 7.6.3, SC Image Module
	Device	Not Used	N/A
	Overlay Plane	Not Used	N/A
	Modality LUT	Not Used	N/A
	VOI LUT	Not Used	N/A
	SOP Common	Mandatory	Section 7.6.4, SOP Common Module
	X-Ray Image	Optional Used in case of mapping points	Section 7.7.6, X-Ray Image module
	X-Ray Acquisition	Optional Used in case of mapping points	Section 7.7.7, X-Ray Table Module
	X-Ray Table	Optional Used in case of mapping points	Section 7.7.8, X-Ray Table Module
	XA Positioner	Optional Used in case of mapping points	Section 7.7.9, XA Positioner Module

7 Information Module Definitions

Please refer to DICOM V3.0 Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the SC Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 and Type 2 Attributes are also included for completeness and to define which values they may take, and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM V3.0 Standard Part 3 (Information Object Definitions).

Also note that Attributes not present in tables are not supported.

7.1 Common Information Module Definitions

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the SC Information Objects.

7.2 Patient Entity

Patient Module

Table 5-3: Patient Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Copied from the 3D model without change or same as Patient's name in the original XA image that resulted in this series if generic 3D heart model is used.
Patient ID	(0010,0020)	2	Copied from the 3D model without change or same as Patient ID in the original XA image that resulted in this series if generic 3D heart model is used.
Patient's Birth Date	(0010,0030)	2	Copied from the 3D model without change or same as Patient's Birth Date in the original XA image that resulted in this series if generic 3D heart model is used.
Patient's Sex	(0010,0040)	2	Copied from the 3D model without change or same as Patient's Sex in the original XA image that resulted in this series if generic 3D heart model is used.
Other Patient ID	(0010,1000)	3	Copied from the 3D model without change or same as Other Patient ID in the original XA image that resulted in this series if generic 3D heart model is used.

7.3 Study Entity

7.3.1 General Study Module

Table 5-4: General Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
study date	(0008,0020)	2	Date the Innova EPVision 2.0 exam is started.
study time	(0008,0030)	2	Time the Innova EPVision 2.0 exam is started.
accession number	(0008,0050)	2	EMPTY

Attribute Name	Tag	Type	Attribute Description
referring physician name	(0008,0090)	2	EMPTY
study description	(0008,1030)	3	hardcoded to “EP Vision 2.0”.
study instance UID	(0020,000D)	1	Uniquely generated for each Innova EPVision 2.0 exam started.
study ID	(0020,0010)	2	Hard coded to “1”.

7.3.2 Patient Study Module

Table 5-5: Patient Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient's age	(0010,1010)	3	Copied from the 3D model without change. Patient's Age attribute is not used if generic 3D heart model is used.
Patient's size	(0010,1020)	3	Copied from the 3D model without change. Patient's Size attribute is not used if generic 3D heart model is used.
Patient's weight	(0010,1030)	3	Copied from the 3D model without change. Patient's Weight attribue is not used if generic 3D heart model is used.

7.4 Series Entity

General Series Module

Table 5-6: General Series Module Attributes

Attribute Name	Tag	Type	Attribute Description
series date	(0008,0021)	3	same as acquisition date of the original XA image that resulted in this series or creation date of the map.
series time	(0008,0031)	3	same as acquisition time of the original XA image that resulted in this series or creation time of the map.
series description	(0008,103E)	3	hardcoded to “EP Vision 2.0”.
modality	(0008,0060)	1	XA
protocol name	(0018,1030)	3	hardcoded to “Innova EPVision”.
patient position	(0018,5100)	2C	Copied from the original XA image without change
series instance UID	(0020,000E)	1	Generated uniquely in AW
series number	(0020,0011)	2	Generated in AW. Unique within the given Innova EP-Vision 2.0 exam.
related series sequence	(0008,1250)	3	One item only, to reference the Innova Series where the X-Ray image (Fluoro or Record) was acquired
>Study Instance UID	(0020,000D)	1	Copied from the original XA image without change
>Series Instance UID	(0020,000E)	1	Copied from the original XA image without change
>Purpose of Reference Code Sequence	(0040,A170)	2	One item only, to describe the purpose of this reference
>>Code Value	(0008,0100)	1C	“122400”

Attribute Name	Tag	Type	Attribute Description
>>Coding Scheme Designator	(0008,0102)	1C	“DCM”
>>Code Meaning	(0008,0104)	1C	"Simultaneously Acquired"

7.5 Equipment Entity

7.5.1 General Equipment Module

Table 5-7: General Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Hard coded to "GE MEDICAL SYSTEMS"
Institution Name	(0008,0080)	3	Institution where the equipment is located that produced the fused images (i.e, the AW system)
Station Name	(0008,1010)	3	User defined name identifying the machine that produced the fused images, typically the AETitle of the AW
Manufacturer’s Model Name	(0008,1090)	3	Manufacturer's model name of the equipment, which is the Innova Vision Applications application name used to generate this image
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of the equipment, which is the Serial Number of the AW machine
Software Version(s)	(0018,1020)	3	Has 2 values: Manufacturer's designation of the software version of the AW and the Innova Vision Applications application

7.5.2 SC Equipment Module

Table 5-8: SC Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
conversion type	(0008,0064)	1	WSD
SC manufacturer	(0018,1016)	3	GE MEDICAL SYSTEMS
SC manufacturer model name	(0018,1018)	3	Manufacturer's model number of the Secondary Capture Device (i.e, AW)

7.6 Image Entity

7.6.1 General Image Module

Table 5-9: General Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
Image type	(0008,0008)	3	DERIVED\SECONDARY\AUGFLUORO
Acquisition Date	(0008,0022)	3	Same as content date
Acquisition Time	(0008,0032)	3	Same as content time
Content date	(0008,0023)	2C	Date the Innova EPVision 2.0 SC image pixel data creation started in AW.
Content time	(0008,0033)	2C	Time the Innova EPVision 2.0 SC image pixel data creation started in AW.

Attribute Name	Tag	Type	Attribute Description
Instance number	(0020,0013)	2	starting at 1. Unique within a serie
Patient orientation	(0020,0020)	2C	Sent as a zero-length empty field
Image comments	(0020,4000)	3	User-defined comments about the image
Burned in annotation	(0028,0301)	3	NO

7.6.2 Image Pixel Module

Table 5-10: Image Pixel Module Attributes

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	3
Photometric Interpretation	(0028,0004)	1	RGB
Rows	(0028,0010)	1	1000
Columns	(0028,0011)	1	1000
Bits Allocated	(0028,0100)	1	8
Bits Stored	(0028,0101)	1	8
High Bit	(0028,0102)	1	7
Pixel Representation	(0028,0103)	1	0
Planar Configuration	(0028,0006)	1C	0
Pixel Data	(7FE0,0010)	1	A data stream of the pixel samples which comprise the SC Image

7.6.3 SC Image Module

Table 5-11: SC Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
SC date	(0018,1012)	3	Date of storing the SC image
SC time	(0018,1014)	3	Time of storing the SC image

7.6.4 SOP Common Module

Table 5-12: SOP Common Module Attributes

Attribute Name	Tag	Type	Attribute Description
Specific character set	(0008,0005)	1C	ISO_IR 100
SOP class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.7
SOP instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance
Contributing Equipment Sequence	(0018,A001)	3	One item shall be present for Innova equipment
>Purpose of Reference Code Sequence	(0040,A170)	1	Describes the purpose for which the related equipment is being reference.
>>Code Value	(0008,0100)	1C	109101
>>Coding Scheme Designator	(0008,0102)	1C	DCM

Attribute Name	Tag	Type	Attribute Description
>>Code Meaning	(0008,0104)	1C	Acquisition Equipment
>Manufacturer	(0008,0070)	1	GE MEDICAL SYSTEMS
>Manufacturer's Model Name	(0008,1090)	3	DL
>Contribution Description	(0018,A003)	3	X-Ray Acquisition equipment

7.7 Standard Extended and Private Data Attributes

The Product supports the Standard and Private Attributes defined in the following sections in Standard Extended SC SOP Instances as Type 3 data elements.

7.7.1 Standard Attributes

The Product supports the following attributes in SOP Instances as Type 3 data elements.

Table 5-13: Standard Extented Attributes

Attribute Name	Tag	Information Entity Name - Image	Use
Kvp	(0018,0060)	3	EMPTY
Exposure	(0018,1152)	3	EMPTY
distance source to detector	(0018,1110)	3	Copied from the original XA image without change
distance source to patient	(0018,1111)	3	Copied from the original XA image without change
positioner motion	(0018,1500)	3	"STATIC" or "DYNAMIC"
positioner primary angle	(0018,1510)	3	Values derived from the original XA image
positioner secondary angle	(0018,1511)	3	Values derived from the original XA image

7.7.2 Private Group DLX_SERIE_01

Private Group DLX_SERIE_01 is modeled as part of the Image (X-Ray Positioner) Information Entity.

Table 5-14: Private Group DLX_SERIE_01

Attribute Name	Tag	VR	VM	Attribute Description and use
Angle value 1	(0019,xx01)	DS	1	Copied from the original XA image without change
Angle value 2	(0019,xx02)	DS	1	Copied from the original XA image without change
Angle value 3	(0019,xx03)	DS	1	Copied from the original XA image without change
Table Vertical Position	(0019,xx21)	DS	1	Copied from the original XA image without change
Table Longitudinal Position	(0019,xx22)	DS	1	Copied from the original XA image without change
Table Lateral Position	(0019,xx23)	DS	1	Copied from the original XA image without change

7.7.3 Private Group GEMS_DL_IMG_01

Private Group GEMS_DL_IMG_01 is modeled as part of the Image (General Image, X-Ray Positioner, X-Ray Table and Curve) Information Entity.

Table 5-15: Private Group GEMS_DL_IMG_01

Attribute Name	Tag	VR	VM	Attribute Description and use
Patient position per image	(0019,xxC7)	CS	1	Patient position descriptor relative to the equipment. Defined terms are: HFP = Head First-Prone HFS = Head First-Supine HFDR = Head First-Decubitus Right HFDL = Head First-Decubitus Left FFDR = Feet First-Decubitus Right FFDL = Feet First-Decubitus Left FFP = Feet First-Prone FFS = Feet First-Supine Values derived from the original XA image
Image flip	(0019,xx95)	CS	2	Contain two defined terms: First value : YES if horizontal flip, else NO Second value : YES if vertical flip, else NO Values derived from the original XA image
SID vector	(0019,xxBE)	FL	1-N	Distance in mm from source to detector center. This is a multi-valued attribute that contains the SID for each frame. Values derived from the original XA image
SOD vector	(0019,xxE9)	FL	1-N	Distance in mm from source to the system isocenter. This is a multi-valued attribute that contains the SOD for each frame Values derived from the original XA image
fov dimension double	(0019,xx0B)	DS	1-2	fov dimension value in floating point resolution, whose truncature is (0018,1149). Possible values are "400/400" OR "320/320" OR "300/300" OR "200/200" OR OR "172.8/172.8" OR "170/170" OR "160/160" OR "150/150" OR "147.2/147.2" OR "121.6/121.6" OR "120/120" Values derived from the original XA image.
image detector rotation angle	(0019,xx92)	DS	1	mage rotation at the detector reading, before image flip. Values derived from the original XA image
can downscan 512	(0019,xxAA)	CS	1	“NO”
table head tilt angle	(0019,xxEE)	FL	1	Angle of the head-feet axis of the table in degrees relative to the horizontal plane. Zero is defined when the head-feet axis is in the horizontal plane. Positive values are when the head of the table is upwards the horizontal plane. The valid range is from -45 to +45.
table rotation angle	(0019,xxEA)	FL	1	Rotation angle in degrees of the table in the horizontal plane (clockwise when looking from above the table). Values derived from the original XA image
table cradle angle	(0019,xxBC)	FL	1	Angle of the left-right axis of the table in degrees relative to the horizontal plane. Positive values indicate that the left of the table is upwards. Value derived from the original XA image

Attribute Name	Tag	VR	VM	Attribute Description and use
Table X Position to Isocenter	(0019,xxEB)	FL	1	X position of the Table Reference Point with respect to the Isocenter (mm). Positive values are towards the LAO direction of the Isocenter. Value derived from the original XA image
Table Y Position to Isocenter	(0019,xxEC)	FL	1	Y position of the Table Reference Point with respect to the Isocenter (mm). positive values are downwards the horizontal plane in the vertical direction. Value derived from the original XA image
Table Z Position to Isocenter	(0019,xxED)	FL	1	Z position of the Table Reference Point with respect to the Isocenter (mm). Positive values are towards the CRA direction of the Isocenter. Value derived from the original XA image
Table Vertical Position with respect to RIRP	(0019,xx67)	DS	1	Table Top Vertical position with respect to RIRP of the equipment in (mm). Table motion downwards is positive. Value derived from the original XA image.
Table Longitudinal Position with respect to RIRP	(0019,xx68)	DS	1	Table Top Longitudinal position with respect to RIRP of the equipment in (mm). Table motion towards CRA is positive assuming that the patient is positioned supine and its head is in normal position. Value derived from the original XA image.
Table Lateral Position with respect to RIRP	(0019,xx69)	DS	1	Table Top Lateral position with respect to RIRP of the equipment in (mm). Table motion towards LAO is positive assuming that the patient is positioned supine and its head is in normal position. Value derived from the original XA image.
ISO x versus RIRP	(0019,xx7A)	DS	1	1 Position in mm of the Frontal (respectively Lateral) Isocenter in the RIRP referential, along the X axis. Positive values are towards the X direction of the Isocenter Coordinate System (LAO direction). Value derived from the original XA image.
ISO y versus RIRP	(0019,xx7B)	DS	1	1 Position in mm of the Frontal (respectively Lateral) Isocenter in the RIRP referential, along the Y axis.Positive values are downwards the horizontal plane in the vertical direction. Value derived from the original XA image.
ISO z versus RIRP	(0019,xx7C)	DS	1	Position in mm of the Frontal (respectively Lateral) Isocenter in the RIRP referential, along the Z axis. Positive values are towards the CRA direction of the Isocenter. Value derived from the original XA image. ISO x versus RIRP increment.

7.7.4 Private Group GEMS_3D_INTVL_01

Table 5-16:

Attribute Name	Tag	VR	VM	Attribute Description
CutPlane activation flag	(0023,xx25)	CS	1	Enumerated values „YES” or „NO”. Indicates if the clipping plane is activated by the user or not.
CutPlane position Value	(0023,xx26)	IS	1	Clipping plane cursor position (selected by the user)

Attribute Name	Tag	VR	VM	Attribute Description
CutPlane normal Value	(0023,xx27)	FL	3	Clipping plane normal coordinates (Float co-ordinates x,y.z)
Volume scaling factor	(0023,xx28)	FL	1	Default value = 1 (no scaling). Magnification factor for the volume linked to the F+ sequence.
Back View Setting	(0023,xx41)	CS	1	Set by User „ON' or „OFF"
Sub Volume Visibility	(0023,xx42)	CS	1-N	Set by User „YES" or „NO"

7.7.5 Private Group GEMS_EP_MAPPING

Table 5-17:

Attribute Name	Tag	VR	VM	Attribute Description
Map data	(0023,xx66)	UT	1	Map settings set by user.
Mapping Point data	(0023,xx67)	UT	1	EP data collected related to the point.
Registration data	(0023,xx68)	UT	1	Registration data set by user.

7.7.6 X-Ray Image module

Table 5-18: X-Ray Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
pixel intensity relationship	(0028, 1040)	1	"DISP"
Image Type	(0008, 0008)	1	Refer to Section 7.6.1
Samples per pixel	(0028, 0002)	1	Refer to Section 7.6.2
Photometric Interpretation	(0028, 0004)	1	Refer to Section 7.6.2
Bits Allocated	(0028, 0100)	1	Refer to Section 7.6.2
Bits Stored	(0028, 0101)	1	Refer to Section 7.6.2
High Bit	(0028, 0102)	1	Refer to Section 7.6.2
Pixel Representation	(0028, 0103)	1	Refer to Section 7.6.2

7.7.7 X-Ray Table Module

Table 5-19: X-Ray Table Module Attributes

Attribute Name	Tag	Type	Attribute Description
Kvp	(0018, 0060)	2	EMPTY
exposure	(0018, 1152)	2C	EMPTY
radiation setting	(0018, 1155)	1	"GR" OR "SC"
intensifier size	(0018, 1162)	3	Copied from the original XA image without change
field of view shape	(0018, 1147)	3	"RECTANGLE"
field of view dimension(s)	(0018, 1149)	3	Copied from the original XA image without change

7.7.8 X-Ray Table Module

Table 5-20: X-Ray Table Module Attributes

Attribute Name	Tag	Type	Attribute Description
table motion	(0018,1134)	2	"STATIC"
Table Angle	(0018,1134)	3	Value derived from the original XA image

7.7.9 XA Positioner Module

Table 5-21:

Attribute Name	Tag	Type	Attribute Description
distance source to detector	(0018,1110)	3	Copied from the original XA image without change
distance source to patient	(0018,1111)	3	Copied from the original XA image without change
positioner motion	(0018,1500)	2C	"STATIC"
positioner primary angle	(0018,1510)	2	Values derived from the original XA image
positioner secondary angle	(0018,1511)	2	Values derived from the original XA image

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