

GE Healthcare

MUSE NX™
Cardiology Information System
XML Developer Guide

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MUSE NX™
Cardiology Information System
English
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Publication Information

The information in this manual applies only to the MUSE™ NX Cardiology Information System. It does not apply to earlier product versions. Due to continuing product innovation, specifications in this manual are subject to change without notice.

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For more information about compliance, refer to the *Regulatory and Safety Guide* for this product.

The document part number and revision are on each page of the document. The revision identifies the document's update level. The revision history of this document is summarized in the following table.

Table 1: Revision History

Revision	Date	Comments
A	30 September 2018	Internal release.

To access other GE Healthcare Diagnostic Cardiology documents, go to the Common Documentation Library (CDL), located at <http://apps.gehealthcare.com/servlet/ClientServlet>, and select **Cardiology**.

To access Original Equipment Manufacturer (OEM) documents, go to the device manufacturer's website.

This document is an XML developer guide for the MUSE™ Cardiology Information System, also referred to as the "product," "system," or "device." This document is intended to be used by GE Healthcare service personnel.

Support

GE Healthcare maintains a trained staff of application and technical experts to answer questions and to respond to issues and problems that may arise during the installation, maintenance, and use of this product.

If you require additional assistance, contact your GE Healthcare representative, or GE Healthcare support at one of the following numbers:

- North America: 1-800-558-7044
- Europe: +49 761 45 43 -0
- Asia: +86 21 3877 7888

Training

This document is intended as a supplement to, not a substitute for, thorough product training. If you have not received training on the use of the product, you should request training assistance from GE Healthcare.

To see available training, go to the GE Healthcare training website www.gehealthcare.com/training.

For more self-paced course offerings, tools, and reference guides you may find useful, visit the GE Healthcare Education Store at www.gehealthcare.com/educationstore.

Service Manual Language Information

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.
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 пациент в резултат на токов удар или механична или друга опасност.
警告 (ZH-CN)	本维修手册仅提供英文版本。 • 如果维修服务提供商需要非英文版本，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人员，操作员或患者造成触电、机械伤害或其他形式的伤害。
警告 (ZH-TW)	本維修手冊只提供英文版。 • 如果客戶的維修人員有英語以外的其他語言版本需求，則由該客戶負責 提供翻譯服務。 • 除非您已詳閱本維修手冊並了解其內容，否則切勿嘗試對本設備進行維修。 • 不重視本警告可能導致維修人員、操作人員或病患因電擊、機械因素或 其他因素而受到傷害。
UPOZORENJE (HR)	Ove upute za servisiranje dostupne su samo na engleskom jeziku. • Ukoliko korisnički servis zahtijeva neki drugi jezik, korisnikova je odgovornost osigurati odgovarajući prijevod. • Nemojte pokušavati servisirati opremu ukoliko niste konzultirali i razumjeli ove upute. • Nepoštivanje ovog upozorenja može rezultirati ozljedama servisnog osoblja, korisnika ili pacijenta prouzročeni električnim udarom te mehaničkim ili nekim drugim opasnostima.

VAROVÁNÍ (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 varování 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 medmindre denne servicemanual har været konsulteret og er forstået. • Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk, mekanisk eller anden fare for teknikeren, operatøren eller patienten.
WAARSCHUWING (NL)	Deze service manual is alleen in het Engels verkrijgbaar. • Indien het onderhoudspersoneel een andere taal nodig heeft, dan is de klant verantwoordelijk voor de vertaling ervan. • Probeer de apparatuur niet te onderhouden voordat deze service manual geraadpleegd en begrepen is. • Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de gebruiker of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.
HOIATUS (ET)	Käesolev 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 technique n'est disponible qu'en anglais. • Si un service technique client souhaite obtenir ce manuel dans une autre langue que l'anglais, il devra prendre en charge la traduction et la responsabilité du contenu. • Ne pas tenter d'intervenir sur les équipements tant que le manuel technique 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 ist nur in englischer Sprache verfügbar. • Falls der Kundendienst eine andere Sprache benötigt, muss er für eine entsprechende Übersetzung sorgen. • Keine Wartung durchführen, ohne diese Serviceanleitung gelesen und verstanden zu haben. • Bei Zuwiderhandlung kann es zu Verletzungen des Kundendiensttechnikers, des Anwenders oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.
FIGYELMEZTETÉS (HU)	Ez a szerviz kézikönyv kizárólag angol nyelven érhető el. • Ha a vevő szerviz ellátója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészítése. • Ne próbálja elkezdni használni a berendezést, amíg a szerviz kézikönyvben leírtakat nem értelmezték és értették meg. • Ezen figyelmeztetés figyelmen kívül hagyása a szerviz ellátó, a működtető vagy a páciens áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.
AÐVÖRUN (IS)	Þessi þjónustuhandbók er eingöngu ááanleg á ensku. • Ef að þjónustuveitandi viðskiptamanns þarfnast annars tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálþjónustu. • Reynið ekki að afgangiða tækið nema þessi þjónustuhandbók hefur verið skoðuð og skilin. • Brot á að sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnaða eða sjúklingi frá raflosti, vélrænum eða öðrum áhættum.
PERINGATAN (ID)	Manual servis ini hanya tersedia dalam bahasa Inggris. • Jika penyedia jasa servis pelanggan memerlukan bahasa lain selain dari Bahasa Inggris, merupakan tanggung jawab dari penyedia jasa servis tersebut untuk menyediakan terjemahannya. • Jangan mencoba melakukan servis terhadap perlengkapan kecuali telah membaca dan memahami manual servis ini. • Mengabaikan peringatan ini bisa mengakibatkan cedera pada penyedia servis, operator, atau pasien, karena terkena kejut listrik, bahaya mekanis atau bahaya lainnya.

AVVERTENZA (IT)	Il presente manuale di manutenzione è disponibile soltanto in Inglese. • Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione. • Si proceda alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto. • Il non rispetto della presente avvertenza potrebbe far compiere operazioni da cui derivino lesioni all'addetto, alla manutenzione, all'utilizzatore ed al paziente per folgorazione elettrica, per urti meccanici od altri rischi.
警告 (JA)	このサービスマニュアル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、十分に理解をした上で装置のサービスを行ってください。 • 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 지침서는 영어로만 이용하실 수 있습니다. • 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다. • 본 서비스 지침서를 참고했고 이해하지 않는 한은 해당 장비를 수리하려고 시도하지 마십시오. • 이 경고에 유의하지 않으면 전기 쇼크, 기계상의 혹은 다른 위험으로부터 서비스 제공자, 운영자 혹은 환자에게 위험을 가할 수 있습니다.
ЕСКЕРТУ (KK)	Бұл қызмет көрсету бойынша нұсқаулығы тек ағылшын тілінде қолжетімді. • Тұтынушының қызмет провайдері ағылшын тілінен басқа тілдегі нұсканы талап етсе, аудару бойынша қызметтерімен қамтамасыз ету тұтынушы жауапкершілігінде болуы тиіс. • Бұл қызмет көрсету бойынша нұсқаулығын назарға алып, түсінбегенше, жабдыққа қызмет көрсетуден бас тартыңыз. • Бұл ескертуді елемей қызмет провайдері, оператор немесе емделушінің электр шоғынан, механикалық немесе басқа қауіптер нәтижесінде жарақат алуына әкелуі мүмкін.
BRĪDINĀJUMS (LV)	Šī apkopotāju rokasgrāmata ir pieejama tikai angļu valodā. • Ja apkalošanas sniedzējam nepieciešama informācija citā, nevis angļu, valodā, klienta pienākums ir nodrošināt tās tulkošanu. • Neveiciet aprīkojuma apkopi, neizlasot un nesaprotot apkopotāju rokasgrāmatu. • Šī brīdinājuma neievērošana var radīt elektriskās strāvas trieciena, mehānisku vai citu risku izraisītu traumu apkopes sniedzējam, operatoram vai pacientam.

ĮSPĖJIMAS (LT)	Šis eksploatavimo vadovas yra prieinamas tik anglų kalba. • Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba - ne anglų, numatyti vertimo paslaugas yra kliento atsakomybė. • Nemėginkite atlikti įrangos techninės priežiūros, nebent atsižvelgėte į šį eksploatavimo vadovą ir jį supratote. • Jei neatkreipsite dėmesio į šį perspėjimą, galimi sužalojimai dėl elektros šoko, mechaninių ar kitų paslaugų tiekėjui, operatoriui ar pacientui.
ADVARSEL (NO)	Denne servicehåndboken finnes bare på engelsk. • Hvis kundens serviceleverandør trenger 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 dostawca usług klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta. • Nie należy serwisować wyposażenia bez zapoznania się i zrozumienia niniejszego podręcznika serwisowego. • Niezastosowanie się do tego ostrzeżenia może spowodować urazy dostawcy usług, operatora lub pacjenta w wyniku porażenia elektrycznego, zagrożenia mechanicznego bądź innego.
AVISO (PT-BR)	Este manual de assistência técnica só se encontra disponível em inglês. • Se o serviço de assistência técnica do cliente não for GE, e precisar de outro idioma, será 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 por em perigo a segurança do técnico, operador ou paciente devido a choques elétricos, mecânicos ou outros.
AVISO (PT-PT)	Este manual técnico só se encontra disponível em inglês. • Se a assistência técnica do cliente solicitar estes manuais noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual técnico. • O não cumprimento deste aviso pode provocar lesões ao técnico, ao utilizador ou ao paciente devido a choques eléctricos, mecânicos ou outros.

AVERTISMENT (RO)	Acest manual de service este disponibil numai 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.
ПРЕДУПРЕЖДЕНИЕ (RU)	Настоящее руководство по обслуживанию предлагается только на английском языке. • Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует обеспечить перевод самостоятельно. • Прежде чем приступать к обслуживанию оборудования, обязательно обратитесь к настоящему руководству и внимательно изучите изложенные в нем сведения. • Несоблюдение требований данного предупреждения может привести к тому, что специалисты по обслуживанию, операторы или пациенты получат 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 serviser, rukovaoca ili pacijenta usled strujnog udara, ili mehaničkih i drugih opasnosti.
VAROVANIE (SK)	Tento návod na obsluhu je k dispozícii len v angličtine. • Ak zákazníkovi poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka. • Nepokúšajte sa o obsluhu zariadenia skôr, ako si neprečítate návod na obsluhu a neporozumiete mu. • Zanedbanie tohto varovania môže vyústiť do zranenia poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanickým alebo iným nebezpečenstvom.
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.

ADVERTENCIA (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 serviceteknikern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.
UYARI (TR)	Bu servis klavuzunun sadece İngilizcesi mevcuttur. • Eğer müşteri teknisyeni bu klavuzu İngilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer. • Servis klavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz. • Bu uyarya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.
ЗАСТЕРЕЖЕННЯ (UK)	Дане керівництво з сервісного обслуговування постачається виключно англійською мовою. • Якщо сервісний інженер потребує керівництво іншою мовою, користувач зобов'язаний забезпечити послуги перекладача. • Не намагайтеся здійснювати технічне обслуговування даного обладнання, якщо ви не читали, або не зрозуміли інформацію, надану в керівництві з сервісного обслуговування. • Недотримання цього застереження може призвести до травмування сервісного інженера, користувача даного обладнання або пацієнта внаслідок електричного шоку, механічного ушкодження або з інших причин невірного обслуговування обладнання.
CẢNH BÁO (VI)	Tài Liệu Hướng Dẫn Sửa Chữa chỉ có bản tiếng Anh. • Nếu các đơn vị cung cấp dịch vụ cho khách hàng yêu cầu một ngôn ngữ nào khác tiếng Anh, thì khách hàng sẽ có trách nhiệm cung cấp các dịch vụ dịch thuật. • Không được sửa chữa thiết bị trừ khi đã tham khảo và hiểu Tài liệu Hướng dẫn Sửa chữa. • Không tuân thủ những cảnh báo này có thể dẫn đến các tổn thương cho người thực hiện sửa chữa, người vận hành hay bệnh nhân, do sốc điện, các rủi ro về cơ khí hay các rủi ro khác

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1

Overview

GE Healthcare's Transactional XML Developer's module allows you to import cardiology-related data from non-GE Healthcare devices into the system for storage, printing, and distribution to the Hospital Information System (HIS). The system accepts only resting ECG test data, both confirmed and unconfirmed.

- Confirmed tests - results were read and confirmed by a physician.
- Unconfirmed tests - results were not interpreted or read by a physician.

Multiple types of vendor data are accepted. The data can be all text, or a combination of textual and waveform data. After the textual data reaches the system, you can modify it. Once confirmed, both textual and waveform data are stored long-term in the system databases. You cannot perform serial comparison on imported data, and interpretation is stored as free text.

This chapter provides an overview of the Transactional XML Developer's module and the requirements needed to run it. This document is intended for individuals who develop Cardiology-related XML documents they want to store in the MUSE system.

Technology

The Transactional XML Developer's module uses the Extensible Markup Language (XML) as the means of importing non-GE Healthcare cardiology data into the system. The test data is packaged into an XML file called a *document*. This document is sent to the system where the data is converted into the appropriate format and then stored in the system databases.

The conversion of data from XML into the system's format is based on a fixed set of data tags. The data tags are contained in XML Document Type Definition (DTD) files defined by GE Healthcare. Each specific test type has its own DTD file.

To successfully transfer your data into the system, you must adhere to the requirements of the DTD file as well as the rules and restrictions specified in this guide.

The Transactional XML Developer's module is built on the Microsoft XML parser and requires the installation of that software. Refer to *MUSE Information System XML Export Option Instruction*.

This manual assumes a working knowledge of XML. It is not intended as a guide to XML nor its terminology. You are encouraged to take advantage of the abundance of information about XML and the XML data specification available on the Internet.

Communication

The system expects to receive XML document files containing the vendor's data either through FTP communication (the system is designated to be the FTP server) or through a mapped drive over a local area network. The local area network connecting to the system must support Ethernet Layer 2 protocol and TCP/IP protocol running layers 3 and 4. These simple communication techniques do not allow for any type of communication acknowledgment other than the inherent acknowledgments built into FTP and/or the network transfers.

You only need to set up a few communication parameters to establish this simple communication. The system needs to know:

- The location of the XML document file(s).
- The extension of the XML document files containing data you are storing on the system. The filename designation accepts wild cards.

NOTE:

The XML document file(s) must reside in a shared directory, that is, a directory to which the system has access.

Once the system accepts an XML document, it begins to parse the data. Once the system successfully acquires the data in the XML document, the XML document is deleted from the communication directory. If the transfer of information fails and the system is unable to obtain the XML document data, the XML document is not deleted from the communication directory but instead is renamed with a **.BAD** extension.

Functionality of Imported Test Data

The **MUSE System XML Parser** accepts third-party vendor data. Because some of this data is not analyzed with 12SL, there are limitations to what you can do with the data:

- You cannot run the data through serial comparison.
- You can send it to carts for printing (Reverse Transmission).

You can retrieve data from acquiring resting ECG devices using the **Remote Query** feature.

You may have limitations in the printing and display of the data because some third-party data does not include all 10 seconds of all 12 leads.

If there is enough information, the system analyzes the data to produce median complexes. The system generates a set of measurements called the **Measurement Matrix** for the data.

2

Rules and Restrictions

To successfully transfer non-GE Healthcare cardiology information to the system through the Transactional XML Developer's module, you need to submit your data in the form of a valid XML document. The XML document you submit must meet all the standard XML requirements and must adhere to specific rules.

General XML Document File Structure

The following outlines the general document file structure for XML documents.

- Every XML document must be a *well-formed* XML document.
- XML documents must be *valid* to the DTD. The system does not process invalid documents.
- Each XML document must begin with an XML document type declaration that specifies:
 - The version of XML you are using.
 - The encoding of the XML document (for example, "windows-1252")
 - The name of the root element.
 - The name of the GE Healthcare external DTD file.
 - The root element identifies the information in the document and relates it to a specific type of system data.

NOTE:

The XML document file(s) must be located in a shared directory, that is, a directory to which the system has access.

- XML documents must contain only one root element.
- XML documents must contain one, and only one, test.
- Each XML document must contain displayable ASCII characters.
- Each data element must be on a separate line, and the line must terminate with a carriage return and line feed (hex format of 0x0D0x0A).

- Each non-empty element within the XML document must contain three components:
 - A start tag
 - An end tag
 - The element's content or value, configured as: **<StartTag> Content </EndTag>**
- Every XML document must contain a **Patient Demographics** and **Test Demographics** data section, and the required elements of each. See ["Section and Element Definitions" on page 53](#) for more information.

XML Element and Tag Requirements

This section defines the specific XML element and tag requirements to effectively use the Transactional XML Developer's module.

- Every data section and element in the XML document must use the appropriate GE Healthcare-defined tag. See ["Section and Element Definitions" on page 53](#) for a list of acceptable sections and elements and their corresponding GE Healthcare tags.
- Each XML tag (for example, **PatientLastName**) consists of a maximum of 127 characters.
- The acceptable values of certain elements are predefined by GE Healthcare. For example, the value of the **Gender** element is limited to *male* or *female*. These **Predefined Values** are specified in the tables in ["Section and Element Definitions" on page 53](#).

Content

The body (content) of the XML document is all the data contained between the root element start and end tags. This includes multiple sections and elements within each section. The data contained in the body of an XML document can be any combination of text, predefined values, and waveform data.

Limits on the value of an element depend on the specific type of element. Refer to the tables in ["Section and Element Definitions" on page 53](#) for limitations on element values.

You can omit elements that have no content, known as empty-elements, from the document or note them as: **<tag> </tag>**

The shortcut method of **<tag/>** is not supported.

DTD File

The GE Healthcare Transactional XML Developer's module uses a library of DTD files. The DTD file is specific to the resting ECG test type. You must include the appropriate DTD filename in the data declaration of your XML document.

3

Data Section and Element Requirements

The system is capable of accepting large amounts of data pertaining to a resting ECG test. To manage this data, the information is organized into logical groups called sections. For example, data related to patient statistics (patient ID, patient name, age, and so forth) is grouped into a section of the XML document called **Patient Demographics**. Similarly, data associated with a particular test (acquisition date and time, location, and so forth) is grouped into a data section called **Test Demographics**.

Within a section, certain elements are required while others are optional. If your XML document includes a particular section, it also must include all required elements for that section. Optional elements are included at your discretion.

Resting ECG Test Requirements

The following are required for resting ECG:

- 500 Hz test data only (250 allowed for export)
- For a 12 lead ECG: 10 seconds of 8 leads in order (I, II, V1-V6)
- For a 15 lead Pediatric ECG: 10 seconds of 11 leads in order (I, II, V1-V6) and V3r, V4r, V7
- For a 15 lead Vector Loop ECG: 10 seconds of 11 leads in order (I, II, V1-V6) and X, Y, Z
- For a 15 lead Aux ECG: 10 seconds of 11 leads in order (I, II, V1-V6) and any 3 lead labels from the supported extra leads (V2R, V3R, V4R, V5R, V6R, V7R, X, Y, Z, V8, V9, V8R, V9R, NEHB_D, NEHB_A, NEHB_J, ML, CH, A1, A2, A3, A4, VM, BP_X, BP_Y, BP_Z)
- Data sampled at 4.88uV/bit
- Waveform data Hex64 encoded

The Resting ECG file can contain the following sections, which must be in this order:

NOTE:

The Waveform element includes an optional PaceSpikes element that can be imported. The import of spikes will override the 12SL automatic spike detection. If the pacemaker spikes are known, they should be included in the XML.

<i>Section</i>	<i>Tag</i>	<i>Required</i>	<i>Repeats</i>	<i>Export Only</i>
MUSE Information	MuseInfo	N	N	y
Patient Demographics	PatientDemographics	Y	N	N
Test Demographics	TestDemographics	y	N	N
Order Information	Order	N	N	N
Resting ECG Measurements	RestingECGMeasurements	N	N	N
Original Resting ECG Measurements	originalRestingECGMeasurements	N	N	Y
Diagnosis	Diagnosis	N	N	N
Original Diagnosis	OriginalDiagnosis	N	N	Y
Extra Questions	ExtraQuestions	N	N	N
ACI TIPI Analysis	ACITIPIAnalysis	N	N	N
Measurement Matrix	MeasurementMatrix	N	N	Y
Interval Editor Interval Measurements	IntervalMeasurements	N	N	Y
QRS Times and Types	QRSTimesTypes	N	N	Y
Interval Editor Amplitude Measurements	AmplitudeMeasurements	N	N	Y
Waveform	Waveform	N	Y	N
Image	Image	N	Y	N
Pharmaceutical Trial Data	PharmaData	N	N	N

Required Sections and Elements

Of all the possible data you can send to the system, you must include the following two sections in every XML document the system receives. Within each of the required sections there are required elements. The required sections and elements are:

- **Patient Demographics** section Required element: **Patient ID**
- **Test Demographics** section Required elements:

- Data Type
- Site
- Acquisition Device
- Status
- Acquisition Time
- Acquisition Date
- Acquisition Software Version

All other sections and elements are optional. If you choose to include a particular section, you must include the required elements for that section. A complete listing of possible data sections and their associated elements is available in ["Section and Element Definitions" on page 53](#). Required elements for each section are in the **Field Status** column of each table.

NOTE:

If your XML document contains elements other than those identified in ["Section and Element Definitions" on page 53](#), the file is considered invalid and does not process.

4

Optional Sections

There are many optional sections that you can include. Optional sections include an assortment of common elements.

One section requires special attention. Although the **Diagnosis** section is optional, if you use a **Diagnosis** section, you must include the **Diagnosis Statement** section(s), which requires a **Statement Text** element. XML samples of optional data sections are provided in ["Sample XML Documents" on page 73](#).

NOTE:

For tests that were not analyzed by GE Healthcare's 12SL analysis program, the diagnosis is input as free text.

Optional sections include:

- Order Information
- Diagnosis with Diagnosis Statement
- Waveforms

Waveforms

You can include waveforms associated with a patient test in the body of XML documents.

The required tag for including waveform information in the body of an XML document is **Waveform**. Since waveforms are made up of lead data, the **Waveform** section of the document must contain information about the leads, followed by the actual **Lead Data** section with all its required elements. The data for each lead must be uncompressed and hex64 encoded.

The required elements in the **Lead Data** section include a 32-bit **Cyclic Redundancy Check (CRC)**, which is a number derived from the lead data. The system recalculates this CRC from the data it receives and compares it to the CRC sent in the **LeadDataCRC32** element. Different CRC values indicate a transmission error.

Additional information on section and element requirements when including waveform data in your XML document is located in ["Section and Element Definitions" on page 53](#).

A sample waveform section from an XML document is located in ["Sample XML Documents" on page 73](#).

MUSE System Data Types

The MUSE system stores various types of information in an assortment of data types. The acceptable data types are shown in the following table.

NOTE:

Although the system can accept many data types, each specific system data field requires a particular type of data. The specific format required for each element passing to the system is specified in the tables in ["Section and Element Definitions" on page 53](#).

Data Type	Description
Date	Contains the day, month, and year to store on the system. Format the date as either MM/DD/YYYY or MM-DD-YYYY. Where:MM = Month 01-12DD = Day = 01-31YYYY = Four digit year value
Time	Contains the hour, minutes, seconds, and milliseconds to store on the system. The time must be formatted as HH:MM:SS:NN. Where:HH = Hour = 00-23MM = Minute = 00-59SS = Second = 00-59NN = Hundredths = 00-99 (optional)
Predefined Values	You can pass many elements to the system for which the system expects to receive one of a limited number of predefined responses. For example, the Gender element is one of these Predefined Values. If your XML document contains the Gender element, then the data passed to the system through that element must be one of the following predefined options for this data: • Male • Female These Predefined Values and their acceptable options are specified in the tables in "Section and Element Definitions" on page 53.
Diagnosis Statements	Contains the textual interpretation, impressions, or conclusions regarding a particular test. No statement or sentence of the diagnosis, referred to as the Statement Text (StmtText), can exceed 127 characters. In addition to the Statement Text, you can include one or more Statement Flags for each Statement Text. The Statement Flag indicates one or more of the following conditions about the statement itself: • EndLine - Statement ends the interpretative line • Deleted - Statement was deleted from interpretation • UserInsert - Statement was added to the interpretation by the user
User ID	A unique numeric number assigned to every person in the system User's List .
Numeric	A number within the element specified range.

Data Type	Description
String	A finite set of characters from the ASCII character set. A String type always has a defined maximum length of characters.
8 Bit Unsigned	Data types ranging from 0 to 253.
8 Bit Signed	Data types ranging from -125 to +125. If the sign is not explicitly defined, it is assumed to be a positive value.
16 Bit Unsigned	Data types ranging from 0 to 65533.
16 Bit Signed	Data types ranging from -32765 to +32765. If the sign is not explicitly defined, it is assumed to be a positive value.
32 Bit Unsigned	Data types ranging from 0 to 4,294,967,293.
32 Bit Signed	Data types ranging from -2,147,483,645 to +2,147,483,645.
Float	Data types cannot exceed three decimal points. Exponential notation is not supported.

Interface Development and Verification

Each vendor must develop, test, verify, and validate their interface before connecting to the MUSE system.

Development

Each vendor requesting the ability to interface their specific devices with the GE Healthcare MUSE system is solely responsible for developing the software and/or hardware needed to complete this interface.

Verification

Before submitting data to the system through the Transactional XML Developer's module, the interface must undergo verification and validation, including clinical testing, by a GE Healthcare-specified certification agent. This verification process is a requirement of GE Healthcare as well as the Food and Drug Administration (FDA). Its purpose is to ensure the overall safety and effectiveness of the interface.

Near or upon completion of the requesting vendor's interface development, the requesting vendor must contact GE Healthcare's interface certification agent to request and schedule an interface certification date and time.

5

MUSE XML Import Option

This chapter describes how to configure the **MUSE XML Import** option to process incoming XML files on the MUSE system.

Theory of Operation

The **XML Import** option allows the MUSE system to acquire XML files that meet the MUSE Transactional XML specification. Devices that are able to output the appropriately structured XML files send their XML files into a shared folder on the MUSE system. The **MUSE XML Parser** service searches this shared folder, acquires the XML files from the shared folder, and moves them into the MUSE system for processing. The test is normalized and stored in the MUSE database.

Figure 1: XML Acquisition Flow Chart



Customer Requirements

The customer is responsible for supplying the following:

- XML files that meet the MUSE Transactional XML specification. Refer to the *MUSE Cardiology Information System Transactional XML Developer's Guide* for details.
- Network connectivity between the device that can output XML files and the MUSE application server.

Install and Configure the MUSE XML Import Option

Adding the **XML Import** option consists of the following tasks:

- ["Install the XML Import Option and the MUSE XML Parser Service" on page 24](#)
- ["Set up the XML Shared Folder" on page 25](#)

- ["Use XMLCONFIG.EXE to Update or Delete a Device" on page 27](#)

Install the XML Import Option and the MUSE XML Parser Service

Use the following procedure to install the **XML Import** option and **MUSE XML Parser** service.

NOTE:

This procedure may only be performed by a qualified GE Healthcare service representative.

1. Log on to the MUSE application server as the MUSE Administrator user.
2. Perform a full or partial shutdown of the MUSE system following the auto shutdown procedures described in the *System Administration* chapter of the *MUSE Cardiology Information System Service Manual*.

NOTE:

If you are just checking to see if the option is already enabled, a shutdown is not required. If you have to enable or disable the option, the MUSE services will be restarted and a shutdown is required.

3. From the Windows **Control Panel**, go to **Programs > Programs and Features**.
4. Select **MUSE NX R1**, right-click and select **Change**.
The **Welcome** window opens.
5. Click **Next**.
The **MUSE Server Details** window opens.
6. Click **Next**.
The **Select Database Server** window opens.
7. Select the appropriate database server and click **Next**.
The **Database Configuration** window opens.
8. Make the appropriate selections and click **Next**.
The **Select Options** window opens.
9. Verify that **XML Import** option is selected. If it is not selected, select it now and go to the next step. If **XML Option** is selected, click cancel.
This installs the **MUSE XML Parser** service.
10. Continue to click **Next** and follow the install wizard until you reach the **MUSE Serial Number** window.
11. If you added the **XML Import** option in step 9, you need to enter the **Options Configuration Password**.

NOTE:

Only qualified GE Healthcare service representatives have access to this password. This password cannot be provided to customers.

12. Click **Next** until your changes are applied and the **Maintenance Complete** window opens.
13. Click **Finish**.
14. If you performed a full or partial shutdown of the MUSE system in step "2", cancel the shutdown following the procedures described in the *System Administration* chapter of the *MUSE Cardiology Information System Service Manual*.

Set up the XML Shared Folder

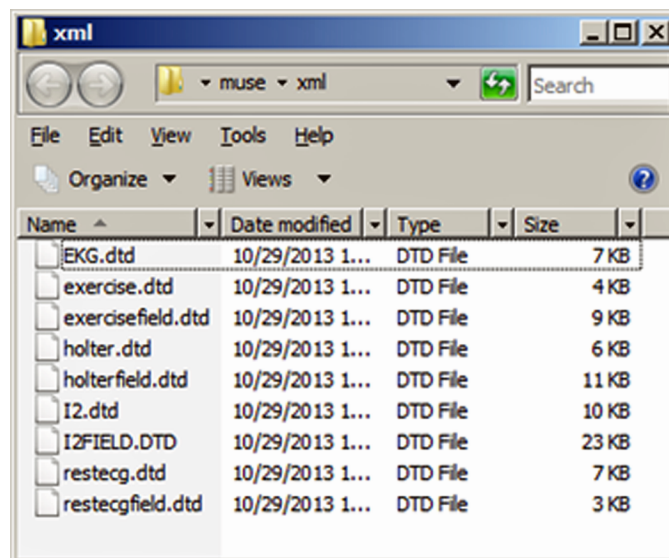
To transfer XML tests from an XML-capable device to the MUSE system, you need to create a shared folder on the MUSE system.

The **MUSE XML Parser** service on the MUSE application server is only configured to check the MUSE XML folder (default is **d:\muse\xml**) for incoming XML files to process.

This folder may need to be shared to allow XML-capable devices to transfer records into it. If this folder is shared, the XML-capable device that will be writing data to the share must have access to it. Customers are responsible for ensuring this connectivity between the XML device and the MUSE system.

NOTE:

There are nine DTD files in the MUSE XML folder. These .DTD files are required for the MUSE system to acquire XML records. These files must not be altered or deleted.



Use XMLCONFIG.EXE to Add a New XML Device

The **XMLCONFIG** utility inserts entries into the **cfgXmlInput** table in the **MUSE_System** database.

1. Log on to the MUSE application server as the MUSE Administrator user.
2. Run the **xmlconfig.exe** utility located in the folder where the MUSE application is installed (default is **c:\Program Files(x86)\MUSE**).

The **XML Input Devices** window opens.

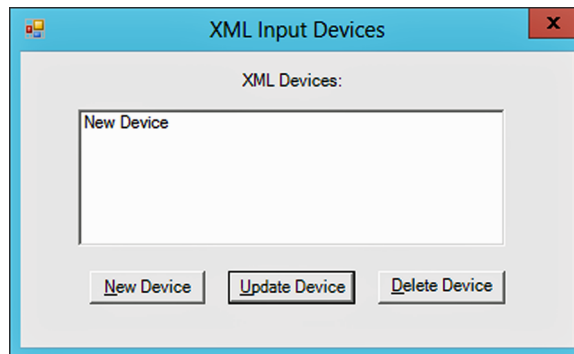
3. Click **New Device**.

The **Add a New XML Device** window opens.

4. Enter the device configuration using the following table.

Field	Value
Device Name	Enter a unique name for each device. The value entered here must match the <AcquisitionDevice> value in the incoming XML file.
Device Type	Select ECG . No other data types are supported at this time.
Manufacturer	Select the appropriate manufacturer. Anyone other than Physio Controls or Getemed is acceptable unless the device is actually a Physio Controls (except for LP15-GL) or Getemed device. The specific configurations for the Physio Control LP12 and Getemed devices are documented in " Known XML Device Configurations " on page 27. When in doubt, choose Other .
Image Type	Always set this to Image as Waveform Data Points .
Analysis Function	Always set this to XML_AnalyzeWaveform . This is case sensitive and is auto-populated in the XMLCONFIG utility; do not change this value.

5. Click **OK**.
6. Verify the **Device Name** has been added to the list of **XML Devices** in the **XMLCONFIG** utility.



7. Close the **XMLCONFIG** utility.
8. Restart the **MUSE XML Parser** service.

Use XMLCONFIG.EXE to Update or Delete a Device

1. Log in to the MUSE application server as the MUSE Administrator user.
2. Run the **xmlconfig.exe** utility located in the folder where the MUSE application is installed (default is **c:\Program Files (x86)\MUSE**).
The **XML Input Devices** window opens.
3. To update a device, select the device and click **Update Device** and use the information in step "4" of the ["Use XMLCONFIG.EXE to Add a New XML Device" on page 25](#).

NOTE:

When updating a device, the device name cannot be changed. To change the name of a device, the device must first be deleted and then recreated with a new name.

To delete a device, click **Delete Device**.

4. Click **OK**.
5. Close the **XMLCONFIG** utility.
6. Restart the **MUSE XML Parser** service.

Known XML Device Configurations

The following windows display the XML device configurations you must use to configure the following specific devices:

- Physio Controls LifePak 12
- Physio Controls LifePak 15
- Getemed CM3012
- DataMed Format Translator
- Zoll RescueNet

Physio Controls LifePak 12

Device Name: LP12

Device Type: ECG

Manufacturer: Physio Controls

Image Type: Image as Waveform Data Points

Analysis Function: XML_AnalyzeWaveform

Ok Close Apply

Getemed CM3012

Device Name: CM3012

Device Type: ECG

Manufacturer: Getemed

Image Type: Image as Waveform Data Points

Analysis Function: XML_AnalyzeWaveform

Ok Close Apply

Physio Controls LifePak 15

Device Name: LP15-GL

Device Type: ECG

Manufacturer: DataMed

Image Type: Image as Waveform Data Points

Analysis Function: XML_AnalyzeWaveform

Ok Close Apply

DataMed Format Translator

Device Name: DataMedFT

Device Type: ECG

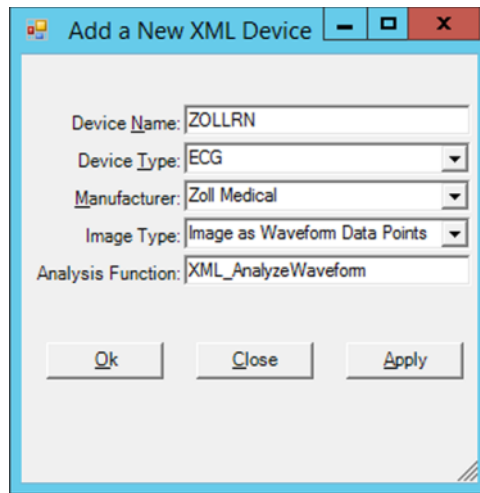
Manufacturer: DataMed

Image Type: Image as Waveform Data Points

Analysis Function: XML_AnalyzeWaveform

Ok Close Apply

Zoll RescueNet



System Checkout

To make sure the MUSE **XML Import** option is properly set up, do the steps below.

1. Transfer an XML file to the XML folder on the MUSE system.
2. Log on to the MUSE system.
3. Verify the test displays in the **Edit List**.
4. Verify the test opens in **Editor**.

Troubleshooting

Use the following troubleshooting tips if something is not working correctly.

Symptom	Condition	Action
The XML file is not processed from the XML folder.	The MUSE XML Parser service is not started.	Start the MUSE XML Parser service.
XML is renamed to BAD in the MUSE XML folder.	The XMLCONFIG.EXE configuration is incorrect.	Ensure the XMLCONFIG.EXE configuration is correct.
	MUSE XML Parser is unable to process the XML file.	Check the MUSE application log for details.

6

Transactional XML to FDA XML Converter

System Requirements

The following table lists the requirements to install and successfully convert resting ECGs from transactional XML to FDA XML.

<i>Item</i>	<i>Requirements</i>
MUSE system	• Software version 9 or higher • Options activated: • XML Export (ECG-only) • Results Interface • Interface Toolkit • *HIS File Copy • *HIS FTP • *HIS Drive Mapping* At least one of these three options needs to be activated. • XML device set up in System Setup. Refer to the <i>MUSE XML Export Option Installation Instructions</i>.
Personal computer:	• Must not be a MUSE file server or client • Windows 7 or later • Microsoft .NET Framework Version 4.5.1 Redistributable Package • CD drive • Internet access
Internet Access	eDelivery Account

Installation Procedures

Use the following instructions to install the **muse2fda.exe** conversion program.

NOTE:

During the installation of MUSE NX R1, Microsoft .NET Framework 4.6.2 is automatically installed.

Create Directories

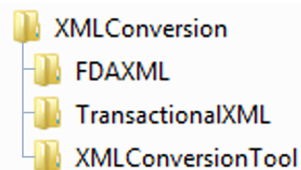
NOTE:

Installation of software requires administrative privileges on the computer.

Create the following directory structure on the computer hard drive running the XML conversion program.

NOTE:

The following directory hierarchy is suggested as a way to help you organize your files, but is not required to run the **MUSE2FDA** program. The procedures in this document refer to these directories by the following names.



Copy Files to Computer

1. From the eDelivery portal, copy and mount the .iso file to the computer that will run the XML conversion.
2. Copy the following files to the directories created earlier.

NOTE:

The four DTD files **MUST** be copied to the directory that contains the ECGs in transactional XML format.

<i>Name of File</i>	<i>Copy to Directory</i>
I2.dtd	TransactionalXML
I2FIELD.DTD	TransactionalXML
restecg.dtd	TransactionalXML
restecgfield.dtd	TransactionalXML
template.xml	XMLConversionTool
templateutf8.xml	XMLConversionTool
muse2fdacfg.xml	XMLConversionTool

<i>Name of File</i>	<i>Copy to Directory</i>
muse2fda.exe	XMLConversionTool
template_minimal.xml	XMLConversionTool

Use the XML Conversion Tool

Copy the transactional XML files from the MUSE system to removable media, such as a flash drive, and from the removable media to the XML Conversion directory. If the computer is networked to the MUSE system, you can map the XML device to the XML Conversion directory. Refer to the *MUSE XML Export Option Installation Instructions* for details.

Run the MUSE2FDA Conversion Program

1. From the Windows desktop of the computer running the XML conversion utility, open a **Command Prompt** window.
2. In the **Command Prompt** window change to the directory where the **muse2fda.exe** file is located.
3. Type the following at the prompt and press **Enter**.

```
muse2fda.exe [MUSE XML path] [FDA XML path] [-t:template-filename] [-e:error-filename] [-v]
[-val] [-p:FDA_Prefix]
```

The following table summarizes the meaning and function of the parts of this command line.

<i>Portion of Command Line</i>	<i>Meaning/Function</i>
[MUSE XML path]	Directory/file name of transactional XML file (wildcards and ? masks supported).
[FDA XML path]	Destination directory name for the FDA XML files.
-t:template-filename	Path to the template.xml file name. Defaults to current directory's template.xml.
-e:error-filename	Path to error file. Default action writes an error log to the console.
-v	Enable verbose mode.
-val	Validates MUSE XML file(s) against the MUSE DTD files.
-p:FDA_Prefix	Names FDA XML files with the template: [FDA_Prefix] PID_YYYYMMDD_HHMMSS.xml Defaults to FDA_ [MUSE XML FILEName].xml

The following is an example using the directory structure suggested in ["Create Directories" on page 31](#). In the **Command Prompt** window, type:

```
muse2fda.exe [Space] ..\transactionalxml\*.xml [Space] ..\fdaxml
```

XML Data Mapping

This section covers the following mappings:

- ["MUSE2FDACFG.XML Mappings" on page 35](#)
- ["Waveform Mapping - Median" on page 43](#)
- ["Waveform Mapping - Raw" on page 42](#)
- ["Interval Annotation Mapping" on page 43](#)
- ["Diagnosis \(Interpretation\) Mapping" on page 43](#)

Object Identifier Mapping

Many FDA fields require the use of an Object Identifier (OID). These OIDs are not typically entered on an electrocardiograph. It is difficult to see a real-world scenario where they would be input at the ECG device. They can be populated by the use of an external configuration file, **MUSE2FDACFG.XML**. The **MUSE2FDACFG.XML** configuration file allows for the definition of OID values as well as controlling how various other fields are mapped.

User-Defined Mapping

The <MUSE2FDA> configuration file allows for various tags that reference specific FDA required or optional fields to be specified in a user-defined <Mapping> section of the file. This section addresses the following cases:

- No equivalent field exists in the GE Healthcare XML definition.
- The definition exists, but only in the /RestingECG/PharmaData section; historical data would not have these fields.
- The definition of the meaning under FDA XML versus GE Healthcare XML is ambiguous.
- The user did not enter the value of a required field during the trial and now wishes to define a valid default value.

This mechanism would be used for the following fields:

<i>/MUSE2FDA/Mapping Config File Tag</i>	<i>MUSE2FDA Config File Valid Values</i>	<i>FDA XML Field</i>
trialSubjectCode	Qn Pn value null	/AnnotatedECG/componentOf/ timepointEvent/componentOf/ subjectAssignment/subject/ trialSubject/code

<i>/MUSE2FDA/Mapping Config File Tag</i>	<i>MUSE2FDA Config File Valid Values</i>	<i>FDA XML Field</i>
treatmentGroup AssignmentCode	Qn Pn value null	/AnnotatedECG/componentOf/ timepointEvent/componentOf/ subjectAssignment/definition/ treatmentGroupAssignment/code
clinicalTrialID	"PPC" Qn Pn value null	/AnnotatedECG/componentOf/ timepointEvent/componentOf/ subjectAssignment/componentOf/ clinicalTrial/id/@extension
timePointEventCode	"PVN" Qn Pn value null	/AnnotatedECG/componentOf/ timepointEvent/code/@code
timePointEventCode_ DisplayName	"PVN" Qn Pn value null	/AnnotatedECG/componentOf/ timepointEvent/code/ displayName
trialInvestigatorID	"RMDID" "PHID" Qn Pn value null	/AnnotatedECG/componentOf/ timepointEvent/componentOf/ subjectAssignment/componentOf/ clinicalTrial/responsibleParty/ trialInvestigator/id/@extension
reasonCode	Qn Pn value null	/AnnotatedECG/reasonCode/ @code
confidentialityCode	Qn Pn value null	/AnnotatedECG/ confidentialityCode/@code
RTPCode	Qn Pn value null	/AnnotatedECG/definition/ relativeTimepoint/componentOf/ protocolTimepointEvent/code/ @code
RTPTimePointEvent	Qn Pn value null	/AnnotatedECG/definition/ relativeTimepoint/componentOf/ protocolTimepointEvent/code/ @code
RTPReferenceCode	Qn Pn value null	/AnnotatedECG/definition/ relativeTimepoint/componentOf/ protocolTimepointEvent/ component/referenceEvent/code/ @code

Consider a **MUSE2FDACFG.XML** entry in the mapping section.

<Mapping>

<trialSubjectCode> Qn or Pn or Value || Null </trialSubjectCode>

Qn or **Pn** are used to specify which extra question value, for example **/ExtraQuestions/Answer** or **/PharmaData/PharmaAnswerN**, where N = 1..5, should be used to populate the value in the FDA output. If no value is entered for this tag, the field is not mapped from the GE Healthcare XML. If a value other than **Qn || Pn** is present, that value is used to populate the field in all records being converted by the program.

XML Data Mapping

This section covers the following mappings:

- ["MUSE2FDACFG.XML Mappings" on page 35](#)
- ["Waveform Mapping - Median" on page 43](#)
- ["Waveform Mapping - Raw" on page 42](#)
- ["Interval Annotation Mapping" on page 43](#)
- ["Diagnosis \(Interpretation\) Mapping" on page 43](#)

MUSE2FDACFG.XML Mappings

The following table describes the mappings controlled by **muse2fdacfg.xml**. A field can be left blank by including a set of open/close tags, for example, `<trialSubjectCode></trialSubjectCode>`.

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
SubjectID/OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ subject/trialSubject/id/ @root	Field is set to value from MUSE2FDACFG.XML
SubjectID/ID	The root value should be unique for the trial; the extension should hold the traditional patient identifier.	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ subject/trialSubject/id	If /MUSE2FDA/SubjectID/ UseSecondary is TRUE root = /MUSE2FDA/ SubjectID/ OrganizationOID + "." + /RestingECG/ PatientDemographics/ PatientID and extension = /RestingECG/ PatientDemographics/ SecondaryID or if /MUSE2FDA/SubjectID/ UseSecondary is different from TRUE, root = / MUSE2FDA/SubjectID/ OrganizationOID and extension = /RestingECG/ PatientDemographics/ PatientID

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
SubjectID/UseSecondary	TRUE	See next column.	root = /MUSE2FDA/ SubjectID/ OrganizationOID + "." + /RestingECG/ PatientDemographics/ PatientID and extension = /RestingECG/ PatientDemographics/ SecondaryID
SubjectID/UseSecondary	FALSE	See next column.	root = /MUSE2FDA/ SubjectID/ OrganizationID and extension = /RestingECG/ PatientDemographics/ PatientID
trialSubject/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ subject/ trialSubject/code/ @codeSystem	Field is set to value from MUSE2FDACFG.XML
treatmentGroup Assignment/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ definition/ treatmentGroup Assignment/code/ @codeSystem	Field is set to value from MUSE2FDACFG.XML
ProtocolID/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ id/@root	Field is set to value from MUSE2FDACFG.XML
SiteID/OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100 The MUSE definition of a "location" matches the FDA definition of a "site"	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ location/trialSite/id/@root and /AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ location/trialSite/id/ @extension	Field is set to value from MUSE2FDACFG.XML and extension = /Resting ECG/TestDemographics/ Location
StudyEventPerformer/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ performer/ studyEventPerformer/id/ @root	Field is set to value from MUSE2FDACFG.XML

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
VisitID/OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ code/ @codeSystem	Field is set to value from MUSE2FDACFG.XML
reasonCode/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ reasonCode/@codeSystem	Field is set to value from MUSE2FDACFG.XML
AnnotationAuthor/ OrganizationOID	Should be an Organization ID, for example, 1. 2. 3. 4. 5. 6.100	/AnnotatedECG/ component/series/ subjectOf/ annotationSet/ author/assignedEntity/id	If /MUSE2FDA/ AnnotationAuthor/OID is not empty, and if any of: /RestingECG/ TestDemographics/ OverreaderID or /RestingECG/ TestDemographics/ OverreaderLastName are not empty, then the FDA XML field is populated with the value of /AnnotationAuthor/OID If MUSE2FDA/ AnnotationAuthor/ OID is not empty and /RestingECG/ TestDemographics/ OverreaderID is not empty, then the /RestingECG/ TestDemographics/ OverreaderID is populated into /AnnotatedECG/ component/series/ subjectOf/annotationSet/ author/assignedEntity/id/ @extension If /MUSE2FDA/ AnnotationAuthor/ OID is not empty and if /RestingECG/ TestDemographics/ OverreaderFirstName or /RestingECG/ TestDemographics/ OverreaderLastName are not empty, MUSE Overreader Name values are used to populate: /AnnotatedECG/ component/series/ subjectOf/annotationSet/ author/assignedEntity/ assignedAuthorType/ assignedPerson/name and /AnnotatedECG/ component/series/ derivation/derivedSeries/ subjectOf/annotationSet/ author/assignedEntity/ assignedAuthorType/ assignedPerson/name

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
InvestigatorID/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ responsibleParty/ trialInvestigator/id/@root	Field is set to value from MUSE2FDACFG.XML
relativeTimePoint/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/definition/ relativeTimepoint/code/ @codeSystem	Field is set to value from MUSE2FDACFG.XML
sponsorOrganization/ OrganizationOID	Should be an Organization ID, for example, 1.2.3.4.5.6.100	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/author/ clinicalTrialSponsor/ID/root	Field is set to value from MUSE2FDACFG.XML
ProtocolID/ ClinicalTrialProtocolTitle	String	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/clinicalTrial/ id/title	Field is set to string
VisitID/CodeSystemName	String	/AnnotatedECG/ componentOf/ timepointEvent/code	Field is set to string
sponsorOrganization/name	String, for example, ABC Inc	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ author/clinicalTrialSponsor	Field is set to string
trialSubjectCode	Qn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ subject/trialSubject/code	Field is set to the value of ExtraQuestion N answer
trialSubjectCode	Pn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ subject/trialSubject/code	Field is set to the value of Pharma Question N
trialSubjectCode	String	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ subject/trialSubject/code	Field is set to the string

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
treatmentGroup AssignmentCode	Qn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ definition/ treatmentGroup Assignment/code	Field is set to the value of ExtraQuestion N answer
treatmentGroup AssignmentCode	Pn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ definition/ treatmentGroup Assignment/code	Field is set to the value of Pharma Question N
treatmentGroup AssignmentCode	String	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ definition/ treatmentGroup Assignment/code	Field is set to the string
clinicalTrialID	PPC	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/clinicalTrial/ id/@extension	Field is set to the value of / RestingECG/PharmaData/ PharmaProjectCode
clinicalTrialID	Qn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/clinicalTrial/ id/@extension	Field is set to the value of ExtraQuestion N answer
clinicalTrialID	Pn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ id/@extension	Field is set to the value of Pharma Question N
clinicalTrialID	String	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ id/@extension	Field is set to the string
timePointEventCode	PVN	/AnnotatedECG/ componentOf/ timepointEvent/ code/ @code	Field is set to the value of / RestingECG/PharmaData/ PharmaVisitNumber
timePointEventCode	Qn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ code/ @code	Field is set to the value of ExtraQuestion N answer

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
timePointEventCode	Pn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ code/ @code	Field is set to the value of Pharma Question N
timePointEventCode	String	/AnnotatedECG/ componentOf/ timepointEvent/ code/ @code	Field is set to the string
timePointEventCode_ DisplayName	PVN	/AnnotatedECG/ componentOf/ timepointEvent/ code/ displayName	Field is set to the value of / RestingECG/PharmaData/ PharmaVisitNumber
timePointEventCode_ DisplayName	Qn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ code/ displayName	Field is set to the value of ExtraQuestion N answer
timePointEventCode_ DisplayName	Pn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ code/ displayName	Field is set to the value of Pharma Question N
timePointEventCode_ DisplayName	String	/AnnotatedECG/ componentOf/ timepointEvent/ code/ displayName	Field is set to the string
trialInvestigatorID	RMDID	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ responsibleParty/ trialInvestigator/id/ @extension	Field is set to Referring MD ID Value
trialInvestigatorID	PHID	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ responsibleParty/ trialInvestigator/id/ @extension	Field is set to Pharmaceutical Investigator ID Value
trialInvestigatorID	Qn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ responsibleParty/ trialInvestigator/id/ @extension	Field is set to the value of ExtraQuestion N answer

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
trialInvestigatorID	Pn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ responsibleParty/ trialInvestigator/id/ @extension	Field is set to the value of Pharma Question N
trialInvestigatorID	String	/AnnotatedECG/ componentOf/ timepointEvent/ componentOf/ subjectAssignment/ componentOf/ clinicalTrial/ responsibleParty/ trialInvestigator/id/ @extension	Field is set to the string
reasonCode	Qn, where n=1..4	/AnnotatedECG/ reasonCode/@code	Field is set to the value of ExtraQuestion N answer
reasonCode	Pn, where n=1..4	/AnnotatedECG/ reasonCode/@code	Field is set to the value of Pharma Question N
reasonCode	String	/AnnotatedECG/ reasonCode/@code	Field is set to the string
confidentialityCode	Qn, where n=1..4	/AnnotatedECG/ confidentialityCode/@code	Field is set to the value of ExtraQuestion N answer
confidentialityCode	Pn, where n=1..4	/AnnotatedECG/ confidentialityCode/@code	Field is set to the value of Pharma Question N
confidentialityCode	String	/AnnotatedECG/ confidentialityCode/@code	Field is set to the string
timePointEventReason Code	Qn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ reasonCode/@code	Field is set to the value of ExtraQuestion N answer
timePointEventReason Code	Pn, where n=1..4	/AnnotatedECG/ componentOf/ timepointEvent/ reasonCode/@code	Field is set to the value of Pharma Question N
timePointEventReason Code	String	/AnnotatedECG/ componentOf/ timepointEvent/ reasonCode/@code	Field is set to the string
RTPCode	Qn, where n=1..4	/AnnotatedECG/definition/ relativeTimepoint/ code/ @code	Field is set to the value of ExtraQuestion N answer
RTPCode	Pn, where n=1..4	/AnnotatedECG/definition/ relativeTimepoint/ code/ @code	Field is set to the value of Pharma Question N
RTPCode	String	/AnnotatedECG/definition/ relativeTimepoint/ code/ @code	Field is set to the string

<i>MUSE2FDACFG.XML Field</i>	<i>Notes</i>	<i>FDA XML Field</i>	<i>Mapping</i>
RTPTimePointEvent	Qn, where n=1..4	/AnnotatedECG/definition/ relativeTimepoint/ componentOf/ protocolTimepointEvent/ code/@code	Field is set to the value of ExtraQuestion N answer
RTPTimePointEvent	Pn, where n=1..4	/AnnotatedECG/definition/ relativeTimepoint/ componentOf/ protocolTimepointEvent/ code/@code	Field is set to the value of Pharma Question N
RTPTimePointEvent	String	/AnnotatedECG/definition/ relativeTimepoint/ componentOf/ protocolTimepointEvent/ code/@code	Field is set to the string
RTPReferenceCode	Qn, where n=1..4	/AnnotatedECG/definition/ relativeTimepoint/ componentOf/ protocolTimepointEvent/ component/ referenceEvent/code/ @code	Field is set to the value of ExtraQuestion N answer
RTPReferenceCode	Pn, where n=1..4	/AnnotatedECG/definition/ relativeTimepoint/ componentOf/ protocolTimepointEvent/ component/ referenceEvent/code/ @code	Field is set to the value of Pharma Question N
RTPReferenceCode	String	/AnnotatedECG/definition/ relativeTimepoint/ componentOf/ protocolTimepointEvent/ component/ referenceEvent/code/ @code	Field is set to the string

Waveform Mapping - Raw

The primary difference in the encoding between the GE Healthcare format and the FDA format is detailed in the following table:

<i>Format</i>	<i>Description</i>
GE Healthcare format	The GE Healthcare format stores the waveform as ASCII encoded binary data that is supported by the XML parser, which reduces the size of the file. The derived leads are not stored in the GE Healthcare file.
FDA format	The FDA format stores each sample value in ASCII as a separate number. On mapping to FDA format, all 10s of the raw waveforms are converted. Derived leads, for example III, aVR, aVF, and aVL, are also calculated and added to the FDA file .

Sample GE Healthcare Waveform data (ASCII encoded binary):

<WaveFormData>

BAADAAMAAwADAAMAAgACAAIAAgACAAIAAgACAAIAAgACAAIAAQ
ABAAEAAQABAAEAAQAB

AAEAAQABAAEAAQABAAEAAQABAAEAAQABAAEAAQABAAAAAAAA
AAAAAAAAAAAAAAAAQABAAEA

AA.....etc.

Sample FDA Waveform data (Each sample is an individual point)

<digits>-13 -7 -2 0 3 3 3 3 0 -9 -11 -14 -14 -15 -16 -18 -22 -25 -26 -26 -24 -23 -23
-23 -23 -25 -30 -36 -39 -36 -17 17 71 139 231 329 414 469 495 482 418 316 195 107
50 17 -14 -31 -35 -34 -41 -41 -43 -45 -45 -47 -44 -42 -44 -46 -48 -46 -46 -46 -47
-48 -48 -49 -49 -49 -50 -50 -48 -49 -50 -54 -58 -53 -48 -54 -58 -59 -60 -57 -53 -57
-62 -67 -71 -66 -60 -62 -67 -64 -64 -64 -62 ... etc.

Waveform Mapping - Median

Median waveforms are also mapped. Derived leads, for example III, aVR, aVF, and aVL, are calculated and added to the FDA file. Like the raw waveforms, the derived leads, III, aVR, aVF, and aVL are also calculated and included in the FDA output .

Interval Annotation Mapping

All annotations made using the MUSE Interval Editor are added to the FDA output.

Diagnosis (Interpretation) Mapping

In the FDA format, Diagnosis statements are treated as an annotation. They are optionally mapped to the FDA file if the /MUSE2FDA/options/ MapDiagnosis is set to TRUE.

MUSE XML to FDA XML Mapping

The following tables show the mapping of MUSE XML tags to FDA XML tags using XPath. For more information about XPath (XML Path Language), see <http://www.w3.org/TR/xpath>.

Table 2: Patient Demographics

<i>Patient Demographics</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
/RestingECG/ PatientDemographics/ DateOfBirth	/AnnotatedECG/componentOf/timepointEvent/ componentOf/subjectAssignment/subject/trialSubject/ subjectDemographicPerson/birthTime
/RestingECG/ PatientDemographics/ Gender	/AnnotatedECG/componentOf/timepointEvent/ componentOf/subjectAssignment/subject/trialSubject/ subjectDemographicPerson/administrativeGenderCode/@code

<i>Patient Demographics</i>		
<i>MUSE XML</i>	<i>FDA XML</i>	
	codeSystem = 2.16.840.1.113883.5.1	
	codeSystemName = is not populated	
	displayName = is not populated	
	The value of this tag is properly converted from the MUSE using the following mapping:	
	MALE = M	
	FEMALE = F	
/RestingECG/ PatientDemographics/ Race	/AnnotatedECG/componentOf/timepointEvent/ componentOf/subjectAssignment/subject/trialSubject/ subjectDemographicPerson/raceCode/@displayName	
	codeSystemName	= Race
	displayName	= /RestingECG/PatientDemographics/ Gender
	The value of this tag is properly converted from the MUSE system using the following mapping:	
	CAUCASIAN	= 2106-3 White
	WHITE	= 2106-3 White
	BLACK	= 2054-4 Black or African American
	ORIENTAL	= 2028-9 Asian
	MONGOLIAN	= 2028-9 Asian
	ASIAN	= 2028-9 Asian
	ASIAN INDIAN	= 2029-7 Asian Indian
	BANGLADESHI	= 2030-5 Bangladeshi
	BURMESE	= 2032-1 Burmese
	CAMBODIAN	= 2033-9 Cambodian
	CHINESE	= 2034-7 Chinese
	FILIPINO	= 2036-2 Filipino
	INDONESIAN	= 2038-8 Indonesian
	JAPANESE	= 2039-6 Japanese

<i>Patient Demographics</i>			
<i>MUSE XML</i>	<i>FDA XML</i>		
	KOREAN	=	2040-4 Korean
	MALAYSIAN	=	2042-0 Malaysian
	PAKISTANI	=	2044-6 Pakistani
	SRILANKAN	=	2045-3 Srilankan
	THAI	=	2046-1 Thai
	VIETNAMESE	=	2047-9 Vietnamese
	SINGAPOREAN	=	2051-1 Singaporean
	HISPANIC	=	2131-1 Other Race
	UNKNOWN	=	2131-1 Other Race
	OTHER	=	2131-1 Other Race
	MIXED RACE	=	2131-1 Other Race
	OTHER RACE	=	2131-1 Other Race
	HISPANIC OR LATINO	=	2131-1 Other Race
	INDIAN	=	1002-5 Native American
	ESKIMO	=	1002-5 Native American
	AMERICAN INDIAN	=	1002-5 Native American
	OTHER PACIFIC ISLANDER	=	2500-7 Other Pacific Islander
	POLYNESIAN	=	2078-4 Polynesian
	HAWAIIAN	=	2076-8 Hawaiian or Pacific Island
	PACIFICISLANDER	=	2076-8 Hawaiian or Pacific Island
	NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER	=	2076-8 Hawaiian or Pacific Island
	PACIFIC ISLANDER	=	2076-8 Hawaiian or Pacific Island

<i>Patient Demographics</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
/RestingECG/ PatientDemographics/ PatientLastName/ RestingECG/ PatientDemographics/ PatientFirstName NOTE: If the PatientLastName is longer than three letters, then the last name initial and first name initial are combined, otherwise only the last name is mapped.	/AnnotatedECG/componentOf/timepointEvent/ componentOf/subjectAssignment/subject/trialSubject/ subjectDemographicPerson/name

Table 3: Test Demographics

<i>Test Demographics</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
	The conversion program generates a GUID (Globally Unique Identifier) which is stored in this XPath. /AnnotatedECG/componentOf/ timepointEvent/performer/ studyEventPerformer/id/@root
/RestingECG/TestDemographics/ AcquisitionTechLastName	/AnnotatedECG/componentOf/ timepointEvent/performer/ studyEventPerformer/ assignedPerson/ name/family
/RestingECG/TestDemographics/ AcquisitionTechFirstName	/AnnotatedECG/componentOf/ timepointEvent/performer/ studyEventPerformer/ assignedPerson/ name/given
/RestingECG/TestDemographics/ AcquisitionTechID	/AnnotatedECG/componentOf/ timepointEvent/performer/ studyEventPerformer/ assignedPerson/id

<i>Test Demographics</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
/RestingECG/TestDemographics/ AcquisitionTime and /RestingECG/ TestDemographics/AcquisitionDate NOTE: StartTime = AcquisitionDate + AcquisitionTime; EndTime = StartTime + 10 seconds	StartTime: 1. /AnnotatedECG/componentOf/ timepointEvent/effectiveTime/low/ @value 2. /AnnotatedECG/effectiveTime/low/ @value 3. /AnnotatedECG/component/series/ effectiveTime/low/@value 4. /AnnotatedECG/component/series/ derivation/Series/effectiveTime/low/ @value EndTime: 1. /AnnotatedECG/componentOf/ timepointEvent/effectiveTime/high/ @value 2. /AnnotatedECG/effectiveTime/high/ @value 3. /AnnotatedECG/component/series/ effectiveTime/high/@value 4. /AnnotatedECG/component/series/ derivation/Series/effectiveTime/ high/@value
/RestingECG/TestDemographics/LocationName NOTE: The MUSE system definition of allocation matches the FDA definition of a site.	/AnnotatedECG/componentOf/ timepointEvent/componentOf/ subjectAssignment/ componentOf/ clinicalTrial/location/trialSite/location/ name
/RestingECG/TestDemographics/ AcquisitionSoftware Version NOTE: This value is stored in two places.	/AnnotatedECG/component/ series/author/seriesAuthor/ manufacturedSeriesDevice/ softwareName /AnnotatedECG/component/ series/derivation/derivedSeries/ author/seriesAuthor/ manufacturedSeriesDevice/ softwareName

<i>Test Demographics</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
/RestingECG/TestDemographics/ AcquisitionDevice NOTE: This value is stored in two places.	/AnnotatedECG/component/ series/author/seriesAuthor/ manufacturedSeriesDevice/ softwareName/ manufacturerModelName /AnnotatedECG/component/ series/author/seriesAuthor/ manufacturedSeriesDevice/ softwareName/ manufacturerModelName

Table 4: Diagnosis

<i>Diagnosis</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
/RestingECG/Diagnosis/DiagnosisStatement [index]/ StmtText	/AnnotatedECG/controlVariable1[<i>index</i>]/ relatedObservation/value/@value

Table 5: Rhythm Wave

<i>Rhythm Wave</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
	The conversion program generates a GUID which is stored in this XPath./AnnotatedECG/ component/series/id/@root
/RestingECG/Waveform/LowPassFilter	/AnnotatedECG/component/series/ component/sequenceSet/controlVariable[1]/ controlVariable/value/@value
/RestingECG/Waveform/HighPassFilter	/AnnotatedECG/component/series/ component/sequenceSet/controlVariable[2]/ controlVariable/value/@value
/RestingECG/Waveform[2]/SampleBase NOTE: The samplebase is converted from samples/ second to seconds/sample.	/AnnotatedECG/component/series/ component/sequenceSet/component[1]/ sequence/value/increment/@value
/RestingECG/ Waveform[2]/Lead Data[i]/ WaveFormData NOTE: Here "i" varies from 1 to 8. (Leads I, II, V1 – V6)	/AnnotatedECG/component/series/ component/sequenceSet/component[i+1]/ sequence/value/digits. Here "i" varies from 0 to 12. Leads I, II, and V1 – V6 come directly from the MUSE XML data. Leads III, aVR, aVL, and aVF are derived from Leads I and II.

<i>Rhythm Wave</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
/RestingECG/Waveform[2]/LeadData[i]/LeadAmplitudeUnitsPerBit	/AnnotatedECG/component/series/component/sequenceSet/component[i + 1]/sequence/value/scale/@value

Table 6: Median Wave

<i>Median Wave</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
	The conversion program generates a GUID which is stored in this XPath./AnnotatedECG/component/series/derivation/Series/id/@root
/RestingECG/Waveform[1]/SampleBase	/AnnotatedECG/component/series/derivation/Series/component/sequenceSet/component[1]/sequence/value/increment/@value
/RestingECG/ Waveform[1]/Lead Data[i]/WaveFormData NOTE: Here "i" varies from 1 to 8. (Leads I, II, and V1 – V6)	/AnnotatedECG/component/series/derivation/Series/component/sequenceSet/component[i+1]/sequence/value/digits Here "i" varies from 0 to 12. Leads I, II, and V1 – V6 come directly from the MUSE XML data. Leads III, aVR, aVL, and aVF are derived from Leads I and II.
/RestingECG/ Waveform[1]/ LeadData[i]/LeadAmplitudeUnitsPerBit	/AnnotatedECG/component/series/derivation/Series/component/sequenceSet/component[i+1]/sequence/value/scale/@value

Table 7: Interval Measurements

<i>Interval Measurements</i>	
<i>MUSE XML</i>	<i>FDA XML</i>
	The conversion program generates a GUID which is stored in this XPath./AnnotatedECG/componentOf/timepointEvent/componentOf/subjectAssignment/subject/trialSubject/id/@root
/RestingECG/IntervalMeasurements/MeasuredInterval	This value is not mapped but used to loop through all leads.
/RestingECG/IntervalMeasurements/IntervalMeasurement Mode	This value is not mapped but used for comparison of mode.

Table 8: Interval Measurements - Raw Mode

Interval Measurements — Raw Mode	
BeatOffset is read from this XPath. RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementBeatOffset	
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementPOnset NOTE: The sum of POnset + BeatOffset is converted from milliseconds to seconds and then mapped.	/AnnotatedECG/component/series/ subjectOf[<i>index</i>] /annotation[1]/ component/ Annotation/support/ supportingROI/component/boundary/value/ low/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementPOffset NOTE: The sum of POffset + BeatOffset is converted from milliseconds to seconds and then mapped.	/AnnotatedECG/component/series/ subjectOf[<i>index</i>] /annotation[1]/ component/ Annotation/support/ supportingROI/component/boundary/value/ high/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementLeadID	/AnnotatedECG/component/series/ subjectOf[<i>index</i>]/annotation[1]/ component[1]/ Annotation/support/ supportingROI/component[2]/boundary/ code/@code
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementQOnset NOTE: The sum of QOnset + BeatOffset is converted from milliseconds to seconds and then mapped.	/AnnotatedECG/component/series/ subjectOf[<i>index</i>]/annotation[1]/ component[2]/ Annotation/support/ supportingROI/component/boundary/value/ low/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementQOffset NOTE: The sum of QOffset + BeatOffset is converted from milliseconds to seconds and then mapped.	/AnnotatedECG/component/series/ subjectOf[<i>index</i>] /annotation[1]/ component[2]/ Annotation/support/ supportingROI/component/boundary/value/ high/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementLeadID	/AnnotatedECG/component/series/ subjectOf[<i>index</i>] /annotation[1]/ component[2]/ Annotation/support/ supportingROI/component[2]/boundary/ code/@code
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementTOffset NOTE: The sum of TOffset + BeatOffset is converted from milliseconds to seconds and then mapped.	/AnnotatedECG/component/series/ subjectOf[<i>index</i>] /annotation[1]/ component[3]/ Annotation/support/ supportingROI/component/boundary/value/ high/@value

<i>Interval Measurements — Raw Mode</i>	
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementLeadID	/AnnotatedECG/component/series/ subjectOf[<i>index</i>] /annotation[1]/ component[3]/ Annotation/support/ supportingROI/component[2]/boundary/ code/@code

Table 9: Interval Measurement - Median Mode

<i>Interval Measurements — Median Mode</i>	
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementPOnset NOTE: POnset is converted from milliseconds to seconds.	/AnnotatedECG/component/series/ derivation/Series/subjectOf[<i>index</i>] / annotation[1]/ component/Annotation/ support/supportingROI/component/ boundary/value/low/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementPOffset NOTE: POffset is converted from milliseconds to seconds.	/AnnotatedECG/component/series/ derivation/Series/subjectOf[<i>index</i>] / annotation[1]/ component/Annotation/ support/supportingROI/component/ boundary/value/high/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementLeadID	/AnnotatedECG/component/series/ derivation/Series/subjectOf[<i>index</i>] / annotation[1]/component[1]/Annotation/ support/supportingROI/component[2]/ boundary/code/@code
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementQOnset NOTE: QOnset is converted from milliseconds to seconds.	/AnnotatedECG/component/series/ derivation/Series/subjectOf[<i>index</i>] / annotation[1]/component[2]/Annotation/ support/supportingROI/component/ boundary/value/low/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementQOffset NOTE: QOffset is converted from milliseconds to seconds.	/AnnotatedECG/component/series/ derivation/Series/subjectOf[<i>index</i>] / annotation[1]/component[2]/Annotation/ support/supportingROI/component/ boundary/value/high/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [<i>index</i>]/Interval MeasurementLeadID	/AnnotatedECG/component/series/ derivation/Series/subjectOf[<i>index</i>] / annotation[1]/component[2]/Annotation/ support/supportingROI/component[2]/ boundary/code/@code

Interval Measurements — Median Mode	
/RestingECG/IntervalMeasurements/ MeasuredInterval [index]/Interval MeasurementTOffset NOTE: TOffset is converted from milliseconds to seconds.	/AnnotatedECG/component/series/ derivation/Series/subjectOf[index] / annotation[1]/component[3]/Annotation/ support/supportingROI/component/ boundary/value/high/@value
/RestingECG/IntervalMeasurements/ MeasuredInterval [index]/Interval MeasurementLeadID	/AnnotatedECG/component/series/ derivation/Series/subjectOf[index] / annotation[1]/component[3]/Annotation/ support/supportingROI/component[2]/ boundary/code/@code



Section and Element Definitions

This section describes the data sections and definitions needed for transactional XML interchanges.

Overview

GE Healthcare's Transactional XML Developer's module allows you to import cardiology-related data from non-GE Healthcare devices into the system for storage, printing, and distribution to the Hospital Information System (HIS). The system accepts only resting ECG test data, both confirmed and unconfirmed.

- Confirmed tests - results were read and confirmed by a physician.
- Unconfirmed tests - results were not interpreted or read by a physician.

Multiple types of vendor data are accepted. The data can be all text, or a combination of textual and waveform data. After the textual data reaches the system, you can modify it. Once confirmed, both textual and waveform data are stored long-term in the system databases. You cannot perform serial comparison on imported data, and interpretation is stored as free text.

This chapter provides an overview of the Transactional XML Developer's module and the requirements needed to run it. This document is intended for individuals who develop Cardiology-related XML documents they want to store in the MUSE system.

GE Healthcare Data Sections

GE Healthcare has defined data sections, each containing a unique combination of data fields:

- Required sections:
 - Patient Demographics
 - Test Demographics
- Optional sections:
 - Additional Patient Demographics
 - Additional Test Demographics
 - Order Information

- Diagnosis with Diagnosis Statement
- Waveforms

If you include any of the optional sections, you must include the required data fields specific to that section. Required data fields are indicated in the tables provided on the following pages.

Table Explanation

Each of the common sections are described in one of the tables provided on the following pages. In addition to identifying the elements, each table also provides the following information:

Column	Description
XML Tag	Indicates the GE Healthcare XML tag you must use if you are including the specified element in your XML document.
MUSE Length	Identifies the maximum field text length allowed for each data element.
Type	Specifies the type of data being passed for a particular element. You may further clarify the information in this field with information in the Value/Range column or the "MUSE System Data Types" on page 21 .
Value/Range	Provides additional detail or specifies the limits for the element's content. In the case of Predefined Values , the acceptable values for the element are listed in this column.
Field Status	Identifies whether or not this element is required in your XML document. If <i>Required</i> is in this column, you must include the element in your XML document for the associated section. If this column is blank, the element is optional for the associated section.
Export Only	Only used in XML data exported from MUSE.
Description	Provides a description for every element in the associated section of data. Each of these elements should occur only once unless otherwise noted.

Patient Demographics Section (Required)

The Patient Demographics section contains information about the patient. The following table lists the required and optional elements for this section. Certain elements are required only if another element is included. For example, the **AgeUnits** element is required only when the **PatientAge** element is used. These types of dependencies are noted in the *Field Status* column.

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
PatientID	16	String	Required - No Truncation Must Match MUSE ID scheme	Required		The Patient ID must be assigned for the life of the patient and must be unique for this patient.

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
PatientAge		Numeric	0 - 127			Patient age
AgeUnits		See Value/Range	YEARS, MONTHS, WEEKS, DAYS, HOURS	Required if PatientAge is provided.		Age Units
DateofBirth	10	DATE	MM/DD/YYYY or MM-DD-YYYY			Patient date of birth
Gender		See Value/Range	MALE, FEMALE		CE6	Patient gender
Race		See Value/Range lo	CAUCASIANBLACK ORIENTALHISPANIC INDIANESKIMO HAWAIIANPACIFIC ISLANDERMONGOLIAN ASIANUNKNOWN WHITEASIAN INDIANBANGLADESHI BURMESECAMBODIAN CHINESEFILIPINO INDONESIAN JAPANESEKOREAN MALAYSIAN PAKISTANISRI LANKAN THAIVIETNAMESE SINGAPORE ANOTHERMIXED RACEOTHER RACEHISPANIC OR LATINOAMERICAN INDIANOTHER PACIFIC ISLANDER POLYNESIAN NATIVE HAWAIIAN OR OTHER ISLANDER			Patient race
HeightIN		Numeric	0-127			Patient height in inches
HeightCM		Numeric	0-323			Patient height in centimeters
WeightLBS		Numeric	0-1,000			Patient weight in pounds
WeighKG		Numeric	0-455			Patient weight in kilograms
PatientLastName		40	String			Patient last name
PatientFirstName	20	String				Patient first name
AnalysisAge			16 Bit Unsigned			Patient age used to run analysis program
AnalysisAgeUnits		See Value/Range	YEARSMONTHS WEEKSDAYS HOURS			Analysis age units

Test Demographics Section (Required)

The Test Demographics section contains information about the particular test. It includes such elements as the type of test performed and the date and time of the test. Any element included in this section should only be included once in the document.

Section and Element Definitions

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
DataType		See Value/Range	RESTING, STRESS, HOLTER, HIRES	Required	No	Identifies the specific type of test
Site		Numeric	1-254	Required	No	MUSE site number - associated to Hospital Name (import and export)
SiteName		String		Optional	Yes	MUSE site name - export only
AcquisitionDevice	5	String		Required	No	Name or acronym for the device on which the test was performed
Status		See Value/Range	CONFIRMED, UNCONFIRMED, FELLOW	Required	No	Status of test
EditListStatus		See Value/Range	- Unknown - Newly Acquired - Confirmed at cart, unconfirmed during acquisition - Updated - Updated after fellow confirmed - Updated after confirmed - Updated after fellow confirmed, confirmed - Demographics complete - Demographics complete after fellow confirmed - Demographics complete after confirmed - Demographics complete after fellow confirmed, confirmed - Diagnosis complete - Diagnosis complete after fellow confirmed - Diagnosis complete after confirmed - Diagnosis complete after fellow confirmed - Diagnosis and Demographics complete - Fellow confirmed - Confirmed - Confirmed after fellow confirmed - Confirmed at cart	Optional	Yes	Workflow status of the test
Priority		See Value/Range	NORMAL, PREOP, STAT	Optional	No	Priority of test
Location		Numeric	0 - 599	Optional	No	Location number corresponding to MUSE list of locations
LocationName		String		Optional	Yes	Location name - export only
RoomID	5	String		Optional	No	Patient room number
AcquisitionTime	11	TIME	HH:MM:SS:NN	Required	No	Time test was performed
AcquisitionDate	10	DATE	MM/DD/YYYY or MM-DD-YYYY	Required	No	Date test was performed
CartNumber		Numeric			No	Number corresponding to a device

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
AcquisitionSoftwareVersion	9	String		Required	No	Version of software used to acquire test
AnalysisSoftwareVersion	9	String		Optional	Yes	Version of software used to analyze test
UserDefined	10	String		Optional	Yes	User-defined data
EditDate		DATE	MM/DD/YYYY or MM-DD-YYYY	Optional	Yes	Date of the last edit
EditTime		TIME	HH:MM:SS:NN	Optional	Yes	Time of the last edit
OrderingMDID		UserID	1-10000		No	Ordering MD MUSE ID number
ReferringMDID		UserID	1-10000		No	MUSE referring MD MUSE ID number
OverreaderID		UserID	1-10000		No	MUSE interpreting MD ID number
FellowID		UserID	1-10000		No	MUSE fellow ID number
AcquisitionTechID		UserID	1-10000		No	Technician performing test MUSE ID number
EditorID		User ID	1-10000		No	MUSE transcriptionist ID
TestType	24	String			No	Description of test
TestReason	32	String			No	Reason for test
OrderingMDLastName	16	String			No	Ordering MD last name
OrderingMDFirstName	10	String			No	Ordering MD first name
ReferringMDLastName	16	String			No	Referring MD last name
ReferringMDFirstName	10	String			No	Referring MD first name
OverreaderLastName	16	String			No	Interpreting MD last name
OverreaderFirstName	10	String			No	Interpreting MD first name
OptionNumber		Numeric	0-65535	Optional	No	Legacy user defined number used by older ECG carts
FellowLastName	16	String			No	Fellow last name
FellowFirstName	10	String			No	Fellow first name
AcquisitionTechLastName	16	String			No	Performing technician last name
AcquisitionTechFirstName	10	String			No	Performing technician first name
EditorLastName	16	String			No	Transcriptionist last name
EditorFirstName	10	String			No	Transcriptionist first name
SecondaryID	16	String			No	Patient secondary ID
HISStatus		Numeric	Bit flags: Bit 0 – A billing transaction was sent Bit 1 – A result transaction was sent Bit 2 – Never bill this record Bit 3 – Test has order extra questions Bit 4 – Test has been edited	Optional	Yes	Status of record in the Hospital Information System

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
XMLSourceVersion	127	String			Yes	Vendor version of software used to create XML document

Order Information Section (Optional)

The Order Information section contains information provided through the HIS link to the MUSE system about an order or account that was assigned to the test. Any element included in this section should only be included once in the document.

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
RequisitionNumber	9	String			No	Requisition number for a test
HISOrderNumber	9	String			No	Order number for a test
HISAccountNumber	19	String			No	Patient account number
HISSystemID	17	String			No	HIS system identifier
Episode	5	String			No	Episode or occurrence of the order
HISTestType	32	String			No	HIS description of test.
OrderingMDID	2	UserID	1-10000	Optional	No	Ordering MD ID
OrderingMDHISID	32	String			No	Ordering MD HIS ID
HISOrderingMDLastName	16	String			No	HIS ordering MD last name
HISOrderingMDFirstName	10	String			No	HIS ordering MD first name
ScheduleTime	32	String			No	Priority of test
OrderTime		DATE TIME	MM/DD/YYYY HH:MM:SS		No	Time test should be performed
OrderExpirationTime	4	DATE TIME	MM/DD/YYYY HH:MM:SS		No	Time order should expire and not be available
AdmitTime	4	TIME	HH:MM:SS:NN		No	Patient Admit Time
AdmitDate	4	DATE	MM/DD/YYYY HH:MM:SS		No	Patient Admit Date
AdmitDiagnosis	80	String			No	Admitting Diagnosis
HISLocation	20	String			No	Patient HIS location
Bed	12	String			No	Patient bed number
Comments	80	String			No	Ordering comments
ExtraADTData1	32	String			No	Additional ADT data field 1
ExtraADTData2	32	String			No	Additional ADT data field 2
ExtraADTData3	32	String			No	Additional ADT data field 3
ExtraADTData4	32	String			No	Additional ADT data field 4
ExtraOrderData1	32	String			No	Additional order data field 1
ExtraOrderData2	32	String			No	Additional order data field 2
ExtraOrderData3	32	String			No	Additional order data field 3
ExtraOrderData4	32	String			No	Additional order data field 4

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Field Status</i>	<i>Export Only</i>	<i>Description</i>
ExtraAccountData1	32	String			No	Additional account data field 1
ExtraAccountData2	32	String			No	Additional account data field 2
ExtraAccountData3	32	String			No	Additional account data field 3
ExtraAccountData4	32	String			No	Additional account data field 4
AttendingMDID	2	UserID	1-10000		No	Attending MD ID
AttendingMDHISID	32	String			No	Attending MD HIS ID
AttendingMDLastName	16	String			No	Attending MD last name
AttendingMDFirstName	10	String			No	Attending MD first name
PriorHISAccountNumber	19	String			No	Prior patient account number
AlternateVisitID	19	String			No	Alternate visit or account number
HISDisposition	19	String			No	Text description of patient class
PatientDischargeDate	4	DATE	MM/DD/YYYY or MM-DD-YYYY		No	Patient's discharge date
PatientDischargeTime	4	TIME	HH:MM:SS:NN		No	Patient's discharge time
AdmitSource	32	String			No	Place patient was admitted from
DischargeDisposition	32	String			No	Disposition of patient at discharge time
PrimaryDiagnosticCode	15	String			No	Primary diagnosis code
SecondaryDiagnosticCode	15	String			No	Secondary diagnosis code
TertiaryDiagnosticCode	15	String			No	Third diagnosis code
OtherDiagnosticCode	15	String			No	Fourth diagnosis code
CurrentDiagnosis	80	String			No	Text of current diagnosis
ServicingFacility	17	String			No	Servicing facility
AdmittingMDID	2	UserID	1-10000		No	Admitting MD ID number on the MUSE system
AdmittingMDHISID	32	String			No	Admitting MD HIS ID
AdmittingMDLastName	16	String			No	Admitting MD last name
AdmittingMDFirstName	10	String			No	Admitting MD first name
ConsultingMDID	2	UserID	1-10000		No	Consulting MD MUSE ID
ConsultingMDHISID	32	String			No	Consulting MD HIS ID
ConsultingMDLastName	16	String			No	Consulting MD last name
ConsultingMDFirstName	10	String			No	Consulting MD first name
ReferringMDHISID	32	String			No	Referring MD HIS ID
HospitalService	19	String			No	Hospital service
AmbulatoryStatus	15	String			No	Ambulatory status
AdmissionType	19	String			No	Admission type
DangerCode	16	String			No	Danger code
AltRequisitionNumber	32	String			No	Alternate requisition number
PlacersHISID	32	String			No	Order placer's HIS ID

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
PlacersLastName	16	String			No	Order placer's last name
PlacersFirstName	10	String			No	Order placer's first name
OrderPlacementDate	10	DATE	MM/DD/YYYY or MM-DD-YYYY		No	Order placement date
OrderPlacementTime	11	TIME	HH:MM:SS:NN		No	Order placement time
ReasonForTest	80	String			No	Reason for test

QRS Times and Types (Optional, Export Only)

The QRS Times and Types section is supported on export only.

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
QRS		See "QRS Section (Optional, Export Only)" on page 65		Optional Repeats	Yes	The QRS times and types, see "QRS Section (Optional, Export Only)" on page 65 .
GlobalRR		Numeric		Optional	Yes	The global mean R-R measurement
QTRGGR		Numeric		Optional	Yes	Sample index of the QRS trigger from the start of the median 124 for 250 sps248 for 500 sps

Diagnosis Section (Optional)

The Diagnosis section contains the physician's textual comments and interpretation of the test. If you include this section, you must include the **Diagnostic Statement** section.

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
Modality		See Value/Range	RESTING, STRESS, HOLTER, CATH, HIRES	Required		Type of test to which this diagnosis corresponds
StatementCount		Numeric	0-254			Total number of diagnosis statements

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Field Status</i>	<i>Export Only</i>	<i>Description</i>
LabelText	32	String				String describing diagnosis
DiagnosisStatement	Variable			Repeats		All diagnosis statements

Waveforms Section (Optional)

If you include the Waveforms section, you must include all required elements and all **Lead Data** sections.

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Field Status</i>	<i>Description</i>
WaveformType		See Value/Range	MEDIANRHYTHM	Required	
WaveformStartTime		Numeric	32 Bit Unsigned	Required	Offset in buffer to beginning of waveform
NumberOfLeads		Numeric	8 or 11	Required	Total number channels in the waveform excluding derived leads. For 12 lead, use 8. For 15 lead, use 11.
SampleType		See Value/Range	DISCRETE_ SAMPLESCONTINUOUS_ SAMPLESMULTIPLEX_ SAMPLESIMPLEX_ SAMPLES	Required	One of the four types of samples listed in the Comments section
SampleBase		Numeric	16 Bit Unsigned	Required	Sample Rate Base
SampleExponent		Numeric	8 Bit Unsigned	Required	Exponent value used in conjunction with the Sample Base value
HighPassFilter		Numeric	16 Bit Unsigned		High pass filter applied to data before it was received by MUSE (in hundredths of Hertz)
LowPassFilter		Numeric	16 Bit Unsigned		Low pass filter applied to data before it was received by MUSE (in Hertz, usually 150 Hz)
ACFilter		See Value/Range	NONE, 50, 60	Required Repeats	AC filter applied to data before it was received by MUSE (in Hertz)
LeadData	Variable		See "Lead Data Section" on page 62	Required Repeats	Base64 encoded uncompressed raw signal data for the current lead, each data sample must be in low byte/high byte format (little endian format). Samples the size of LeadSampleSize and can be multiplied by LeadAmplitudeUnitsPerBit to get the actual value. Missing samples should be represented as zeros.
PaceSpikes			See "Pacemaker Spikes Section (Optional)" on page 61	Optional	See "Pacemaker Spikes Section (Optional)" on page 61

Pacemaker Spikes Section (Optional)

The Pacemaker Spikes section is supported on import and is not produced on export.

Section and Element Definitions

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
PaceType		See Value/Range	External/Internal	Required	No	Defines if pacing was done external to the body or internally
PaceCharacteristicsFromDevice		True/False	TRUE/FALSE	Optional group of (PaceCharacteristicid FromDevice, PaceWidth, PaceWidthUnits)	No	Indicates if the pacer characteristics are taken from the device recording them. This tag is ignored by MUSE.
PaceWidth		Numeric		Optional group of (PaceCharacteristicid FromDevice, PaceWidth, PaceWidthUnits)	No	Width of the pacemaker spikes. This tag is ignored by MUSE.
PaceWidthUnits		See Value/Range	milliseconds	Optional group of (PaceCharacteristicid FromDevice, PaceWidth, PaceWidthUnits)	No	Units for PaceWidth. This tag is ignored by MUSE.
PaceAmplitude		Numeric		Optional group of (PaceAmplitude, PaceAmplitudeUnits)	No	Amplitude of all pace spikes. This tag is ignored by MUSE.
PaceAmplitudeUnits		See Value/Range	microvolts	Optional group of (PaceAmplitude, PaceAmplitudeUnits)	No	Units for PaceAmplitude. This tag is ignored by MUSE.
IndexOffsets				Required	No	Locations of the beginning of spikes in sample offsets from the beginning of the ECG (zero based). (Convert a time in milliseconds to a sample offset by dividing by 2 when sample rate is 500 and 4 when sample rate is 250.) Offsets are zero-based, so the first sample is zero, the second is one, and so forth. The spike offsets are comma delimited.

Lead Data Section

Required if you include a Waveform section.

XML Tag	MUSE Length	Type	Value/Range	Field Status	Description
LeadByteCountTotal		Numeric	16 Bit Unsigned	Required	Total uncompressed lead buffer size in bytes
LeadTimeOffset		Numeric	16 Bit Unsigned	Required	Offset of lead in reference to the waveform (in milliseconds)
LeadSampleCountTotal		Numeric	16 Bit Unsigned	Required	Total number of samples in the lead buffer
LeadAmplitudeUnitsPerBit		Numeric	Float	Required	A/D scaling factor (for ECG this value is the number of volts per A/D bit)
LeadAmplitudeUnits		See Value/Range	VOLTS/MILLIVOLTS/MICROVOLTS	Required	A/D scaling factor units (for ECG, this is usually microvolts)
LeadHighLimit		Numeric	16 Bit Signed	Required	High limit value for a single lead measurement

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Field Status</i>	<i>Description</i>
LeadLowLimit		Numeric	16 Bit Signed	Required	Low limit value for a single lead measurement
LeadID		See Value/Range	I,II, V1,V2,V3, V4,V5,V6 VCG - add X,Y, Z Ped - add V3R,V4R,V7	Required	Specific lead Identifier
LeadOffsetFirstSample		Numeric	16 Bit Unsigned	Required	Offset within lead buffer of first valid lead data (in samples)
FirstSampleBaseline		Numeric	32 Bit Unsigned	Required	Value indicating amount of baseline shift
LeadSampleSize		Numeric	8 Bit Unsigned	Required	Size of individual data sample (in bytes)
LeadOff		BOOL	TRUE, FALSE	Required	Boolean value indicating the Lead is off
BaselineSway		BOOL	TRUE, FALSE	Required	Boolean value indicating that baseline sway is present in the data
ExcessiveACNoise		BOOL	TRUE, FALSE		Boolean value indicating that excessive AC noise is present in data
MuscleNoise		BOOL	TRUE, FALSE		Boolean value indicating the muscle noise is present in the data
LeadDataCRC32		Numeric	32 Bit Unsigned	Required	32 bit CRC of unencoded and uncompressed raw signal data for the current lead
WaveFormData	Variable		Base64 Encoded Data	Required	Base64 encoded uncompressed raw signal data for the current lead. Each data sample must be in low byte/high byte format (little endian format).

Pharma Data (Optional)

The optional Pharma Data section is both import and export.

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Description</i>
PharmaDoseType	32	String	16 Bit Unsigned	
PharmaRRInterval		Numeric	16 Bit Unsigned	RR Interval
PharmaVisitNumber	6	String		Visit Number
PharmaVisitType	17	String		Visit Type defined by trial Administrator
PharmaUniqueECGID	32	String		Value assigned by cart to ECG
PharmaPPInterval		Numeric	16 Bit Unsigned	PP Interval
PharmaExtendedCartID	10	String		Value assigned to cart by trial Administrator

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Description</i>
PharmaCartID	16	String		Value assigned by cart to ECG
PharmaProjectCode	32	String		Project Code assigned by trial administrator
PharmaQuestion1	10	String		First user defined question
PharmaAnswer1	17	String		First user defined answer
PharmaQuestion2	10	String		Second user defined question
PharmaAnswer2	17	String		Second user defined answer
PharmaQuestion3	10	String		Third user defined question
PharmaAnswer3	17	String		Third user defined answer
PharmaQuestion4	10	String		Fourth user defined question
PharmaAnswer4	17	String		Fourth user defined answer
PharmaQuestion5	10	String		Fifth user defined question
PharmaAnswer5	17	String		Fifth user defined answer

Resting ECG Measurements Section (Optional)

The Resting ECG Measurements section is not required in the XML document.

<i>XML Tag</i>	<i>Type</i>	<i>Value/Range</i>	<i>Field Status</i>	<i>Description</i>
SystolicBP	Numeric	0-999		Systolic blood pressure (mm Hg)
DiastolicBP	Numeric	0-999		Diastolic blood pressure (mm Hg)
VentricularRate	Numeric	0-999		Ventricular rate in BPM
AtrialRate	Numeric	0-999		Atrial rate (in BPM)
PRInterval	Numeric	0-999		P-R interval (in msec)
QRSDuration	Numeric	0-999		QRS duration (in msec)
QTInterval	Numeric	0-999		QT interval (in msec)
QTCorrected	Numeric	16 Bit unsigned		Bazett's Algorithm
PAxis	Numeric	-89 to 270		P axis
RAxis	Numeric	-89 to 270		R axis
TAxis	Numeric	-89 to 270		T axis
QRSCount	Numeric	0-254		QRS count
QOnset	Numeric	16 Bit unsigned		Q onset (median complex sample point)
QOffset	Numeric	16 Bit unsigned		Q offset (median complex sample point)
POnset	Numeric	16 Bit unsigned		P onset (median complex sample point)

XML Tag	Type	Value/Range	Field Status	Description
POffset	Numeric	16 Bit unsigned		P offset (median complex sample point)
TOffset	Numeric	16 Bit unsigned		T offset (median complex sample point)
ECGSampleBase	Numeric	16 Bit unsigned	Required	ECG sample rate base
ECGSampleExponent	Numeric	8 Bit signed	Required	ECG sample rate base exponent
QTcFrederica	Numeric	16 Bit unsigned		QT calculated with the Frederica Algorithm

Original Resting ECG Section (Optional)

This Original Resting ECG section includes the original resting ECG measurements for 12SL before they were edited. The tags for this section are identical to the tags in the Resting ECG Measurements section. See ["Resting ECG Measurements Section \(Optional\)" on page 64](#).

QRS Section (Optional, Export Only)

The QRS section is supported on export only.

XML Tag	MUSE Length	Type	Value/Range	Field Status	Export Only	Description
Number		Numeric		Required	Yes	Number of this QRS
Type		Numeric		Required	Yes	The beat type number for this QRS as determined by analysis
Time		Numeric		Required	Yes	The sample index (zero based) of the beginning of this QRS complex, from the beginning of the waveform.

XML Data Export

The MUSE system supports an XML Export option that provides an XML representation of Resting ECG data based on the existing Transactional XML Developer's specifications. You can include Waveform and measurements matrix data in the output if the test is a 12- or 15-lead ECG. The waveform and measurement matrix data are not available for reduced ECGs and ECGs that were created manually on the MUSE system. The XML Export includes the following additional sections:

- PharmaData
- ACITIPIAnalysis
- IntervalMeasurements

- AmplitudeMeasurements
- MeasurementMatrix

The resting ECG measurements section is different from the one used in XML import.

For the individual data fields within these sections, refer to the following tables:

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Field Status</i>	<i>Export Only</i>	<i>Description</i>
MuseVersion	16	String		Required	Yes	The version of MUSE system producing the XML
RegisteredName	50	String		Optional	Yes	Registered customer name for this MUSE

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Description</i>
ACITIPI Analysis <ACITIPIAnalysis>				
TIPIStatement				ACI TIPI statements
ACITIPIAlgorithmVersion	9	String		Version of the ACI TIPI algorithm
TwelveSLVersion	9	String		Version of the 12SL algorithm
TIPIScore	Numeric	8 Bit Unsigned		ACI TIPI Score
TIPIChestPain			NonePrimary ComplaintSecondary Complaint	ACI TIPI Chest Pain Rating
TIPIGender			Male, Female	ACI TIPI Gender
TIPIAgeRange			Pediatric (<16) 16-40 years 41-50 years Over 50 years	ACI TIPI Age Range
Interval Measurements <IntervalMeasurements>				
IntervalMeasurement TimeResolution		Numeric	25, 50, 100	The resolution for time (x) (in mm/ms)
IntervalMeasurement AmplitudeResolution		Numeric	10, 20, 40	The resolution for amplitude (y) (in mv/mm)
Interval MeasurementFilter		String	None, 40, 80	The type of low pass filter used to smooth the waveform display (in Hz)
Interval MeasurementMode		String	medians, raw	The mode used to measure the data (median or consecutive raw beats)
IntervalMeasurement MethodType		String	OnsetOffset IntervalGlobal	The measurement method to determine the global measurements
LeadInterval CalculationMethod		String	MeanMedian MinimumMaximum	Method to determine global intervals from each lead; present when IntervalMeasurementMethodType is set to Interval .
LeadPOnset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global P Onset from each lead; present when IntervalMeasurementMethodType is set to OnsetOffset .

<i>XML Tag</i>	<i>MUSE Length</i>	<i>Type</i>	<i>Value/Range</i>	<i>Description</i>
LeadPOffset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global P Offset from each lead; present when IntervalMeasurementMethodType is set to OnsetOffset .
LeadQOnset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global Q Onset from each lead; present when IntervalMeasurementMethodType is set to OnsetOffset .
LeadQOffset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global Q Offset from each lead; present when IntervalMeasurementMethodType is set to OnsetOffset .
LeadTOffset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global T Offset from each lead, present when IntervalMeasurementMethodType is set to OnsetOffset .
BeatPONset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global P Onset from each beat; present when IntervalMeasurementMethodType is set to OnsetOffset and the IntervalMeasurementMode is set to Raw .
BeatPOffset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global P Offset from each beat; only present when IntervalMeasurementMethodType is set to OnsetOffset and the IntervalMeasurementMode is set to Raw .
BeatQOnset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global Q Onset from each beat; present when IntervalMeasurementMethodType is set to OnsetOffset and the IntervalMeasurementMode is set to Raw .
BeatQOffset CalculationMethod		String	Mean MedianEarliestLatest	Method to determine global Q Offset from each beat; present when IntervalMeasurementMethodType is set to OnsetOffset and the IntervalMeasurementMode is set to Raw .
Interval Measurement LeadID		String	I, II, III, AVR, AVL, AVF, V1, V2, V3, V4, V5, V6	Lead ID
Interval Measurement BeatNumber		Numeric	16 Bit Unsigned	The beat index of the beat in the ECG. The first beat is zero; present when IntervalMeasurementMode is set to Raw .
Interval Measurement BeatOffset		Numeric	16 Bit Unsigned	The offset in number of samples to the beginning of this beat, present when IntervalMeasurementMode is set to Raw .
Interval Measurement PONset		Numeric	16 Bit Unsigned	The P Onset measurement for this beat and lead
Interval Measurement POffset		Numeric	16 Bit Unsigned	The P Offset measurement for this beat and lead.

XML Tag	MUSE Length	Type	Value/Range	Description
IntervalMeasurementQOnset		Numeric	16 Bit Unsigned	The Q Onset measurement for this beat and lead
IntervalMeasurementQOffset		Numeric	16 Bit Unsigned	The Q Offset measurement for this beat and lead
IntervalMeasurementTOffset		Numeric	16 Bit Unsigned	The T Offset measurement for this beat and lead
IntervalMeasurementRRInterval				
Amplitude Measurements <AmplitudeMeasurements>				
AmplitudeMeasurementMode		String	Raw, Median	Modes used to measure amplitude in the Interval Editor
AmplitudeMeasurementLeadID		String	I, II, III, AVR, AVL, AVF, V1, V2, V3, V4, V5, V6	Lead ID
AmplitudeMeasurementWaveID		String	IE_P, IE_PPM, IE_QIE_QS, IE_R, IE_RPMIE_S, IE_SPM, IE_STJIE_STJ40, IE_STJ60IE_STJ80, IE_T, IE_TPMIE_U, IE_SPPMIE_RPPM, IE_PPPMIE_DELTA, IE_TNCHIE_TDNCH, IE_QRSNCH	Name of the Wavelet you are measuring
AmplitudeMeasurementBeatID		Numeric		Beat ID
AmplitudeMeasurementPeak		Numeric		Peak of the wavelet (in uV)
AmplitudeMeasurementStart		Numeric		Start of wavelet in samples
AmplitudeMeasurementDuration		Numeric		Wavelet duration (in msec)
AmplitudeMeasurementArea		Numeric		Wavelet area (in uv*msec)
Extra Questions <ExtraQuestions>				
ExtraQuestion	Variable		See Extra Question <ExtraQuestion>	Repeating section (see Extra Question <ExtraQuestion>)
Extra Question <ExtraQuestion>				
Question	10	String		Generic question prompt
Answer	17	String	This can be an String, numeric (32 bit unsigned), or Yes, No, or Unknown	Answer to the question
QRSTimesTypes <QRSTimesTypes>				
GlobalRR		Numeric	16 Bit unsigned	Average RR Interval
QTRGGR		Numeric	124, 248	Constant, for premacvu and monitor EEC 124; for macvu ECG 248
QRS <QRS>				
Number		Byte	0-254	QRS Number
Type		Byte		QRS Type
Time		Numeric	0-999	QRS Duration

Measurement Matrix

<MeasurementMatrix> is the XML tag for the Measurement Matrix. The measurement matrix exported in the XML file contains the global measurements and per-lead measurements. This document details the contents of both sections. The data in the XML file is Base64 encoded and should be decoded before interpreting as described in the following sections.

Global Measurements

An array of 18 words (2-byte values) follows the data header:

- [0] =36// always 36 (decimal), (the array size in bytes)
- [1] =pon// P-wave onset in median beat (in samples)
- [2] =poff// P-wave offset in median beat
- [3] =qon// Q-Onset in median beat
- [4] =qoff// Q-Offset in median beat
- [5] =ton// T-Onset in median beat
- [6] =toff// T-Offset in median beat
- [7] =nqrs// Number of QRS Complexes
- [8] =qrsdur// QRS Duration
- [9] =qt// QT Interval
- [10]=qtc// QT Corrected
- [11]=print // PR Interval
- [12]=vrate// Ventricular Rate
- [13]=avgrr// Average R-R Interval
- [14]=0xFFFFh// Pad- Always 0xFFFFh
- [15]=0xFFFFh// Pad- Always 0xFFFFh
- [16]=0xFFFFh// Pad- Always 0xFFFFh
- [17]=636;//(53*12) Decimal Number of Columns*Number of Leads

Per-Lead Measurements

The per-lead measurements section follows the global measurements. These measurements consist of an array 12 leads by 53 four-byte values. The four bytes are further subdivided into three parts. The first byte is the lead ID, the second byte is the measurement ID, and the remaining two bytes are the actual measurement value.

For each lead of the 12 leads in the order [I, II, V1, V2, V3, V4, V5, V6, III, AVR, AVL, AVF], the following values are present:

[1]PONA

\\ P Wave amplitude at P-onset

Section and Element Definitions

[2]PAMP	\\ P wave amplitude
[3]PDUR	\\ P wave duration
[4]bmPAR	\\ P wave area
[5]bmPI	\\ P wave intrinsicoid (time from P onset to peak of P)
[6]P'AMP	\\ P Prime amplitude
[7]P'DUR	\\ P Prime duration
[8]bmPPAR	\\ P Prime area
[9]bmPPI	\\ P Prime intrinsicoid (time from P onset to peak of P')
[10]QAMP	\\ Q wave amplitude
[11]QDUR	\\ Q wave duration
[12]bmQAR	\\ Q wave area
[13]bmQI	\\ Q intrinsicoid (time from Q onset to peak of Q)
[14]RAMP	\\ R amplitude
[15]RDUR	\\ R duration
[16]bmRAR	\\ R wave area
[17]bmRI	\\ R intrinsicoid (time from R onset to peak of R)
[18]SAMP	\\ S amplitude
[19]SDUR	\\ S duration
[20]bmSAR	\\ S wave area
[21]bmSI	\\ S intrinsicoid (time from Q onset to peak of S)
[22]R'AMP	\\ R Prime amplitude
[23]R'DUR	\\ R Prime duration
[24]bmRPAR	\\ R Prime wave area
[25]bmRPI	\\ R Prime intrinsicoid (time from Q onset to peak of R Prime)
[26]S'AMP	\\ S Prime Amplitude
[27]S'DUR	e\\ S Prime Duration
[28]bmSPAR	\\ S Prime wave area

[29]bmSPI	\\ S intrinscoid (time from Q onset to peak of S prime)
[30]STJ	\\ STJ point, End of QRS Point Amplitude
[31]STM	\\ STM point, Middle of the ST Segment Amplitude
[32]STE	\\ STE point, End of ST Segment Amplitude
[33]MXSTA	\\ Maximum of STJ, STM, STE Amplitudes
[34]MNSTA	\\ Minimum of STJ and STM Amplitudes
[35]SPTA	\\ Special T-Wave amplitude
[36]QRSA	\\ Total QRS area
[37]QRSDEF	\\ QRS Deflection
[38]MAXRA	\\ Maximum R Amplitude (R or R Prime)
[39]MAXSA	\\ Maximum S Amplitude (S or S Prime)
[40]TAMP	\\ T amplitude
[41]TDUR	\\ T duration
[42]bmTAR	\\ T wave area
[43]bmTI	\\ T intrinscoid (time from STE to peak of T)
[44]T'AMP	\\ T Prime amplitude
[45]TPDUR	\\ T Prime duration
[46]bmTPAR	\\ T Prime area
[47]bmTPI	\\ T Prime intrinscoid (time from STE to peak of T)
[48]TEND	\\ T Amplitude at T offset
[49]PAREA	\\ P wave area, includes P and P Prime
[50]QRSAR	\\ QRS area
[51]TAREA	\\ T wave area, include T and T Prime
[52]QRSINT	\\ QRS intrinscoid (see following)

[53]BITFLG \\ Bitmask sum of (values) decoded as follows:

Bit 1 (2) :TTAL- Peak of T > ST measurement

Bit 2 (4) :STDOWN- ST Segment Depressed

Bit 3 (8) :STELEV- ST Segment Elevated

Bit 4 (16) :JELEV- J point Elevated by 100uV

Bit 5 (32) :DLTWV- Delta-Wave Detected

Bit 6 (64) :STINJ- ST Segment Elevated

Bit 7 (128):PPDEEP- P Prime Area was 1000uV*ms



Sample XML Documents

To successfully transfer your test data to the MUSE system, you must submit your data in the form of XML documents. These documents must be valid to the DTD files. Following are samples of XML files.

Sample Well-formed Document

```
<?xml version="1.0"? encoding="windows-1252"?><!DOCTYPE RestingECG SYSTEM "restecg.DTD">

<RestingECG>

  <PatientDemographics>

    <PatientID>041399090751</PatientID> <Race>Unknown</Race><Gender>Unknown</
    Gender><PatientLastName></PatientLastName> <PatientFirstName></PatientFirstName> <AnalysisAge>47</
    AnalysisAge> <AnalysisAgeUnits>Years</AnalysisAgeUnits>

  </PatientDemographics>

  <TestDemographics>

    <DataType>RESTING</DataType> <Site>1</Site><AcquisitionDevice>ABC123</AcquisitionDevice>
    <Status>UNCONFIRMED</Status> <Priority>STAT</Priority> <Location>0</Location> <AcquisitionTime>09:08:38</
    AcquisitionTime> <AcquisitionDate>04/13/1999</AcquisitionDate> <CartNumber>000</CartNumber>
    <AcquisitionSoftwareVersion>Version 2.31</AcquisitionSoftwareVersion>

  </TestDemographics>

  <AddPatientDemographics>

    <PatientSSN>990-90-9090</PatientSSN> <PatientAddress1>300 N. Main Street</
    PatientAddress1><PatientAddress2>Apt. 2C</PatientAddress2><PatientCity>Newtown</PatientCity>
    <PatientState>OH</PatientState> <PatientCountry>USA</PatientCountry>

  </AddPatientDemographics>

  <OrderInformation>

    <HISTestType>12-Lead Electrocardiograph
    </HISTestType><HISAccountNumber>10100
    </HISAccountNumber> <AdmitDiagnosis>
    Chest Pain</AdmitDiagnosis> <HISOrderingMDLastName>
    Gannon<HISOrderingMDLastName>
    <HISOrderingMDFirstName>Joe
    <HISOrderingMDFirstName> <ServicingFacility>
    St.Mary's Hospital</ServicingFacility>
```

```

</OrderInformation>

<Diagnosis>

  <Modality>RESTING</Modality>

  <DiagnosisStatement>

    <StmtFlag>EndsLine</StmtFlag>

    <StmtText>*** ACUTE MI SUSPECTED ***</StmtText>

  </DiagnosisStatement>

  <DiagnosisStatement>

    <StmtFlag>EndsLine</StmtFlag>

    <StmtText>Abnormal ECG **Unconfirmed**</StmtText>

  </DiagnosisStatement>

  <DiagnosisStatement>

    <StmtFlag>EndsLine</StmtFlag>

    <StmtText>Normal sinus rhythm</StmtText>

  </DiagnosisStatement>

  <DiagnosisStatement>

    <StmtFlag>EndsLine</StmtFlag>

    <StmtText>ST elevation consider inferior injury or acute infarct</StmtText>

  </DiagnosisStatement>

</Diagnosis>

<Waveform>

  <WaveformType>Rhythm</WaveformType><WaveformStartTime>0</WaveformStartTime>
  <NumberOfLeads>8</NumberOfLeads> <SampleType>CONTINUOUS_SAMPLES</SampleType>
  <SampleBase>500</SampleBase><SampleExponent>0</SampleExponent>

  <LeadData>

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</LeadData>

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NgA2ADQANQA4ADkAQQA7AD0APgBAAEIArgBKAE0ATwBRAfQAVQBxAFsAXgBgAGM AZgBsAG8A
cAB0AHUAeqB8AA==

```

```

</WaveFormData>

</LeadData>

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  <LeadOff>FALSE</LeadOff>
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  <LeadDataCRC32>2158029626</LeadDataCRC32>

<WaveFormData>

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  YABgAFgATABIAEgASABIABQAEAAQABQAGAAUABAADAAIAAwEEAAQAawAEAAcACAAGAAY
  ABgAGAAAYABgAFAAQAAgCAAEAAAAAAAAAAD//wAAAQABAP//AQAEAAQABAABA P7//P/9////v/9//3//f/8//z/
  +v/4//f/ 9f/0//P/9P/z/w==

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</LeadData>

<LeadData>

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ADsAOwA9AD8APQA9ADoANwA1ADQAMwA2 ADcAOAA2ADMAMgAxADEAMwA0ADQA5f/l/+P/5P/l/+L/4v/h/
+H/5P/k/+X/5P/k/+P/4v/h/ +H /4v/i/9//3P/a/9r/2f/Y/9j/1v/V/9P/0f/R/9L/0P/O/8z/y//M/8v/yv/J/8b/w//C/8L/v/
+7 /7r/uv+6/7j/uP+1/7T/sf+u/63/rf+s/w==

</WaveFormData>

</LeadData>

<LeadData>

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  <LeadAmplitudeperUnit>4.88</LeadAmplitudeperUnit>

  <LeadAmplitudeUnits>microvolts</LeadAmplitudeUnits>

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  <LeadDataCRC32>2092541187</LeadDataCRC32>

</WaveFormData>

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wAXABkAGgAaABgAFgAUABMA3f/b/9v/3f/f/9//3f/d/97/4P/h/+H/3//e/+H/4v/i/+P/4f/f/97/ 3f/b/9r/2P/Y/9j/ 2P/
Z/9j/1//W/9f/1v/U/9L/0//V/9X/1f/T/9L/0P/P/9H/0f/P/8//zv/O/8//zv/L/8r/yf/l/8n/y//L/w==

</WaveFormData>

</LeadData>

<LeadData>

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```

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<WaveFormData>
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  oACQAIAAaABcAEwASABAADgAKAAUAwAAAP7//v/8//r/+P/2//X/8//w/+3/6//r/+v/6 f/o/+j/ 6f/p/+n/6f/p/+f/3//
  b/9n/2//e/+D/4v/k/+L/4f/i/+X/5f/k/+b/6P/p/+n/6P/p/+n/6P/o/+f/5 //p/+r/6//s/+3/7v/u/+7/7//u/+3/8P/y//X/9//5//
  r/+f/4//n/+//9/wAABAAFAAUAAgACAAQ ABwAMAA8AEQATAA==
</WaveFormData>

</LeadData>

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  <LeadTimeOffset>0</LeadTimeOffset>
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  <LeadAmplitudeUnits>microvolts</LeadAmplitudeUnits>
  <LeadHighLimit>32767</LeadHighLimit>
  <LeadLowLimit>-32768</LeadLowLimit>
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  <LeadSampleSize>2</LeadSampleSize>
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<WaveFormData>
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  +T/5P/k/+X/5//n/+f/5v/k/+b/5//o/+n/6f/q/+n/6P/n/+f/5v/l/+X/ 5f/n/+j/5//o/+n/6//r/+n/6P/o/+n/6//t/+//8P/v//H/8f/
  w//D/8v/0//T/9P/0//X/9v/3//j/9//4/w==
</WaveFormData>

```

```

</LeadData>

<LeadData>

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  <LeadTimeOffset>0</LeadTimeOffset>
  <LeadSampleCountTotal>5000</LeadSampleCountTotal>
  <LeadAmplitudeperUnit>4.88</LeadAmplitudeperUnit>
  <LeadAmplitudeUnits>microvolts</LeadAmplitudeUnits>
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  <LeadOffsetFirstSample>0</LeadOffsetFirstSample>
  <FirstSampleBaseline>0</FirstSampleBaseline>
  <LeadSampleSize>2</LeadSampleSize>
  <LeadOff>FALSE</LeadOff>
  <BaselineSway>FALSE</BaselineSway>
  <LeadDataCRC32>4053461019</LeadDataCRC32>

<WaveFormData>

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  A8AEAAOAAACgAJAAG7f/r/+r/6f/o/+f/5f/k/+b/6P/p/+n/5//j/+L/4//k/+X/5f/l/+X/4//g/97/ 3P/c/9v/ 2v/d/9//3//
  e/93/3f/c/9r/2f/a/9j/2P/Z/9z/3P/b/9r/2f/y/9j/2f/x/9b/1f/U/9b/1//X/9X/0v/Q/w==

</WaveFormData> </LeadData></Waveform>

</RestingECG>

```

Sample Patient Demographics Section

```

<?xml version="1.0"? encoding="windows-1252"?><!DOCTYPE RestingECG SYSTEM
"restecg.DTD"><RestingECG>

  <PatientDemographics>

    <PatientID>041399090751</PatientID> <Gender>Male</Gender> <Race>Unknown</Race>

    <PatientLastName></PatientLastName><PatientFirstName></PatientFirstName>
    <AnalysisAge>47</AnalysisAge> <AnalysisAgeUnits>Years</AnalysisAgeUnits>

  </PatientDemographics>

</RestingECG>

```

Sample Test Demographics Section

```

<?xml version="1.0"? encoding="windows-1252"?> <!DOCTYPE RestingECG SYSTEM "restecg.DTD">
<RestingECG>

```

```

<TestDemographics>
  <DataType>RESTING</DataType> <Site>1</Site> <AcquisitionDevice>ABC123</
  AcquisitionDevice> <Status>UNCONFIRMED</Status>

  <Priority>STAT</Priority><Location>0</Location> <AcquisitionTime>09:08:38</AcquisitionTime>

  <AcquisitionDate>04/13/1999</AcquisitionDate> <CartNumber>000</CartNumber>
  <AcquisitionSoftwareVersion>Version 2.31</AcquisitionSoftwareVersion>

</TestDemographics>
</RestingECG>

```

Sample Order Information Section

```

<?xml version="1.0"? encoding="windows-1252"?> <!DOCTYPE RestingECG SYSTEM "restecg.DTD">
<RestingECG>

  <OrderInformation>

    <HISTestType>12-Lead Electrocardiograph</HISTestType> <HISAccountNumber>10100</
    HISAccountNumber> <AdmitDiagnosis>Chest Pain</AdmitDiagnosis>

    <HISOrderingMDLastName>Gannon</HISOrderingMDLastName>
    <HISOrderingMDFirstName>Joe</HISOrderingMDFirstName> <ServicingFacility>St.Mary's
    Hospital</ServicingFacility>

  </OrderInformation>

</RestingECG>

```

Sample Diagnosis Section with Diagnosis Statement

```

<?xml version="1.0"? encoding="windows-1252"?> <!DOCTYPE RestingECG SYSTEM "restecg.DTD">
<RestingECG>

  <Diagnosis>

    <Modality>RESTING</Modality> <DiagnosisStatement>

      <StmntFlag>EndsLine</StmntFlag>

      <StmntText>*** ACUTE MI SUSPECTED ***</StmntText>

    </DiagnosisStatement> <DiagnosisStatement>

      <StmntFlag>EndsLine</StmntFlag>

      <StmntFlag>UserInsert</StmntFlag>

      <StmntText>Abnormal ECG **Unconfirmed**</StmntText>

    </DiagnosisStatement><DiagnosisStatement>

```



```

    <StmtFlag>EndsLine</StmtFlag>
    <StmtText>Normal sinus rhythm</StmtText>
  </DiagnosisStatement>
</Diagnosis>
</RestingECG>

```

Sample Waveform Section

```

<Waveform>
  <WaveformType>Rhythm</WaveformType>
  <WaveformStartTime>0</WaveformStartTime>
  <NumberOfLeads>8</NumberOfLeads>
  <SampleType>CONTINUOUS_SAMPLES</SampleType>
  <SampleBase>500</SampleBase>
  <SampleExponent>0</SampleExponent> <LeadData>
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    <LeadTimeOffset>0</LeadTimeOffset>
    <LeadSampleCountTotal>5000</LeadSampleCountTotal>
    <LeadAmplitudeperUnit>204918.0</LeadAmplitudeperUnit>
    <LeadAmplitudeUnits>volts</LeadAmplitudeUnits>
    <LeadHighLimit>4294967295</LeadHighLimit>
    <LeadLowLimit>4294967295</LeadLowLimit>
    <LeadID>I</LeadID>
    <LeadOffsetFirstSample>0</LeadOffsetFirstSample>
    <FirstSampleBaseline>0</FirstSampleBaseline>
    <LeadSampleSize>2</LeadSampleSize>
    <LeadOff>FALSE</LeadOff>
    <BaselineSway>FALSE</BaselineSway>
    <LeadDataCRC32>3790641214</LeadDataCRC32>
  </WaveFormData>
</WaveFormData>
</LeadData>

```

```

<LeadData>
  <LeadByteCountTotal>10000</LeadByteCountTotal>
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  <LeadSampleCountTotal>5000</LeadSampleCountTotal>
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  <BaselineSway>FALSE</BaselineSway>
</WaveFormData>
</WaveFormData>
</LeadData>
</Waveform>

```



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