JASTRO Integrating the Healthcare Enterprise



IHE-Japan Radiation Oncology Technical Framework Supplement – Enterprise Schedule Integration Profile

2009

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http://forums.rsna.org under the "IHE" forum

Select the "Radiation Oncology Technical Framework" sub-forum.

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1 Foreword

In this supplement, sections 1 through 2.4 are boilerplate taken from the Technical Framework, and are intended to provide sufficient background to the reader. Sections 2.5 and greater are intended to be added to the Japanse National/Regional Specialization of the Technical Framework with numbering appropriate to the Technical Framework at the time they are added.

Integrating the Healthcare Enterprise (IHE) is an initiative designed to stimulate the integration of the information systems that support modern healthcare institutions. Its fundamental objective is to ensure that in the care of patients all required information for medical decisions is both correct and available to healthcare professionals. The IHE initiative is both a process and a forum for encouraging integration efforts. It defines a technical framework for the implementation of established messaging standards to achieve specific clinical goals. It includes a rigorous testing process for the implementation of this framework. And it organizes educational sessions and exhibits at major meetings of medical professionals to demonstrate the benefits of this framework and encourage its adoption by industry and users.

The approach employed in the IHE initiative is not to define new integration standards, but rather to support the use of existing standards, HL7, DICOM, IETF, and others, as appropriate in their respective domains in an integrated manner, defining configuration choices when necessary. When clarifications or extensions to existing standards are necessary, IHE refers recommendations to the relevant standards bodies.

This initiative has numerous sponsors and supporting organizations in different medical specialty domains and geographical regions. In North America the primary sponsors are the American College of Cardiology (ACC), the Healthcare Information and Management Systems Society (HIMSS) and the Radiological Society of North America (RSNA). IHE Canada has also been formed. IHE Europe (IHE-EUR) is supported by a large coalition of organizations including the European Association of Radiology (EAR) and European Congress of Radiologists (ECR), the Coordination Committee of the Radiological and Electromedical Industries (COCIR), Deutsche Röntgengesellschaft (DRG), the EuroPACS Association, Groupement pour la Modernisation du Système d'Information Hospitalier (GMSIH), Société Française de Radiologie (SFR), and Società Italiana di Radiologia Medica (SIRM). In Japan IHE-J is sponsored by the Ministry of Economy, Trade, and Industry (METI); the Ministry of Health, Labor, and Welfare; and MEDIS-DC; cooperating organizations include the Japan Industries Association of Radiological Systems (JIRA), the Japan Association of Healthcare Information Systems Industry (JAHIS), Japan Radiological Society (JRS), Japan Society of Radiological Technology (JSRT), and the Japan Association of Medical Informatics (JAMI). Other organizations representing healthcare professionals are actively involved and others are invited to join in the expansion of the IHE process across disciplinary and geographic boundaries.

The IHE Technical Frameworks for the various domains (Patient Care Coordination, IT Infrastructure, Cardiology, Laboratory, Radiation Oncology, Radiology, etc.) define specific implementations of established standards to achieve integration goals that promote appropriate

sharing of medical information to support optimal patient care. These are expanded annually, after a period of public review, and maintained regularly through the identification and correction of errata. The current version for these Technical Frameworks may be found at www.ihe.net.

The IHE Technical Framework identifies a subset of the functional components of the healthcare enterprise, called IHE Actors, and specifies their interactions in terms of a set of coordinated, standards-based transactions. It describes this body of transactions in progressively greater depth. The volume I provides a high-level view of IHE functionality, showing the transactions organized into functional units called Integration Profiles that highlight their capacity to address specific clinical needs. The subsequent volumes provide detailed technical descriptions of each IHE transaction.

1.1 Content of the IHE-RO Technical Framework

This profile defines the relevant standards and constraints on those standards in order to implement a specific use case for the transfer of information between systems. This document is organized into 2 volumes as follows:

1.1.1 Volume 1 – Integration Profiles

This volume is provided as a high level overview of the profiles including descriptions of the use cases, the actors involved, the process flow, and dependencies on other standards and IHE profiles. It is of interest to care providers, vendors' management and technical architects and to all users of the profile

1.1.2 Volume 2 - Transactions

This volume is intended as a technical reference for the implementation of specific transactions in the use case including references to the relevant standards, constraints, and interaction diagrams. It is intended for the technical implementers of the profile.

2 Preface to Volume 1

2.1 Intended Audience

The intended audience of this document is:

Healthcare professionals involved in informatics

IT departments of healthcare institutions

Technical staff of vendors participating in the IHE initiative

Experts involved in standards development

Those interested in integrating healthcare information systems and workflows

2.2 How this Volume is Organized

Section 2 describes the general nature, purpose and function of the Technical Framework.

Section 3 and the subsequent sections of this volume provide detailed documentation on each integration profile, including the clinical problem it is intended to address and the IHE actors and transactions it comprises.

The appendices following the main body of the document provide a summary list of the actors and transactions, detailed discussion of specific issues related to the integration profiles and a glossary of terms and acronyms used.

2.3 Conventions Used in this Document

This document has adopted the following conventions for representing the framework concepts and specifying how the standards upon which the IHE Technical Framework is based should be applied.

2.3.1 Technical Framework Cross-references

When references are made to another section within a Technical Framework volume, a section number is used by itself. When references are made to other volumes or to a Technical Framework in another domain, the following format is used:

<domain designator> TF-<volume number>: <section number>

where:

<domain designator> is a short designator for the IHE domain (PCC= Patient Care Coordination, ITI = IT Infrastructure, RAD = Radiology, RO = Radiation Oncology)

 $<\!$ volume number $\!>\!$ is the applicable volume within the given Domain Technical Framework (e.g., 1, 2, 3), and

<section number> is the applicable section number.

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For example: RO TF-1: 3.1 refers to Section 3.1 in volume 1 of the IHE Radiation Oncology Technical Framework, ITI TF-2: 4.33 refers to Section 4.33 in volume 2 of the IHE IT Infrastructure Technical Framework.

2.3.2 IHE Actor and Transaction Diagrams and Tables

Each integration profile is a representation of a real-world capability that is supported by a set of actors that interact through transactions. Actors are information systems or components of information systems that produce, manage, or act on categories of information required by operational activities in the enterprise. Transactions are interactions between actors that communicate the required information through standards-based messages.

The diagrams and tables of actors and transactions in subsequent sections indicate which transactions each actor in a given profile must support.

The transactions shown on the diagrams are identified both by their name and the transaction number as defined in RO TF-2 (Volume 2 of the RO Technical framework). The transaction numbers are shown on the diagrams as bracketed numbers prefixed with the specific Technical Framework domain.

In some cases, a profile is dependent on a prerequisite profile in order to function properly and be useful. These dependencies, if any would be found by locating the desired profile in Table 2.6-1 to determine which profile(s) are listed as prerequisites. An actor must implement all required transactions in the prerequisite profiles in addition to those in the desired profile.

2.3.3 Process Flow Diagrams

The descriptions of integration profiles that follow include process flow diagrams that illustrate how the profile functions as a sequence of transactions between relevant actors.

These diagrams are intended to provide an overview so the transactions can be seen in the context of an institution's or cross-institutions' workflow. Certain transactions and activities not defined in detail by IHE are shown in these diagrams in *italics* to provide additional context on where the relevant IHE transactions fit into the broader scheme of healthcare information systems.

These diagrams are not intended to present the only possible scenario. Often other actor groupings are possible, and transactions from other profiles may be interspersed.

In some cases the sequence of transactions may be flexible. Where this is the case there will generally be a note pointing out the possibility of variations. Transactions are shown as arrows oriented according to the flow of the primary information handled by the transaction and not necessarily the initiator.

2.4 Copyright Permissions

Health Level Seven, Inc., has granted permission to the IHE to reproduce tables from the HL7 standard. The HL7 tables in this document are copyrighted by Health Level Seven, Inc. All rights reserved. Material drawn from these documents is credited where used.

2.5 Comments

IHE Sponsors welcome comments on this document and the IHE initiative. They should be directed to the discussion server at http://forums.rsna.org or to:

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3 Introduction

This document, the IHE-Japan Radiation Oncology Technical Framework Supplement for Enterprise Schedule Integration, defines specific implementations of established standards. These are intended to achieve integration goals that promote appropriate exchange of medical information to coordinate the optimal patient care among care providers in different care settings.

The Technical Framework is expanded annually, after a period of public review, and maintained regularly through the identification and correction of errata. The latest version of the document is always available via the Internet at http://www.ihe.net/Technical_Framework, where the technical framework volumes specific to the various healthcare domains addressed by IHE may be found.

The IHE Radiation Oncology Technical Framework identifies a subset of the functional components of the healthcare enterprises and health information networks, called IHE actors, and specifies their interactions in terms of a set of coordinated, standards-based transactions.

The other domains within the IHE initiative also produce Technical Frameworks within their respective areas that together form the IHE Technical Framework. Currently, the following IHE Technical Framework(s) are available:

IHE IT Infrastructure Technical Framework

IHE Cardiology Technical Framework

IHE Eye Care

IHE Laboratory Technical framework

IHE Radiology Technical Framework

IHE Patient Care Coordination Technical Framework

Where applicable, references are made to other technical frameworks. For the conventions on referencing other frameworks, see the preface of this volume.

3.1 Relationship to Standards

The IHE Technical Framework identifies functional components of a distributed healthcare environment (referred to as IHE actors), solely from the point of view of their interactions in the healthcare enterprise. At its current level of development, it defines a coordinated set of transactions based on standards (such as HL7, IETF, ASTM, DICOM, ISO, OASIS, etc.) in order to accomplish a particular use case. As the scope of the IHE initiative expands, transactions based on other standards may be included as required.

In some cases, IHE recommends selection of specific options supported by these standards. However, IHE does not introduce technical choices that contradict conformance to these standards. If errors in or extensions to existing standards are identified, IHE's policy is to report them to the appropriate standards bodies for resolution within their conformance and standards evolution strategy.

IHE is therefore an implementation framework, not a standard. Conformance claims for products must still be made in direct reference to specific standards. In addition, vendors who have implemented IHE integration capabilities in their products may publish IHE Integration Statements to communicate their products' capabilities. Vendors publishing IHE Integration Statements accept full responsibility for their content. By comparing the IHE Integration

Statements from different products, a user familiar with the IHE concepts of actors and integration profiles can determine the level of integration between them. See http://www.ihe.net/Resources/upload/ihe integration statements.pdf for the format of IHE Integration Statements.

3.2 Relationship to Product Implementations

The IHE actors and transactions described in the IHE Technical Framework are abstractions of the real-world healthcare information system environment. While some of the transactions are traditionally performed by specific product categories (e.g. HIS, Clinical Data Repository, Electronic Health record systems, Radiology Information Systems, Clinical Information Systems or Cardiology Information Systems), the IHE Technical Framework intentionally avoids associating functions or actors with such product categories. For each actor, the IHE Technical Framework defines only those functions associated with integrating information systems. The IHE definition of an actor should therefore not be taken as the complete definition of any product that might implement it, nor should the framework itself be taken to comprehensively describe the architecture of a healthcare information system.

The reason for defining actors and transactions is to provide a basis for defining the interactions among functional components of the healthcare information system environment. In situations where a single physical product implements multiple functions, only the interfaces between the product and external functions in the environment are considered to be significant by the IHE initiative. Therefore, the IHE initiative takes no position as to the relative merits of an integrated environment based on a single, all-encompassing information system versus one based on multiple systems that together achieve the same end.

3.3 Framework Development and Maintenance

The IHE Radiation Oncology Technical Framework is continuously maintained and expanded on an annual basis by the IHE Radiation Oncology Technical Committee. The development and maintenance process of the Framework follows a number of principles to ensure stability of the specification so that both vendors and users may use it reliably in specifying, developing and acquiring systems with IHE integration capabilities.

The first of these principles is that any extensions or clarifications to the Technical Framework must maintain backward compatibility with previous versions of the framework (except in rare cases for corrections) in order to maintain interoperability with systems that have implemented IHE Actors and Integration Profiles defined there.

The IHE Radiation Oncology Technical Framework is developed and re-published annually following a three-step process:

The Radiation Oncology Technical Committee develops supplements to the current stable version of the Technical Framework to support new functionality identified by the IHE Strategic and RO Planning Committees and issues them for public comment.



The Committee addresses all comments received during the public comment period and publishes an updated version of the Technical Framework for "Trial Implementation." This version contains both the stable body of the Technical Framework from the preceding cycle and the newly developed supplements. It is this version of the Technical Framework that is used by vendors in developing trial implementation software for the IHE Connectathons.

The Committee regularly considers change proposals to the Trial Implementation version of the Technical Framework, including those from implementers who participate in the Connectathon. After resolution of all change proposals received within 60 days of the Connectathon, the Technical Framework version is published as "Final Text".

The Committee as part of the Technical framework maintenance will consider change proposals received after the publication to the "Final Text".

3.4 Integration Profiles Overview

In this document, each IHE Integration Profile is defined by:

The IHE actors involved

The specific set of IHE transactions exchanged by each IHE actor.

These requirements are presented in the form of a table of transactions required for each actor supporting the Integration Profile. Actors supporting multiple Integration Profiles are required to support all the required transactions of each Integration Profile supported. When an Integration Profile depends upon another Integration Profile, the transactions required for the dependent Integration Profile have not been included in the table.

Note that IHE Integration Profiles are not statements of conformance to standards, and IHE is not a certifying body. Users should continue to request that vendors provide statements of their conformance to standards issued by relevant standards bodies, such as HL7 and DICOM. Standards conformance is a prerequisite for vendors adopting IHE Integration Profiles.

Also note that there are critical requirements for any successful integration project that IHE cannot address. Successfully integrating systems still requires a project plan that minimizes disruptions and describes fail-safe strategies, specific and mutually understood performance expectations, well-defined user interface requirements, clearly identified systems limitations, detailed cost objectives, plans for maintenance and support, etc.

3.5 Radiation Oncology Integration Profiles

3.5.1 Overview

IHE Integration Profiles offer a common language that healthcare professionals and vendors can use to discuss integration needs of healthcare enterprises and the integration capabilities of information systems in precise terms. Integration Profiles specify implementations of standards that are designed to meet identified clinical needs. They enable users and vendors to state which IHE capabilities they require or provide, by reference to the detailed specifications of the IHE Radiation Oncology Technical Framework.

Integration profiles are defined in terms of IHE Actors, transactions and their content. Actors (listed in RO TF-1: Appendix A) are information systems or components of information systems that produce, manage, or act on information associated with clinical and operational activities. Transactions (listed in RO TF-1: Appendix B) are interactions between actors that communicate the required information through standards-based messages.

Vendor products support an Integration Profile by implementing the appropriate actor(s) and transactions. A given product may implement more than one actor and more than one integration profile as in example below.

Insert Diagram Here describing Enterprise Schedule Integration (Actors and Transactions)

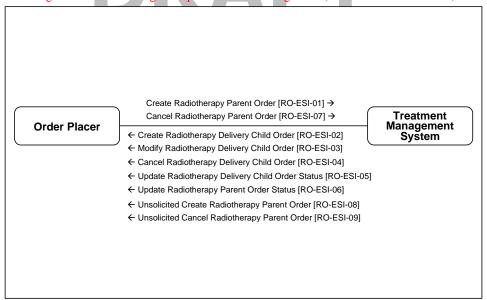


Figure 3.5-1 IHE Radiation Oncology Enterprise Schedule Integration Profiles

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To support a dependent profile, an actor must implement all required transactions in the prerequisite profiles in addition to those in the dependent profile. In some cases, the prerequisite is that the actor selects any one of a given set of profiles.

The following profiles are documented in this supplement (to be added to the Technical Framework):

• Enterprise Schedule Integration Profile: This integration profile involves the exchange of Schedule, Order, and Results information between hospital information systems and (Radiation Oncology) treatment management systems. The emphasis for this profile is on improving schedule and procedure coordination between the Radiation Oncology department and the rest of the clinical enterprise.

3.5.2 Scope of Future Work

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3.6 Product Implementations

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Developers have a number of options in implementing IHE actors and transactions in product implementations. The decisions cover three classes of optionality:

For a system, select which actors it will incorporate (multiple actors per system are acceptable). For each actor, select the integration profiles in which it will participate.

For each actor and profile, select which options will be implemented.

All required transactions must be implemented for the profile to be supported.

Implementers should provide a statement describing which IHE actors, IHE integration profiles and options are incorporated in a given product. The recommended form for such a statement is defined at http://www.ihe.net/Resources/upload/ihe_integration_statements.pdf.

In general, a product implementation may incorporate any single actor or combination of actors. When two or more actors are grouped together, internal communication between actors is assumed to be sufficient to allow the necessary information flow to support their functionality. The exact mechanisms of such internal communication are outside the scope of the IHE Technical Framework.

When multiple actors are grouped in a single product implementation, all transactions originating or terminating with each of the supported actors shall be supported (i.e., the IHE transactions shall be offered on an external product interface).

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4 Enterprise Schedule Integration Profile

4.1 Scope and Purpose

Currently in Japan, Healthcare enterprises attempt to coordinate scheduling between Hospital Information Systems and Oncology Information Systems by use of intermediaries which communicate to the Hospital Information System using either proprietary interface specifications or de-facto standard interfaces, utilizing the Japanese language, and to Oncology Information Systems utilizing the English language and using proprietary interface specifications and customized implementations. Integration between systems is painstaking, and the lack of Japanese on many of the Radiation Oncology systems makes use of these systems more difficult and less efficient.

This integration profile involves the exchange of Schedule information between hospital information systems and (Radiation Oncology) treatment management systems. The emphasis for this profile is on improving schedule and procedure coordination between the Radiation Oncology department and the rest of the clinical enterprise. The transactions involve both workflow and content.

It is expected that the actual products commonly referred to as Hospital Information Systems and Oncology Information Systems will each implement one of the actors (Order Placer and Treatment Management System respectively). The Treatment Management System actor is explicitly intended to be the same as the Treatment Management System actor in the "Integrated Positioning and Delivery" profile. There are already IHE-J regional specializations of profiles for the Radiology domain, these specializations of profiles and systems implementing them have been tested in Japanese region supported Connectathons, and this profile is intended to build on those efforts.

4.2 Enterprise Schedule Integration Process Flow

4.2.1 Issue Order from Order Placer

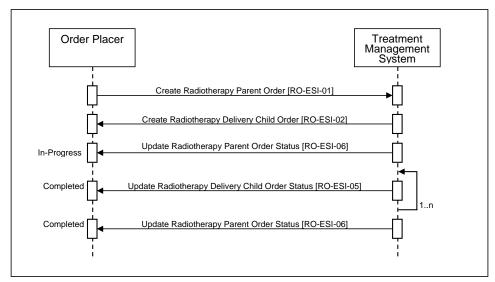


Figure 4.2.1-1 Normal Process Flow – Issue Order from OP

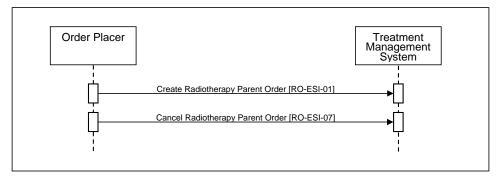


Figure 4.2.1-2 Cancel Process Flow(Non-Delivery Child Order)

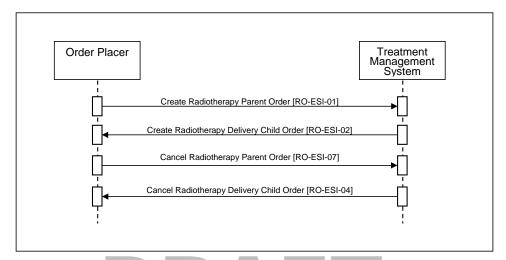


Figure 4.2.1-3 Cancel Process Flow(Scheduled Delivery Child Order, Non-Delivery)

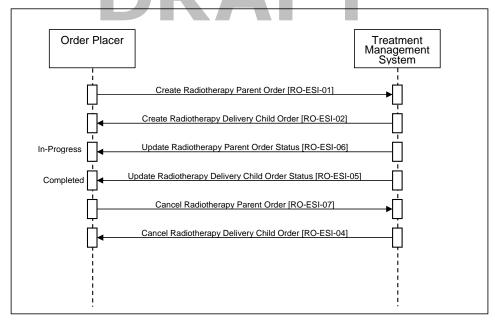


Figure 4.2.1-4 Discontinue Process Flow

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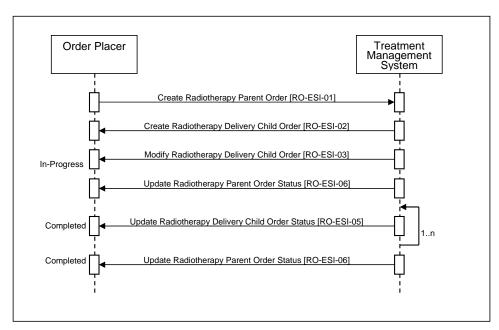


Figure 4.2.1-5 Modify Delivery Child Order Process Flow

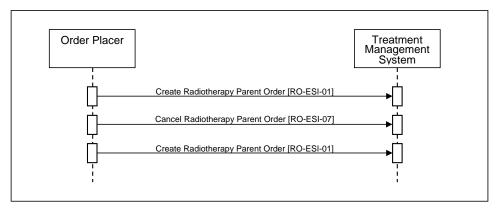


Figure 4.2.1-6 Modify Parent Order Process Flow

4.2.2 Issue Order from Treatment Management System

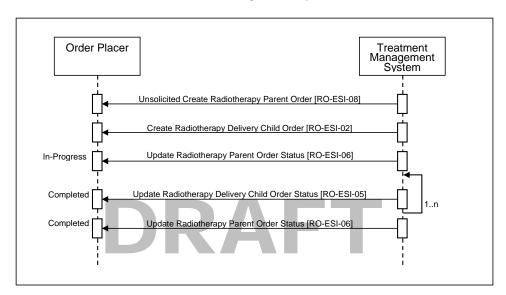


Figure 4.2.2-1 Normal Process Flow – Issue Order from TMS

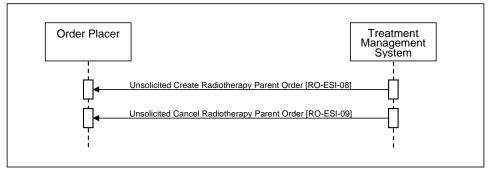


Figure 4.2.2-2 Cancel Process Flow(Non-Delivery Child Order)

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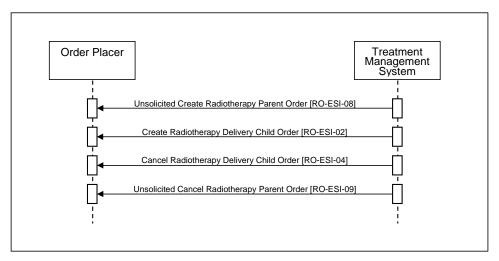


Figure 4.2.2-3 Cancel Process Flow(Scheduled Delivery Child Order, Non-Delivery)

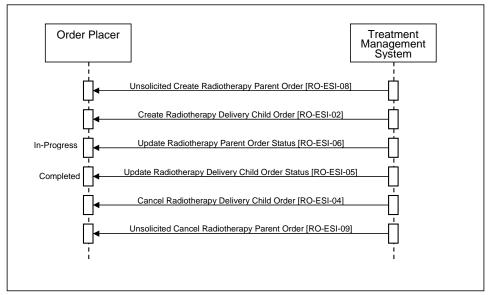


Figure 4.2.2-4 Discontinue Process Flow

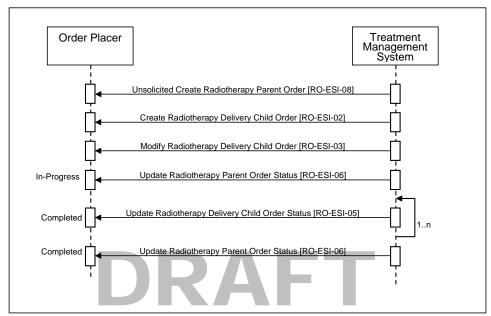


Figure 4.2.2-5 Modify Delivery Child Order Process Flow

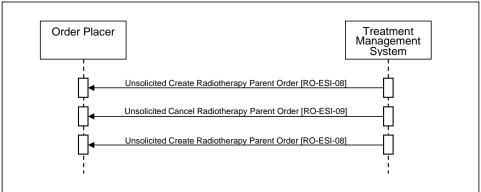


Figure 4.2.2-6 Modify Parent Order Process Flow

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Appendix A Actors

A.1 Actor Descriptions

<No Additions>

A.2 RT Specific Actors

<for reference purposes, no changes implied>

Archive (including RT) – A system that stores the RT SOP Classes in addition to the CT images and is capable of transmitting them.

Treatment Delivery Device (TDD) – A system that delivers therapeutic radiation to a correctly positioned patient. The TDD fulfils the role of a UPS-Pull 'Pull Performer' SCU as described in DICOM Supplement 96 Part 17 Table Z.1-1.

<additions/changes>

Treatment Management System (TMS) – An information system that manages oncology information and is responsible for the scheduling of radiotherapy activities (i.e. is a workflow manager). The TMS is similar to an Order Filler/Department System Scheduler as described in the IHE Radiology Domain.

The TMS fulfils the role of a UPS-Pull 'Worklist Manager' SCP as described in DICOM Supplement 96 Part 17 Table Z.1-1. Note that a specific product implementation could potentially fulfill the role of both a TMS <u>and</u> an Archive, in which case the supplied AE Title in Input and Output Sequences may be an AE Title managed by that implementation.

Order Placer (OP) – A system that operates at the Enterprise level (rather than just within the Radiation Oncology department) and initiates orders for radiation oncology. The order placer also receives schedule information that is necessarily managed within the Radiation Oncology department (e.g. fractionation).

The following table is to be added to the Appendix, and it shows which transactions are required to be supported by the actors in the **Enterprise Schedule Integration profile.**

Table A.2-5 Enterprise Schedule Integration

Actors	Transactions	Optionality	Section in Vol. 2
OP	Create Radiotherapy Parent Order	R	RO-ESI-01
	Create Radiotherapy Delivery Child Order	R	RO-ESI-02
	Modify Radiotherapy Delivery Child Order	R	RO-ESI-03
	Cancel Radiotherapy Delivery Child Order	R	RO-ESI-04
	Update Radiotherapy Delivery Child Order Status	R	RO-ESI-05
	Update Radiotherapy Parent Order Status	R	RO-ESI-06
	Cancel Radiotherapy Parent Order	R	RO-ESI-07
	Unsolicited Create Parent Order	R	RO-ESI-08
	Unsolicited Cancel Parent Order	R	RO-ESI-09
Treatment Management System	Create Radiotherapy Parent Order	R	RO-ESI-01
	Create Radiotherapy Delivery Child Order	R	RO-ESI-02
	Modify Radiotherapy Delivery Child Order	R	RO-ESI-03
	Cancel Radiotherapy Delivery Child Order	R	RO-ESI-04
	Update Radiotherapy Delivery Child Order Status	R	RO-ESI-05
	Update Radiotherapy Parent Order Status	R	RO-ESI-06

Cancel Radiotherapy Parent Order	R	RO-ESI-07
Unsolicited Create Parent Order	R	RO-ESI-08
Unsolicited Cancel Parent Order	R	RO-ESI-09

Appendix B Transactions

B.1 Transaction Descriptions

Transactions are interactions between actors that transfer the required information through standards-based messages. The following are the transactions defined in this supplement and referenced throughout the rest of this document. <The transactions contain the identifer ESI to avoid numbering clashes, however, when inserted in to the Technical Framework, the transactions will be renumbered to align with the Technical Framework at that time. The Transactions will be referred to by name rather than number throughout the document to avoid confusion>

RO-ESI-01: Create Radiotherapy Parent Order

The top level request for a patient to receive radiation therapy. This order is issued typically in response to a request by a referring physician (that request is out of the scope of this profile). In Japan, the Radiation Oncologist is the User who interacts with the OP to generate the Radiotherapy Parent Order.

RO-ESI-02: Create Radiotherapy Delivery Child Order

Radiotherapy delivery is provided in individual fractions, each of which is scheduled for a particular date. The TMS creates a fractionation schedule, and for each fraction issues a Radiotherapy Delivery Child Order.

RO-ESI-03: Modify Radiotherapy Delivery Child Order

When an individual Radiotherapy Delivery Child Order must be changed (e.g. rescheduled for the next day), the order is modified.

RO-ESI-04: Cancel Radiotherapy Delivery Child Order

In various circumstances a fraction must be cancelled. These circumstances may include a decision to terminate radiotherapy for

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the patient, or a decision to make a significant change to the course of therapy.

RO-ESI-05: Update Radiotherapy Delivery Child Order Status

When a fraction is delivered, the status of the child order changes to complete, and the OP must be notified of this by the TMS.

RO-ESI-06: Update Radiotherapy Parent Order Status

When all of the fractions corresponding to a Radiotherapy Parent order have been completed, the status of the Parent Order is updated.

RO-ESI-07: Cancel Radiotherapy Parent Order

When a decision is made to discontinue a Radiotherapy Parent Order, the OP cancels the order and notifies the TMS using this transaction.

RO-ESI-08: Unsolicited Create Radiotherapy Parent Order

Similar to the "Create Radiotherapy Parent Order", but with the roles reversed between actors in terms of creator and consumer of the message.

RO-ESI-09: Unsolicited Cancel Radiotherapy Parent Order

Similar to the "Cancel Radiotherapy Parent Order", but with the roles reversed between actors in terms of creator and consumer of the message.

The following table (**Table B.1-1**) shows which transactions are used in which

Integration Profiles.

<This corresponding table in the IHE-RO TF is to be modified to include all of the transactions in this supplement which are all part of Enterprise Schedule Integration profile, and these transactions are not used in any other profile. The profile defined in

this supplement does not utilize any transactions other than the ones defined in this supplement>

Table B.1-1 IHE-RO Profile Transactions



Appendix C Glossary