IHE-RO MMRO II Test tools

Test scenario descriptions
Image Registration profile

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Scope of this document

This document contains the scenario descriptions of the IHE-RO MMRO II test tools 2013 for this years Image Registration profile tests. Purpose of this document is to clarify what scenario's will (and are being) created. It gives more insight in the test scenarios being developed and provides a means for feedback from the customer and IHE-RO TC members on the test scenarios . Your comments and questions are welcome.

Archive Actor scenarios

Archive Actor - Test Scenario 1

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

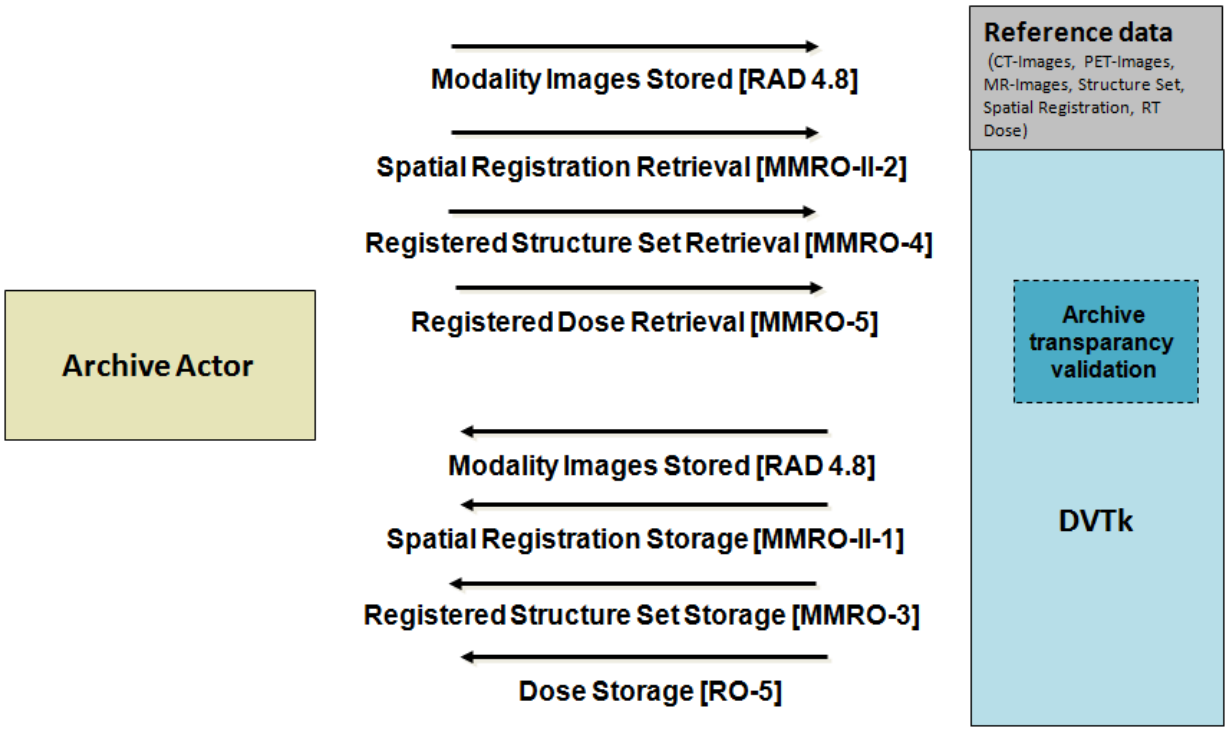
This scenario will test that the output from the Archive is consistent with its input: the retrieved data should not be changed by the archive.

The Archive actor should be able to support the following SOP classes.

- CT Image Storage
- MR Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage
- RT Dose Storage
- RT Structure Set Storage

For this Archive test scenario, DVTk as generic actor will:

- store the reference test data objects to the Archive
- retrieve the reference test data objects from the Archive
- compare the test data objects received with the original reference test data (archive transparancy test)
- check the archives level 2 SCP conformance



Transactions sent to actor

RAD-4.8: Modality Images Stored
RO-5: Dose Storage
MMRO-II-1: Spatial Registrations Stored
MMRO-3: Registered Structure Set Storage

Expected transactions from actor

RAD-4.8: Modality Images Stored
MMRO-II-2: Utilize Spatial Registrations
MMRO-4: Registered Structure Set Retrieval
MMRO-5: Registered Dose Retrieve

Used scenario dataset

The dataset supplied with the installation of the IHE-RO MMRO II testtool.

Note: If present, remove the IHE-RO-MMRO II Patient from the archive before running this scenario.

Archive Actor - Test Scenario 2

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

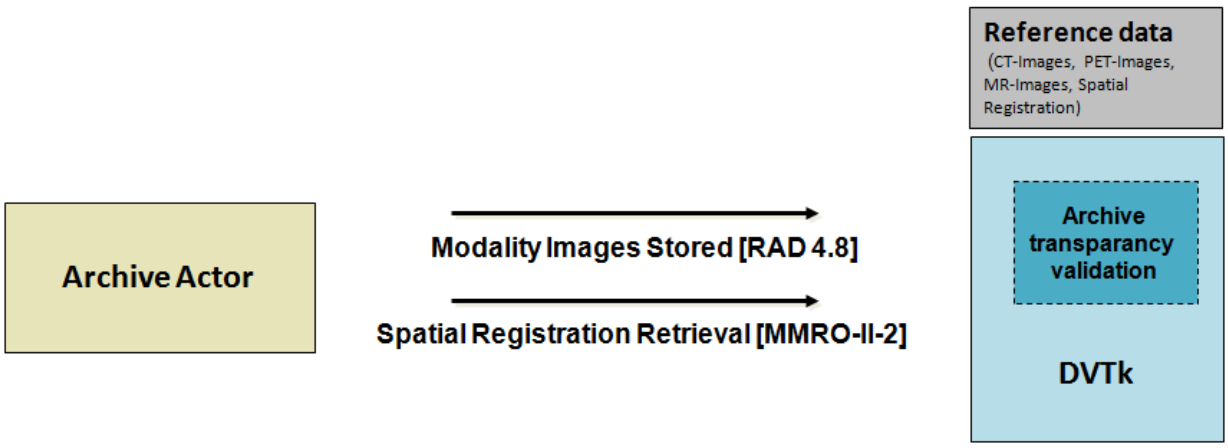
This scenario will test that the Archive output is consistent with the IHE-RO 2013 rules in the context of the Registrator actor.

The Archive actor should be able to support the following SOP classes.

- CT Image Storage
- MR Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage

For this Archive test scenario DVTk as Registrator actor will receive data from the Archive.

- The testtool will determine that the inputs to a Registrator actor, which can consist of multiple image datasets, and optionally prior Spatial Registrations, are properly structured. The tester is able to send one or more image datasets of different image modalities combined with spatial registration objects.
  Note: Per image SOP class only one SOP instance is supported; multiple Spatial Registration SOP instances are allowed.



Transactions sent to actor

Not applicable

Expected transactions from actor

RAD-4.8: Modality Images Stored
MMRO-II-2: Utilize Spatial Registrations

Used scenario dataset

This scenario uses the actual real-world dataset as received by the Archive.

Archive Actor - Test Scenario 3

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

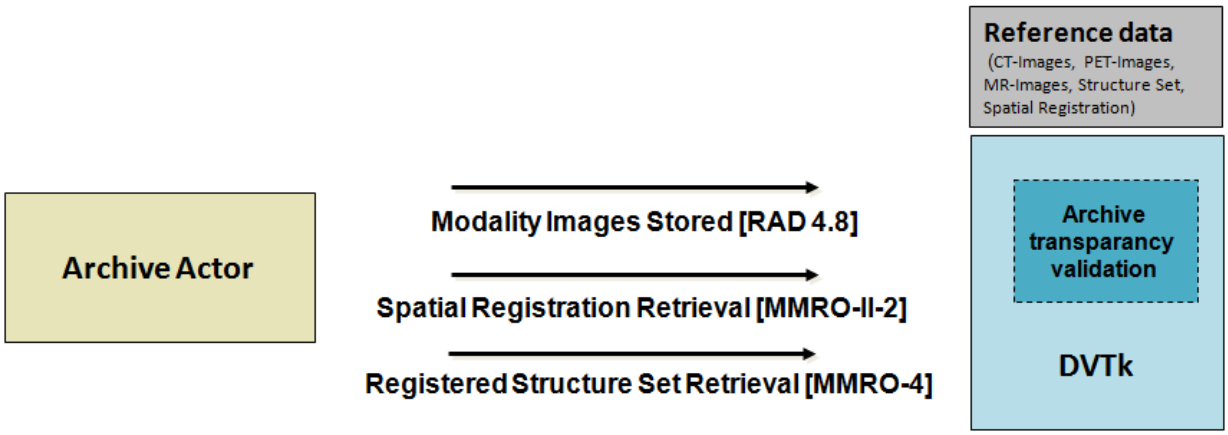
This scenario will test that the Archive output is consistent with the IHE-RO 2013 rules in the context of the Registered Display and Registered Contourer actors.

The Archive actor should be able to support the following SOP classes.

- CT Image Storage;
- MR Image Storage;
- Positron Emission Tomography Image Storage (PET);
- Spatial Registration Storage;
- RT Structure Set Storage.

For this Archive test scenario DVTk as Registered Display or Registered Contourer actor will receive data from the Archive.

- The testtool will determine that the inputs to a Registered Display or Registered Contourer actor, which can consist of multiple image datasets, associated RT Structure Sets, and (prior) Spatial Registrations objects, are properly structured.



Transactions sent to actor

Not applicable

Expected transactions from actor

RAD-4.8: Modality Images Stored
MMRO-II-2: Utilize Spatial Registrations
MMRO-4: Registered Structure Set Retrieval

Used scenario dataset

This scenario uses the actual real-world dataset as received by the Archive.

Archive Actor - Test Scenario 4

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

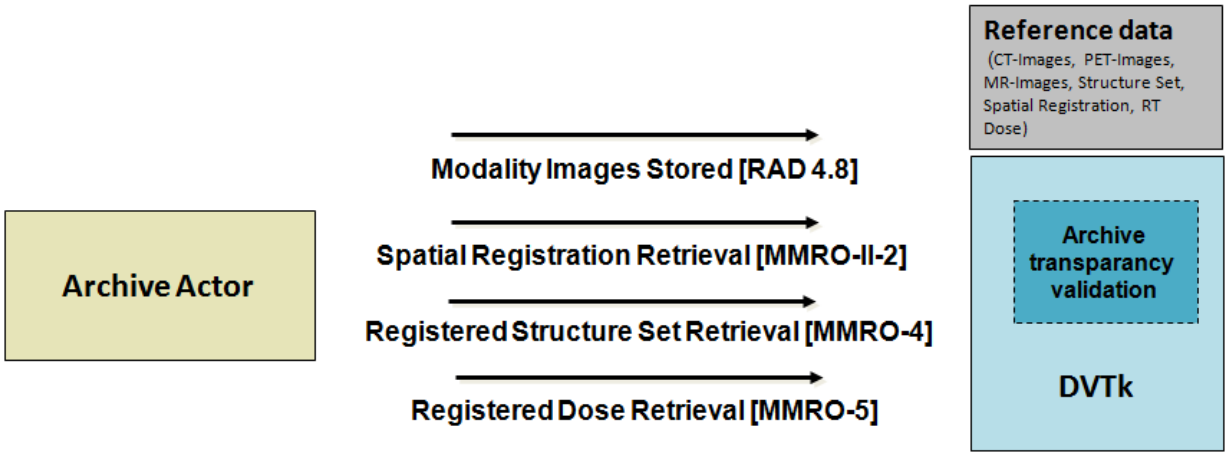
This scenario will test that the Archive output is consistent with the IHE-RO 2013 rules in the context of the Registered Dose Display actor.

The Archive actor should be able to support the following SOP classes.

- CT Image Storage
- MR Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage
- RT Dose Storage
- RT Structure Set Storage

For this Archive test scenario DVTk as Registered Dose Display actor will receive data from the Archive.

- The testtool will determine that the inputs to a Registered Dose Display actor, which can consist of multiple image datasets, associated RT Structure Sets and Doses, and (prior) Spatial Registrations objects, are properly structured.



Transactions sent to actor

Not applicable

Expected transactions from actor

RAD-4.8:	Modality Images Stored
MMRO-II-2:	Utilize Spatial Registrations
MMRO-4:	Registered Structure Set Retrieval
MMRO-5:	Registered Dose Retrieve

Used scenario dataset

This scenario uses the actual real-world dataset as received by the Archive.

Registered Contourer Actor scenarios

Registered Contourer Actor - Test Scenario 1 (non-hybrid system)

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

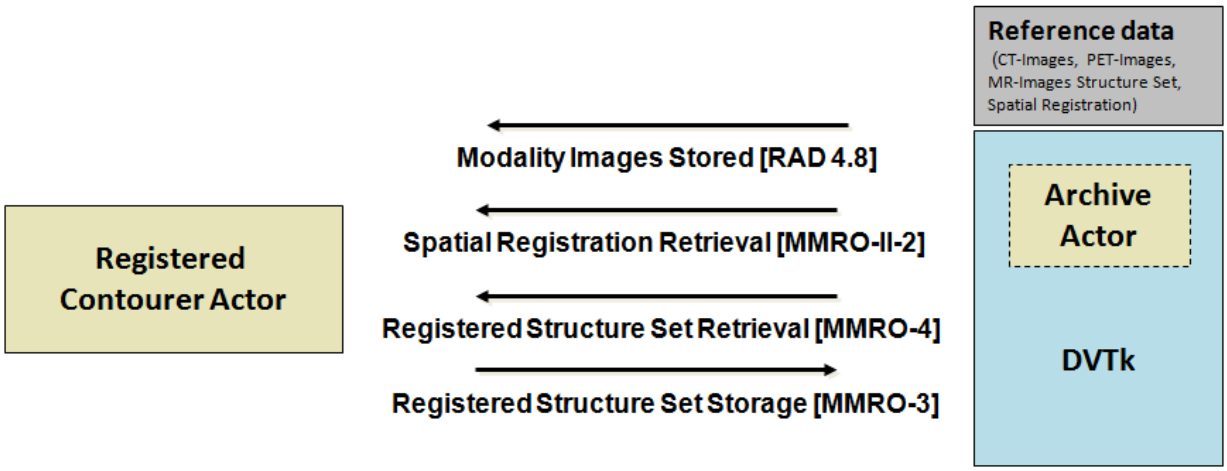
This scenario will test that the Registered Contourer is able to create RT structure sets consistent with the IHE-RO 2013 rules using non-hybrid image data.
The Registered Contourer Actor receives the images (CT, MR and/or PET), Spatial Registration, and related RT Structure Set; each image may have an RT Structure Set created in its Frame of Reference. The Registered Contourer will store the RT Structure Set(s) to the Archive.

The Registered Contourer actor should be able to support the following SOP classes.

- CT Image Storage
- MR Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage
- RT Structure Set Storage

For this Registered Contourer test scenario DVTk as Archive actor will receive data from the Registered Contourer.

- The testtool will verify that the (resampled) RT Structure Set output of a Registered Contourer is properly formatted, references the correct image data sets, and is correctly aligned.



Transactions sent to actor

RAD-4.8: Modality Images Stored
MMRO-II-2: Utilize Spatial Registrations
MMRO-4: Registered Structure Set Retrieval

Expected transactions from actor

MMRO-3: Registered Structure Set Storage

Used scenario dataset

The dataset supplied with the installation of the IHE-RO MMRO II testtool.

Registered Contourer Actor - Test Scenario 2 (hybrid system)

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

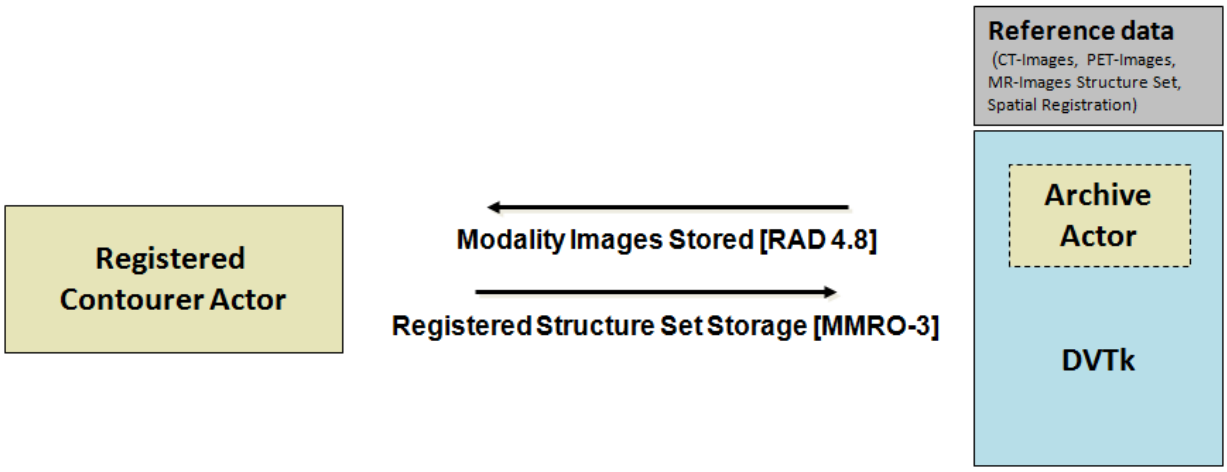
This scenario will test that the Registered Contourer is able to create RT structure sets consistent with the IHE-RO 2013 rules using hybrid image data.
Two series of image data sets, CT series and PET series, are acquired and reconstructed on a single hybrid system.
The image data sets, having the same Frame of Reference, are stored to the Archive. A common Frame of Reference implies that the two datasets are already in the same coordinate system and no transformation is required.
The Registered Contourer actor retrieves the image data sets and creates an RT Structure Set in the same Frame of Reference as the datasets. The resulting RT Structure Set shall explicitly reference the images from only one of the series in the Frame of Reference. The Registered Contourer will store the RT Structure Set(s) to the Archive.

The Registered Contourer actor should be able to support the following SOP classes.

- CT Image Storage
- Positron Emission Tomography Image Storage (PET)
- RT Structure Set Storage

For this Registered Contourer test scenario DVTk as Archive actor will receive data from the Registered Contourer.

- The testtool will verify that the RT Structure Set output of a Registered Contourer is properly formatted, references the correct image data sets, and is correctly aligned.



Transactions sent to actor

RAD-4.8: Modality Images Stored

Expected transactions from actor

MMRO-3: Registered Structure Set Storage

Used scenario dataset

The dataset supplied with the installation of the IHE-RO MMRO II testtool.

Registered Display Actor scenario

Registered Display Actor - Test Scenario 1

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

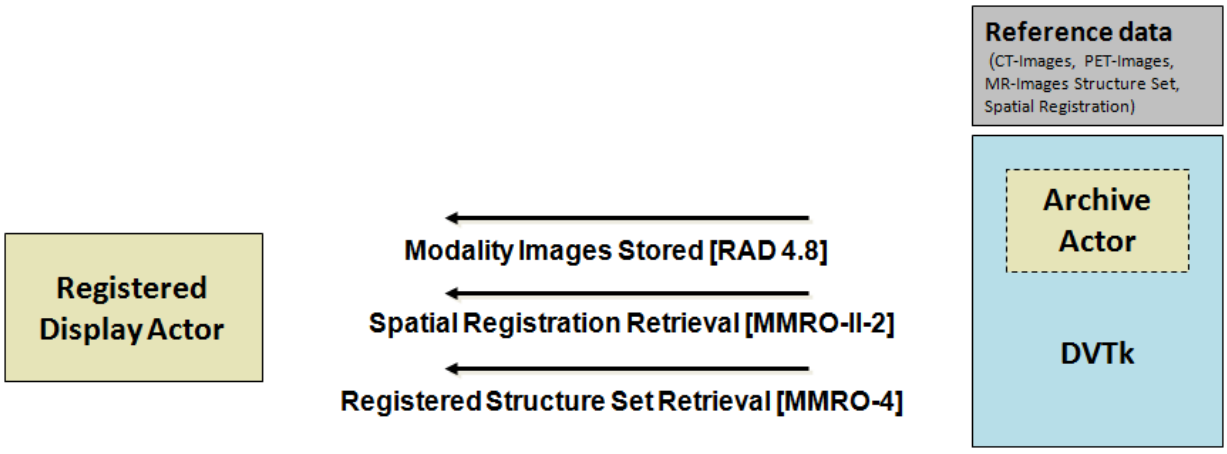
To render the display, the Registered Display uses the transformation in the Spatial Registration to translate the superimposed data into the same space as the underlying data. Because the RT Structure Set shares a Frame of Reference UID with one of the datasets, the structures will be transformed by applying the same transformation to the coordinates in the structure set as the dataset.
In case of hybrid system data no spatial registration transformation is required; the Registered Display re-samples the datasets, if necessary to match resolution for display.
This scenario will test that the Registered Display consistently handles the input data sets.

The Registered Display actor should be able to support the following SOP classes.

- CT Image Storage
- MR Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage
- RT Structure Set Storage

For this Registered Display test scenario DVTk as Archive actor will store data to the Registered Display.

- The testtool will determine that the inputs to a Registered Display actor, which can consist of multiple image datasets and associated RT Structure Sets and Spatial Registrations objects, are properly accepted.



Transactions sent to actor

RAD-4.8: Modality Images Stored
MMRO-II-2: Utilize Spatial Registrations
MMRO-4: Registered Structure Set Retrieval

Expected transactions from actor

Not applicable

Registered Dose Display Actor scenario

Registered Dose Display Actor - Test Scenario 1

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

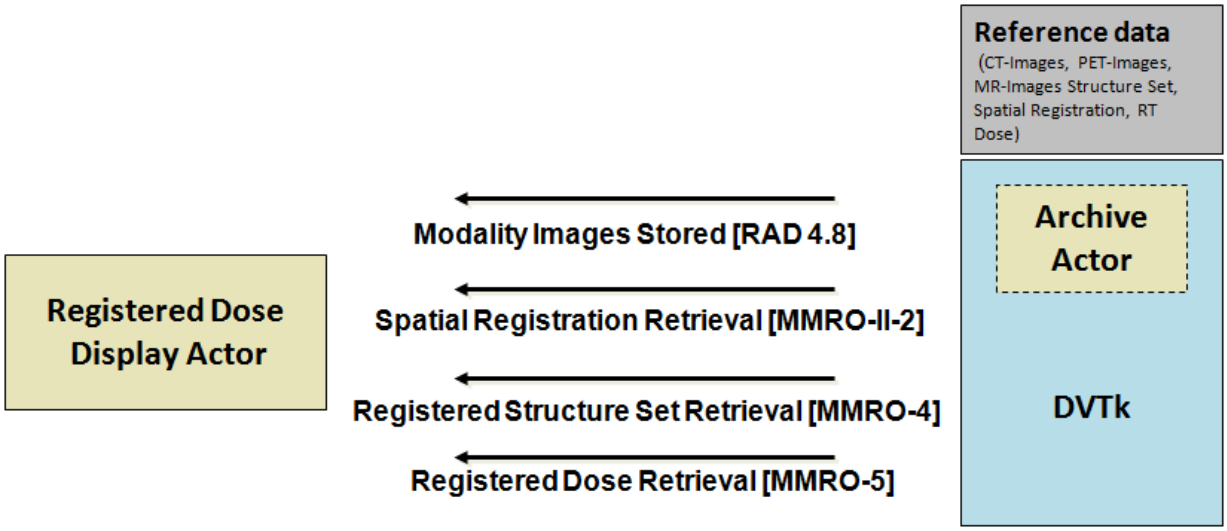
To render the display, the Registered Dose Display uses the transformation in the Spatial Registration to translate the superimposed data into the same space as the underlying data. Because the RT Structure Set shares a Frame of Reference UID with one of the datasets, the structures will be transformed by applying the same transformation to the coordinates in the structure set as the dataset.
In case of hybrid system data no spatial registration transformation is required; the Registered Dose Display re-samples the datasets, if necessary to match resolution for display.
This scenario will test that the Registered Dose Display consistently handles the input data sets.

The Registered Display actor should be able to support the following SOP classes.

- CT Image Storage
- MR Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage
- RT Dose Storage
- RT Structure Set Storage

For this Registered Dose Display test scenario DVTk as Archive actor will store data to the Registered Dose Display.

- The testtool will determine that the inputs to a Registered Dose Display actor, which can consist of multiple image datasets and associated RT Structure Sets, Spatial Registrations, and RT Dose objects, are properly accepted.



Transactions sent to actor

RAD-4.8: Modality Images Stored
MMRO-II-2: Utilize Spatial Registrations
MMRO-4: Registered Structure Set Retrieval
MMRO-5: Registered Dose Retrieve

Expected transactions from actor

Not applicable

Used scenario dataset

The dataset supplied with the installation of the IHE-RO MMRO II testtool.

Registrator Actor scenarios

Registrator Actor - Test Scenario 1

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

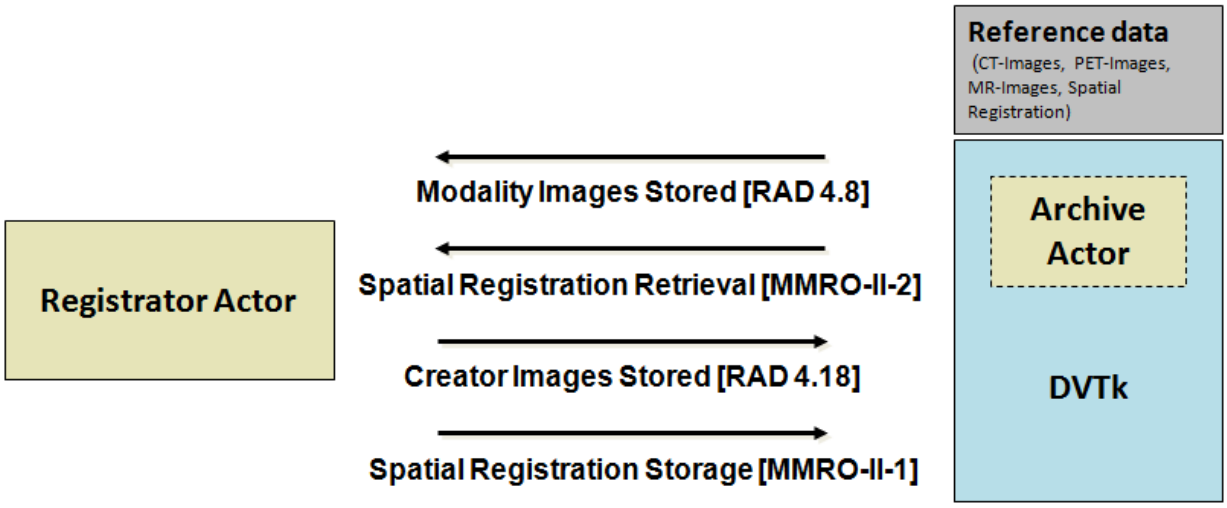
A Registrator obtains the datasets and RT Structure Set(s) and determines the transformation for mapping each dataset from their respective Frame of Reference into the first Frame of Reference and records the transformations in Spatial Registration objects.
This scenario will test that the Registrator output is consistent with the IHE-RO 2013 rules.

The Registered Display actor should be able to support the following SOP classes.

- CT Image Storage
- MR Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage

For this Registrator test scenario DVTk as Archive actor will store CT, MR and PET images and receive the derived spatial registration.

- The testtool will verify that the Spatial Registrations of the Registrator are properly formatted, reference the correct Image Datasets, and are correctly aligned.
- The test tool will verify that the Images of the Registrator are properly formatted.



Transactions sent to actor

RAD-4.8: Modality Images Stored
MMRO-II-2: Utilize Spatial Registrations

Expected transactions from actor

RAD-4.18: Creator Images Stored
MMRO-II-1: Spatial Registrations Stored

Used scenario dataset

The dataset supplied with the installation of the IHE-RO MMRO II testtool.

Registrator Actor - Test Scenario 2

Description

The Image Registration Profile specifies how images, RT Structure Sets, RT Doses, and associated spatial registration information can be exchanged, stored, processed and displayed.

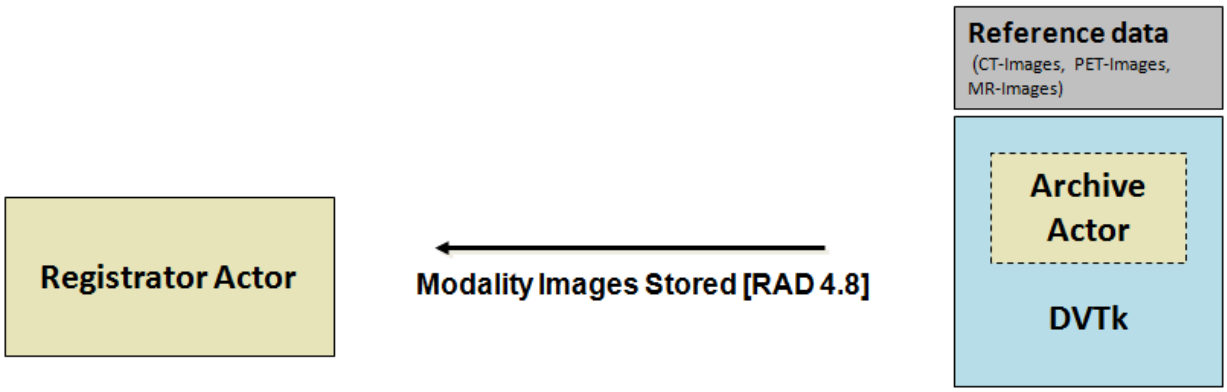
A Registrator obtains the datasets and RT Structure Set(s) and determines the transformation for mapping each dataset from their respective Frame of Reference into the first Frame of Reference and records the transformations in Spatial Registration objects.
This scenario will test that the Registrator output is consistent with the IHE-RO 2013 rules.

The Registered Display actor should be able to support the following SOP classes.

- CT Image Storage
- Positron Emission Tomography Image Storage (PET)
- Spatial Registration Storage

For this Registrator test scenario DVTk as Archive actor will store CT and PET hybrid images.

- The tester has to verify that when two image datasets are commonly registered (i.e. a PET and CT from a PET-CT device and already in a common Frame of Reference), there will be no output as the two image datasets are already in a single Frame of Reference.



Transactions sent to actor

RAD-4.8: Modality Images Stored

Expected transactions from actor

Not applicable

Used scenario dataset

The dataset supplied with the installation of the IHE-RO MMRO II testtool.