

IHE Work Item Proposal (Detailed)

# Proposed Work Item: BSR-WD (Basic Study Requesting - Workflow Definition)

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Date: September 25, 2014

Version: 0.4

Domain: Patient Care Coordination

# The Problem

Healthcare professionals have a wide array of diagnostic[[1]](#footnote-1) studies at their disposal. Laboratory findings, radiological studies, functional tests, endoscopies and many more studies are requested by physicians to support them in the diagnostic process. These studies are usually performed by specialized departments (both within and outside the confines of the healthcare organization), after which the results are communicated back to the requestor of the study.

Traceability of the diagnostic study process, from request to result and all the steps in between, helps the healthcare professional to monitor the progress, and to view all the relevant information within the context of the study request. A physician wants to know when the study he has requested is scheduled, whether the study material has already been collected from the patient, whether the analysis has been done on that material, and whether the report has been written and approved.

In practice, the traceability and linking of the information used and produced around a diagnostic study request does not support this. First, there are still many healthcare facilities that work with paper order forms, where the traceability is only possible through telephone calls to the ‘producing’ departments. Organizations that do use an order management system may have control over the diagnostic study workflows, but only within the confines of their own organization.

**Cross-enterprise exchange of workflow information not standardized**

Different organizations use different order management applications, and as the exchange and sharing of order management information is usually not standardized, cross-enterprise workflow management needs some form of implementation-independent way of transferring at least the basic ordering / workflow information.

**No linking of diagnostic study ‘elements’**

In many EHR systems, the request information, the diagnostic images and the reports lack a binding context. The information can be found, but often in separate parts of the application suite, especially for diagnostic studies that aren’t closely linked to the EHR. From the healthcare professional’s point of view, request information, workflow status, images and study reports belong together, and should also be viewed in relation to each other.

**Workflow support for many different diagnostic studies not available**

For some diagnostic studies (especially in the radiology area), IHE has defined specific workflow profiles (see Appendix A - Existing Workflow Profiles). However, there are many other types of diagnostic study that currently have no structured definition in the IHE realm (see Appendix B - Overview of diagnostic and therapeutic studies). And the question is, whether this is necessary from a cross-organizational point of view.

Currently there is no standardized, application-independent Profile that allows tracking and management of the workflow of study requesting. Such a profile would allow for a generic approach towards the requesting, monitoring and archiving of the workflow of any diagnostic study, with the purpose of workflow overview and status sharing between the different organizational units that are involved in such a workflow.

# Value statement

A generic Workflow Definition for the requesting of diagnostic and therapeutic studies enables the cross-enterprise (but also the intra-enterprise) sharing of workflow information. It also provides an overview of, and context to, the documents that are used and produced in the course of that workflow. The Basic Study Requesting - Workflow Definition describes the main steps in the process of a study request. It can be used for many different types of requesting workflow, and for the tracking, managing and archiving of those workflows. By using one Workflow Definition for many different types of studies, the tracking and management of these studies is simplified.

The BSR-WD profile, like other Workflow definition Profiles such as XbeR-WD, XTB-WD, EHDI-WD and others, builds upon the generic ITI profile **XDW** (Cross-enterprise Document Workflow).

As such, this Workflow Definition Profile is relatively lightweight, as its mechanism is already described in the XDW profile definition. The Workflow Definitions can be seen as a template for the different steps of a workflow. These steps are defined on the level of different organizations or organizational units, as their main goal is to inform other participants to the workflow about the workflow status and the produced results.

**Business cases (NL)**

Several hospitals and regional organizations in the Netherlands have expressed interest in using the BSR-WD to support several cross-enterprise study workflows, and have offered help to further refine and develop the profile by providing use cases, workflow descriptions et cetera from their organizations. This direct support will increase the chances of this profile to become a success.

**BSR-WD and XDW roadmap**

A generic approach towards the tracking and management of these different types of diagnostic studies enables a standardized methodology for the cross-system transfer of ordering and workflow information. See chapter *7. Discussion* for more details.

# Key Use Case

**Use Case 1**

Dr. Fripp, a cardiologist, receives a patient with chest pain. After anamnesis and physical examination, he decides to request the following diagnostic studies: an angiogram, an ECG, some lab-studies, and an X-thorax. These requests are sent to different departments in the hospital, and to locations outside the hospital. Dr. Fripp decides he wants to admit the patient to the hospital where he is being monitored. 15 minutes later, Dr. Fripp is called because the patient’s complaints have increased. Dr. Fripp looks at his EMR to see which of his requests have been performed. Only the X-thorax has been performed, but there is no report yet. The cardiologist opens the image, and sees that the patient has a pneumothorax.

**Use Case 2**

Mr. Mallory visits his GP, Dr. Wetton, with complaints of impaired vision. He has a history of high blood pressure and diabetes, so Dr. Wetton decides to make a fundus photograph. This photograph will be examined by Dr. Bruford, an ophthalmologist with whom Dr. Wetton has a contract, and who resides is in the same Affinity Domain. Dr. Bruford examines the fundus photo, and writes his findings in a report. Note that in this Use Case, there is no referral of the patient himself to the ophthalmologist.

**Use Case 3 - Inpatient lab requesting**

Dr. Sinclair requests some blood tests for the patient on his ward. A blood sample is taken from the patient by a specialized professional, which is taken to the lab. The sample is fed to the analyzer that processes the sample and produces an automatic report with the measured values. A laboratory employee looks at the results, and adds some suggestions for the diagnosis to the automatic report. The report is then sent to dr. Sinclair.

# The Basic Study Requesting Workflow Definition

The BSR-Workflow Definition informs all parties that are involved in a workflow of a diagnostic study or test about the current status of the diagnostic study progress, and links the process steps to images and documents that are used and produced in these steps. The BSR-WD profile builds upon the XDW profile, and can be seen as a template for the tracking and management of most diagnostic study workflows. It looks at the exchange of workflow information between, but not within organizations or organizational units. The BSR-WD profile enables the monitoring of the status and progress of the requested diagnostic study and at the same time provides context to the documents that are produced and are relevant to that study.

## Analysis of diagnostic study workflows

As shown in Appendix B, *Overview of diagnostic and therapeutic studies*, there are many different types of (diagnostic and/or therapeutic) studies. After analysis of their respective workflow steps, one general pattern emerges for most of these studies.

## Workflow participants

First, the following **workflow participants** (human roles) have been identified:

* Study Requestor – requests a diagnostic (or therapeutic) study
* Study Material Collector – collects the study material
* Study Data Processor – operates the capturing and processing phase
* Study Performer – reports on the findings of the study, and writes the results  
   into a study report.

## Workflow steps

Using these workflow participants, the generic **workflow steps** for a Diagnostic Study can be described as follows:

1. A Study Requestor starts a workflow and sends a study request to a Study Performer, who accepts the task and starts a task for the study to be performed.  
   *A BSR-WD document is created and made available through the XDS Registry*
2. A Study Material Collector takes a specimen from the patient and brings it to the Study Data Processor.  
   *This is an optional step, only used when bodily specimens are involved (blood, tissue, etc.)*
3. The Study Data Processor captures and processes data, either from the patient as a whole, or from a specimen of the patient.   
   *The capturing and analysis of the data collection is usually performed by specialized equipment, operated by the Study Data processor.*
4. The Study Performer analyzes the study data and interprets these along with other relevant information, and writes a diagnostic study report.  
   *The study report often contains a description of relevant procedure details, a conclusion and/or suggestions for further treatment.*

Some notes:

* In individual cases, other participants may be involved. However, after analysis of many diagnostic study workflows, most diagnostic studies can be described using these roles and workflow steps.
* Workflow steps should reflect the tasks performed by different organizational units that need to inform each other along the workflow
* Some roles may be performed by the same person
* Each step of a workflow has to be planned

## The BSR-WD Tasks

From the above analysis, the following workflow steps/tasks have been identified:

1. Request Study Study Requestor
2. Collect Study Material Study Material Collector
3. Capture & Process Data Study Data Processor
4. Evaluate & Report Study Performer

Below is a schematic overview of these workflow steps, including the names of the input- and output document types / descriptors.

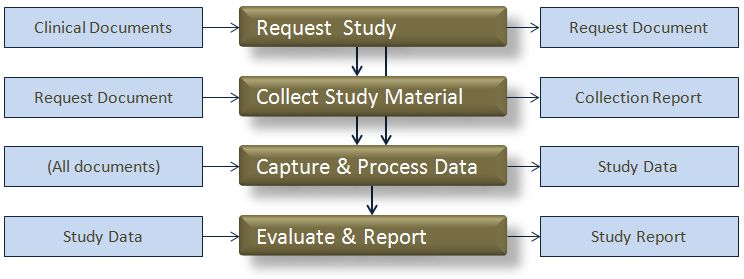


Figure 1 - BSR-WD tasks schema

**Profile name**

The name of the profile reflects the fact, that it is a *Basic* workflow, meant for the sharing of overall statuses of a study workflow.   
It is not called ‘Diagnostic’ Study, because these studies can be both for diagnostic and therapeutic purposes.

It is also not called ‘Cross-enterprise …’, because these workflows can also be used *within* a healthcare organization.   
Hence the name ‘Basic Study Requesting Workflow Definition’

**Implementation**

For each type of study, the workflow is basically the same, but the content is mostly different. Based upon the BSR-WD, implementation guidelines can be given for specific diagnostic studies.

# Standards & Systems

The Diagnostic Study Requesting - Workflow Definition is based upon the ITI-XDW Profile. No extra Actors or Transactions are needed for the BSR-WD Profile.

# Discussion

## 7.1 Suggestions for changes to the XDW profile metadata

Each task in XDW-based workflows is currently characterized by metadata, as defined in the XDW profile technical framework.

One of the tasks in some of the Workflow definitions included a separate task for the planning of the workflow. However, looking closer to the different tasks in a workflow, each task needs to be scheduled, because each step represents another organizational unit, such as an endoscopy department, a laboratory, et cetera.

Therefore, a change proposal for the XDW profile is submitted here, to add metadata to the XDW profile that makes it possible to capture more order-related information.

These are the metadata elements that are suggested for the XDW TaskDetails section, with the corresponding metadata elements on the right hand side (red = missing element, ? = not sure):

**Metadata element Details Possible OASIS   
 metadata element**

* Order placer ID requestor ID taskInitiator ?
* Order placer order ID <order placer reference ID> <missing?>
* Order filler ID ID of task performer actualOwner?
* Order filler order ID <order filler reference ID> <missing?>
* Scheduled Start Time planned start datetime startByTime?
* Scheduled End Time planned end datetime completeByTime?
* Start Time actual start datetime <missing?>
* CompletedTime actual end datetime <missing?>

NOTE: This needs some more discussion on the technical levels.

## 7.2 Using BSR-WD in other workflow definitions

PCC Workflow Definition Profiles can be used as building blocks that constitute the different steps in a care pathway. The BSR-WD is one of the basic building blocks that can be used for the construction of more elaborate pathways. An example of this is the [EHDI-WD](ftp://ftp.ihe.net/Patient_Care_Coordination/yr9_2013-2014/Planning%20Committee/Brief%20Profile%20Proposals/IHE_Profile_Proposal_Template-Brief%20XDW-EHDI-Final10-03-12.pdf), where the XBeR-WD and the BSR-WD are used as part of the Early Hearing Detection and Intervention - Workflow Definition, see figure below:

EHDI-WD Profile using BSR-WD and XBeR-WD building blocks.

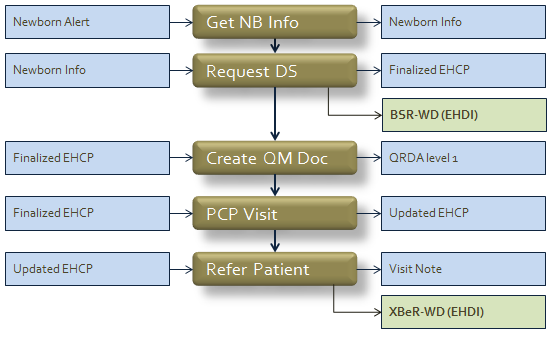


Figure 2 - EHDI - WD schema

## 7.3 Time based alerts

* XDW issues: use of Time-based alerts (due date, both absolute and relative to otherTasks)

## 7.4 Import (and export) of order-messages

* XDW issues: possibility to add and update tasks to XDW Workflow Definition type documents through messaging (ORM, BPEL and the like)

# Appendix A - Existing Workflow Profiles

**Anatomic Pathology**

APW  [Anatomic Pathology Workflow](http://wiki.ihe.net/index.php?title=Anatomic_Pathology_Workflow)

**Cardiology**

CATH  [Cardiac Cath Workflow](http://wiki.ihe.net/index.php?title=Cardiac_Cath_Workflow)

ECHO  [Echocardiography Workflow](http://wiki.ihe.net/index.php?title=Echocardiography_Workflow)

STRESS  [Stress Testing Workflow](http://wiki.ihe.net/index.php?title=Stress_Testing_Workflow)

REWF  [Resting ECG Workflow](http://wiki.ihe.net/index.php?title=Resting_ECG_Workflow)

**Eye Care**

A-EYECARE - [Advanced Eye Care Workflow](http://wiki.ihe.net/index.php?title=Advanced_Eye_Care_Workflow)

**Laboratory**

 [LTW] - [Laboratory Testing Workflow](http://wiki.ihe.net/index.php?title=Laboratory_Testing_Workflow)

[LAW] - [Laboratory Analytical Workflow Profile](http://wiki.ihe.net/index.php?title=Laboratory_Analytical_Workflow_Profile)

**Radiology**

[SWF] [Scheduled Workflow](http://wiki.ihe.net/index.php?title=Scheduled_Workflow)

# Appendix B - Overview of diagnostic and therapeutic studies

* Audiometry
  + Audiogram
  + Tympanogram
* DNA sequencing and analysis
* Echography / TDI (Tissue Doppler Imaging) / Echotherapy
* Electrography
  + ECG (ElectroCardioGram)
  + EEG (Electro-EncephaloGram)
  + EMG (Electro-MyoGram)
  + ENG (Electro-NystagmoGram)
* Endoscopy
  + Bronchoscopy
  + Colonoscopy
  + Colposcopy
  + Cystoscopy
  + ERCP (endoscopic retrograde cholangiopancreatography)
  + Gastroscopy
  + Hysteroscopy
  + Laparoscopy
  + Mediastinoscopy
  + Sigmoidoscopy
* Medical photography
  + Fluorescein angiography (for diabetic retinopathy)
  + Before-after photos (dermatology, surgery, decubitus)
  + Videos (revalidation, movement studies, behavior)
  + Microscopic images (cell structures)
* Function studies
  + Longfunction tests
  + Ergometry, Holter tests
  + Neurological function tests
  + UDO (urodynamic studies), flow measurements
  + DAS28 (disease activity score, reumatology)
* Laboratory studies, clinical chemistry
* Laserdiagnostics
  + retina-tomografie
* Magnetic Resonance Imaging (MRI)
  + Body scan
  + Cholangiopancreatography
  + Brainscan
  + Vertebra-scan
* Pathological studies
  + Punction
  + Biopsy
* Radiological studies
  + Bone scan, Bone density test - osteoporosis
  + Radiology studies
    - X-thorax
    - X-mamma
    - X-abdomen
    - X-…
  + Radiodiagnostics (PET, scintigrafie, SPECT)
    - CAG (coronair angiogram)
    - Hysterosalpingogram
  + CT (Computed Tomography)
    - Angiogram
    - Cystourethrogram
    - Intravenous pyelogram
* Tonometry
  + IOP (intraocular pressure)
* Other diagnostic studies
  + CTG (Cardiotocografie)
  + Electrophysiological studies
  + Snellen test

1. In this proposal, the term ‘diagnostic study’ is used for any anatomic, functional or chemical type study, examination or test. Some of these may also be used therapeutically. An endoscopic study, for instance, can be used for diagnosis and treatment at the same time. [↑](#footnote-ref-1)