

QUALITY CONTROL PIPELINE

ICD

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1 INTRODUCTION

1.1 Purpose

The present document describes the interfaces between the Herschel Common Science System (HCSS) and the Instrument Control Centres (ICCs), and identify the requirements on both systems for the generation and management of the quality data associated to every observation being processed by the Standard Product Generation (SPG) framework.

For its implementation, the Quality Control is divided in two different steps:

- Automatic Quality Control pipeline
- Manual Quality Control analysis

The Automatic Quality Control pipeline defines the phase where the quality data is created during the processing on an observation. Quality data consisting of flags, specific logs and optional previews is generated automatically during the Standard Product Generation and stored in the Quality Report (QCR) for its later analysis.

The Manual Quality Control analysis is started by the Scientific Product Analyst (SPA) but other actors can also be involved. This phase consists in the inspection and evaluation of the Quality Report and during this analysis, the Report can go through four different levels:

- QCL1, Starting level for all the QCRs, based on well known rules
- QCL2, When a software error is suspected on a given QCR
- QCL3, When a problem on scientific data must be deeper analysed
- QCL4, When an astronomer reports a possible problem in one observation.

1.2 Scope

This document defines the structures of the quality data that is generated when an observation is processed. The document also defines the life cycle of these structures from their creation to the moment the observation is tagged as “PASSED” and stored in the public archive¹ or “FAILED”. In the latter case, it will either be reprocessed by the SPG or re-scheduled by the Mission Planning Subsystem (MPS). Finally, the document describes the different tools involved in the Quality Control procedure.

1.3 Applicable documentation

- AD-1 Herschel Products Definitions Document, HERSCHEL-HSC-DOC-0959, draft 0.5, 11 May 2007, LiveLink ID 2766178
- AD-2 Standard Products Generation Requirements Document, HERSCHEL-HSC-DOC-0860, Issue 1.0, 19 Dec 2006, LiveLink ID XXXXX
- AD-3 Quality Control Pipeline documentation: <http://www.rssd.esa.int/SD-general/Projects/Herschel/hscdt/releases/doc/ia/qcp/index.html>

To retrieve a document, the LiveLink ID can be used as follows:
[http://www.rssd.esa.int/lmlink/open/\[LiveLink ID\]](http://www.rssd.esa.int/lmlink/open/[LiveLink ID])

¹ In any case, an observation can be saved to the public archive before the Quality Control process is finished.

1.4 Reference documentation

RD-1 Kayako Support Suite User Manual: <http://docs.kayako.net/>

1.5 Acronyms

The acronyms list used within the Herschel project can be found at: <http://www.herschel.be/twiki/bin/view/Hcss/HerschelAcronyms>. Below is a selection:

AST	Astronomer
CS	Calibration Scientist
IA	Interactive Analysis
ICC	Instrument Control Centre
HCSS	Herschel Common Science System
MOC	Mission Operations Centre
MPS	Mission Planing Subsystem
QCL #	Quality Control Level #
QCP	Quality Control Pipeline
QCR	Quality Control Report
QCR-Summary	Quality Control Summary
SPG	Standard Product Generation
SPA	Scientific Product Analyst

2 DOMAIN OBJECTS

Every observation processed through the SPG framework must include information related to the quality of the scientific data and other inputs relevant to the entire quality process as, for example, the range of temperatures when the data was gathered, pointing error margins, the number of telemetry packets lost, etc. This information will allow the Scientific Product Analyst to assess the quality of the process, as derived from this, the quality of the resulting Products.

2.1 Observation

An Observation is a container of Products applicable to an specific observation. It provides associations to products which are specific to a single observation (e.g. Telemetry Product, reduced data products or the **Quality Report** linked to this observation) as well as associations to Products that are applicable to multiple observations (such as the calibration products).

2.2 Quality Logs

HCSS system uses the Java logging API to record its own logs. The provided API is powerful enough to give the developer all the needed functionality in order to monitor the execution of an application or even to investigate any possible problem that can arise. All the logs are stored in a custom table and added to the Quality Report at the end of the processing of every observation.

For the specific case of the quality pipeline HCSS provides an additional feature still compatible with the standard logging system: A new log message class (actually a hierarchy of classes) that can be used instead of the normal messages to mark a log as being a Quality log. This allows the developer to manage logs using an additional parameter to the two already available:

- Domain (or source)
- Level: From FINEST to SEVERE
- Type: Regular or custom quality log

This messages are used as any other Java log message and can be filtered by domain and level in the same way other logs do. They are also compatible with any of the handlers the Java logging package provides.

Currently, the HCSS provides a complete set of quality log messages organized hierarchically in different categories (see[AD-3], under the developer's guide). This classification is still under definition and must be completed (**OI-004**).

2.3 Preview images

At one point in the Standard Product Generation, the pipeline should be able to create a preview of the data being processed. In case this preview exists, it must be possible to add it to the Quality Report as one more element of analysis.

This object is currently under definition as stated in the **OI-005**.

2.4 Quality Report

All the quality information for a given observation is gathered in the Quality Report of that observation. The Quality Report contains the data automatically generated in the Standard Product Generation process and the inputs resulting from the Quality Control analysis.

The quality data automatically generated during the Standard Product Generation falls in the following categories:

- Report specific data: Observation Id it belongs to, software version
- Quality flags
- Pipeline's logs
- Image previews

The Quality Control analysis provides additional information to the report:

- Final state
- Pending action
- Linked SxRs (if applicable)
- User comments (optional)

The following table provides a more detailed explanation of all these fields:

Field	Comments
Observation Id	Reference to the observation this instance belongs to
Software version	HCSS version, pipeline's version, ... (TBD)
State	<p>Define the state of the observation from the point of view of the Quality Control. Possible states are:</p> <ul style="list-style-type: none"> ● PENDING ● PASSED ● FAILED
Action	<p>Legal actions depend on the value of the QualityContext's state.</p> <p>When the state is "PASSED" the only possible action is NONE.</p> <p>When the state is "FAILED" the possible actions are:</p> <ul style="list-style-type: none"> ● DELIVERED FOR RESCHEDULING ● DELIVERED FOR REPROCESSING ● DISCARD <p>When the state is "PENDING" the possible actions are:</p> <ul style="list-style-type: none"> ● DELIVERED FOR QCL1 ● DELIVERED FOR QCL2 ● DELIVERED FOR QCL3
SPRs	If applicable, reference to the SxR reporting system. SPA should include this data manually during the quality analysis and it will consist on: SxR number and title.
Quality flags	<p>Quality flags are a pre-defined list of fields of simple data types (strings, numbers and booleans) defined per instrument. These fields will be stored as METADATA into the Quality Report allowing them to be part of the searching fields in any possible query. Some of their characteristics are:</p> <ul style="list-style-type: none"> ● Quality flags can be declared of any of the legal METADATA types ● The METADATA tag is just a flag identifier, ie: "SAT_TEMPERATURE" following the Product Definition Group conventions. ● Quality information is included as a string, number or boolean into the METADATA value., for example: <i>LongParameter(18)</i>. ● Only the flags that are meaningful for the current observation are included into the Quality Report. <p>Quality flags used in the QCP are still under definition (OI-001)</p>

Field	Comments
Pipeline's logs	<p>A table containing all the logs produced during the pipeline's execution, including those in the pre and post-processing SPG phases.</p> <p>The HCSS framework provides also additional categories to use into the Logging subsystem. This gives the developer the means to filter the information available through a new criterion apart from the source or the log's level: the log type (quality/others).</p>
Preview	Preview or snapshot of the scientific data. TBD
Users' comments	<p>Comments on the quality data written by the different actors involved into the Quality Control of the observation. As the unique actor allowed to modify the Quality Report, the SPA is the responsible of updating the Quality Report whenever a new input must be included. The fields stored for every comment are:</p> <ul style="list-style-type: none"> ● Time stamp: When the comment was created ● User: Identifier of the person writing the comment. ● Text: The comment itself as a string. <p>Every comment can be tagged as public or private.</p>

2.5 Quality Report summary

Due to access permission issues, one single Product can not contain public and private elements at the same time (IR-001). This means that once the quality analysis is finished and before the result is made available to the astronomers' community, private data must be, in some way, removed from the Quality Report.

As this data could be useful for internal purposes, the actual deletion of the private data is not an option in this case. So the solution adopted is declare the original Quality Report as a private Product and, once the quality analysis is finished, create a new copy of this data including only the public fields. This new Product is referred as the Quality Report summary and is, in fact, a new instance of the same type that the original, stored as a new field under the observation Product they belong to.

Said that, the actual process is still under definition and even a manual step is probably needed (**OI-003**).

3 ROLES

The roles list used within the Herschel project can be found at:
[HCSS Actor descriptions document](#)

This chapter provides a description of the actor roles used in this ICD.

3.1 Scientific Product Analyst

The Scientific Product Analyst (SPA) has the responsibility for the success of the Quality Control Processing (QCP).

Quality Control Processing is performed automatically on all observations related telemetry received from the MOC. The SPA monitors this automatic process and the output it produces. He supplies information to be included in the observation Quality Report (QCR) when necessary. Additionally, the SPA can invoke QCP to (re)process selected observations. It is the SPA who is responsible for the edition of the Quality Report with the new inputs resulting from the analysis of the data.

3.2 Calibration Scientist

The Calibration Scientist (CS) has a strong astronomical background and an in-depth knowledge of the properties and operations of the instrument. This actor is the instrument expert, knowing about the instrument and its calibrations.

The calibration scientist is responsible for reviewing the Quality Reports when these are marked to be delivered for Quality Control Level 2 (QCL2). This is the case when the SPA detects any problem into the Observation that must be clarified by calibration scientist or when the Help Desk decides that a Observation being reviewed in Quality Control Level 3 (QCL3) must be delivered to the calibration scientist for a further analysis.

At QCL2 the Calibration Scientist performs the Quality analysis of the observation from the point of view of the instrument performance and data processing.

3.3 Instrument Engineer

The Instrument Engineer (IE) has a deep knowledge of the instrument hardware and its operations. The instrument engineer also has significant insight into the calibration of the instrument. The main task of the instrument engineer is to bring the instrument to optimal operation and maintain it there and, in the Quality Control context, its role is to assist the Calibration Scientist in the QLC2 analysis.

3.4 Scientific Software Developer

The Scientific Software Developer has a computer engineering and astronomical data reduction background. Furthermore this person has an understanding of the instrument characteristics and its operation modes. The scientific software developer designs, codes, tests and implements software for scientific data analysis and reduction. A key issue is the use of sandboxes (private environment) by this actor in order to develop and modify his software.

As the Instrument Engineer, the Scientific Software Developer will assist the Calibration Scientist in the QLC2 analysis.

3.5 Help Desk

The help desk actor is responsible for providing answers to technical and scientific questions coming from HCSS users external to the HSC and ICCs but in this context it is also responsible for performing the Quality Control analysis at level three. At this level of analysis the Help Desk should determine if a failed observation must be rescheduled. In all the cases, the Help Desk actor forward his/her decisions to the SPA.

3.6 Astronomer

The astronomer (AST) is included into this document as a secondary actor. The astronomer interaction with the QCP is done via the Help Desk. This will be the case when the astronomer finds a problem in a given observation and requests its reprocessing or rescheduling.

4 USE CASES

4.1 UC-001: Create the Quality Report

System: HCSS (SPG)

Actor: SPA (AST for the on demand mode)

Main

1. Actor sends a request for processing of an observation to the system (BR-001)
2. System returns the ObservationContext associated to the corresponding observation. (BR-002)

Extensions

- 2.a. Observation not found: Actor is notified and the processing interrupted.

Business Rules

BR-001: There are three different cases:

- Standard Product Generation: First time an observation is processed.
 - Process is launched from the SPG GUI
 - A new ObservationContext and the associated Quality Report are created.
- Bulk reprocessing: The observation is processed again
 - Process is launched from the SPG GUI
 - The ObservationContext is retrieved from the system and its data initialized: Old products at the different levels are removed and a new Quality Report replaces the original one. Once reprocessed, this ObservationContext will be stored into the archive as a new version of the same observation. Previous data, including the original Quality Report, will still be available at the end of the process².
- On demand processing: An observation is reprocessed starting from the Level0 data.
 - Process is launched from the SPG GUI or from a request from Internet.
 - Previous ObservationContext is retrieved from the system, data from Level1 and superior removed and a new Quality Report created replacing the old one. **TBC**
 - Resulting data will not be stored into the archive and no Quality Analysis will be performed.

BR-002: The Quality Report will be accessible through the ObservationContext it belongs to.

² Different versions of an observation (and their associated data) are always available from the archive

4.2 UC-002: Populate the Quality Report (Automatic Quality Pipeline)

System: HCSS (SPG)

Actor: IE

Main

1. Actor updates the Quality Report with the generated quality data (BR-001, BR-002)
2. System stores the new data

Extensions

2.a. Data can not be stored

2.a.1 System notifies the actor (for example, raising an exception).

Business Rules

BR-001: Quality Report accessibility: The Quality Report associated to a given observation will be accessible at any moment during the processing:

- Pre-processing phase: From the different plugins provided.
- Processing phase: Through the code in the pipeline, but not in the related tasks **TBC**
- Post-processing phase: From the quality plugin provided by the ICCs. This provides to the quality pipeline developer an entry point to gather all the quality data at the end of the entire process.

BR-002: Types of quality data: From the point of view of the ICC's quality pipeline developer there are three different types of quality data:

- Quality flags
- Quality logs
- Preview images

Quality flags

As described in the previous section, these flags give information about the quality of the Products generated during the processing on an observation. We provide an example in Java and the same in Jython of how to add a new flag to the Quality Report:

Java example

```
...
// Adding quality data to the QualityContext
QualityContext quality = (QualityContext) observation.getQuality();

BooleanParameter qData1 = new BooleanParameter((temp > 10.0));
quality.getMeta().set(QUALITY_TAG_1, qData1);

// Quality data from data into the Products
MapContext level1 = (MapContext) observation.getLevel1();
Product product_a = level1.getProduct(LEVEL1_PRODUCT_KEY);
StringParameter qData2 = (StringParameter)
    product_a.getMeta().get(PIPELINE_QUALITY_TAG);
quality.getMeta().set(QUALITY_TAG_2, qData2);
...
```

Jython example

```
...
# First way to add a quality flag in jython
observation.quality.meta["quality_flag_1"] = StringParameter("Quality item");

# Second way
observation.quality.meta.set("quality_flag_2",
                             StringParameter("Another quality item"))
...
```

Quality logs

Quality logs are managed in the system in the same way as Tasks logs. The SPG will attach both kind of logs to the Quality Report at the end of the pipeline execution.

Quality logs are also affected by the same rules that apply to the regular logs. For instance, quality logs with a level lower than the minimum accepted level will not be registered during the processing of the pipeline.

On the SPG subsystem, the minimum log level will be set to “INFO” by default and only in very special conditions this level should be modified (TBC).

Quality logs are defined in different categories in a hierarchical way. Current categories can be consulted in this document but also in the intranet under the [qcp package documentation](http://www.rssd.esa.int/SD-general/Projects/Herschel/hscdt/releases/doc/ia/qcp/index.html) (http://www.rssd.esa.int/SD-general/Projects/Herschel/hscdt/releases/doc/ia/qcp/index.html, under the developer's guide).

The following is an example of how to use the quality logs in a Java program:

Adding a quality log in a Java task

```
import java.util.logging.Level;

import herschel.ia.qcp.QCLogMsg;
import herschel.ia.qcp.flags.QCFlags;

...
QCLogMsg msg = new QCLogMsg(QCFlags.DataProcessing.Background.
                             WrongBackgroundCorrection.
                             BrightSourceInTheOffBeam,
                             "Added Dark Correction");
getLogger().log(Level.INFO, QCLogMsg.ID, msg);
...
```

Preview images

If needed, preview images can be added to the Quality Report. The format of these images and the way they are stored in the Quality Report is **TBD (OI-005)**.

4.3 UC-003: Perform Quality Control Analysis

System: HCSS

Actor: SPA (CS, HelpDesk)

Main

1. System issues a new ticket to Kayako eSupport (BR-001, BR-002)
2. SPA is notified of this new ticket in the system (BR-003)
3. SPA logs in on Kayako eSupport and search for the new tickets
4. SPA reiterates the following steps as many times as needed:
 - 4.1 SPA opens the ticket and consult the Quality Report (BR-004)
 - 4.2 SPA updates the Quality Report with new data (BR-005)
5. SPA finishes the Quality Control Analysis (BR-006, BR-007)

Extensions

1a. Ticket creation failed

1a.1 An exception is raised and the SPA is notified

4.2.a SPA forward the ticket to the IE for QCL2 (BR-008)

4.2.a.1 CS analyses the data and reports the proper feedback

4.2.a.2 SPA updates the Quality Report accordingly

4.2.b SPA forward the ticket to HelpDesk for QCL3 (BR-008)

4.2.b.1 HelpDesk analyses the data and reports the proper feedback

4.2.b.2 SPA updates the Quality Report accordingly

Business Rules

BR-001: A new ticket is created every time an observation is processed on Systematic mode. In On Demand processing and Bulk re-processing modes Quality Control Analysis is not performed (TBC).

BR-002: A ticket is the record created in the Kayako eSupport for every action we want to register into the system such as performing quality control analysis on an observation. The minimum information that a ticket must contain is:

- The Obsid of the observation it refers to
- A reference to the QCR linked to this observation³.

BR-003: Notification will be implemented through any of the means already available in the Kayako eSupport (for instance, through the email)

BR-004: QCR data is accessed through specific tools like the *QualityBrowser*. This tool connects to the store to retrieve the information and show it to the user.

³ Quality data is not included in the ticket itself and so this information never enters into the Kayako eSupport. Instead, a reference is attached. This reference can be a URN or any other information that allow standard or specific tools to access the actual information.

BR-005: SPA will use the *QualityBrowser* for updating the QCR. Possible changes are:

- Updating the state and action fields of the QCR
- Including new Quality flags
- Adding new comments

BR-006: Once the QC analysis is done, Quality Report's state is set to one of PASSED or FAILED. In the first case (PASSED), action field must be set to NONE.

In the last case (FAILED), possible actions are:

- DELIVERED FOR RESCHEDULING
- DELIVERED FOR REPROCESSING
- DISCARD

BR-007: Final Quality Report must be re-ingested in the HSA. Due to the (IR-001) and because the *QualityContext* class (the class implementing the Quality Report in the HCSS) contains public and private data, this process must be split in two different steps (**TBC**):

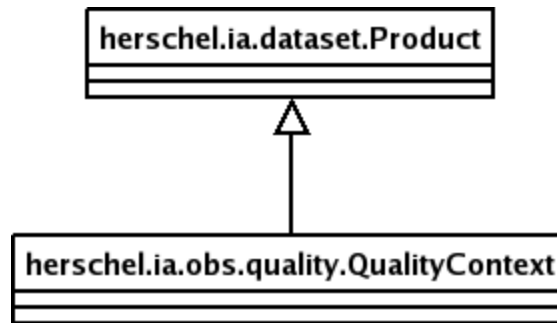
- A new *QualityControl* instance (aka the Quality Report Summary) must be created. This new instance will be a copy of the original *QualityControl* Product but it will only contain the public fields. Private fields will be discarded.
- The *ObservationContext* containing the original *QualityControl* will be updated also with this new Product and re-ingested in the HSA.

BR-008: See chapter 6 and Appendix A for a more detailed description of the data flow.

5 DESIGN DESCRIPTIONS

5.1 Class diagram

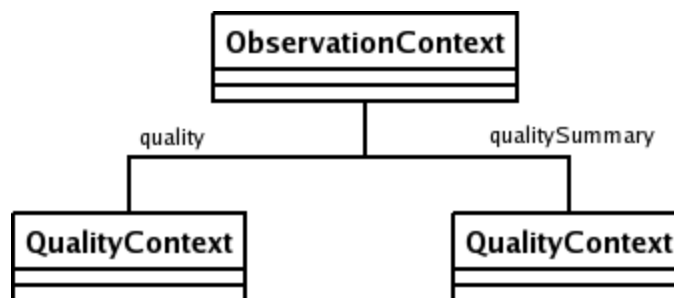
The Quality Report is implemented in the HCSS system as a single class named *QualityContext* (under the *herschel.ia.obs* package). The *QualityContext* inherits from the Product class, so it includes the Product's mechanisms to store and access METADATA and, of course, it can be stored in a PAL pool as any other Product.



Simplified class diagram of the QualityContext class

An instance of the *QualityContext* class will be automatically created during the Standard Product Generation process executed on an observation. This instance will be accessible through the "quality" field of the *ObservationContext* representing the processing observation. It is responsible of the ICC to populate the corresponding *QualityContext* with the adequate information.

The Quality Report Summary will be created at the end of the Quality Control analysis as a result of this process. It will be implemented in the HCSS as a new instance of a *QualityContext* and it will be accessible through the "qualitySummary" field of the same *ObservationContext* containing the original Quality Report.



Instance diagram

The Quality Report Summary is a product oriented to the final astronomer. As a first step, it will just contain a copy of all the public elements of the Quality Report but it is foreseen that a translation between private (usually more technical) and public flags (more oriented to final users) must be specified in some cases. See also (OI-002, OI-003) (TBC)

5.2 *Quality flags organization*

Quality flags are stored into the QualityContext Product as METADATA. This means that the flags do not follow any special order that a browsing application could use to present the data to the user. Also, there is no way to classify the flags in different categories as, for example, the processing levels (Level0, ...).

Taken this into consideration, data will be presented to the user in alphabetical order.

6 PROCESS DESCRIPTIONS

6.1 Quality control data flow

The Quality Control process is split in two steps:

- The first one is the Automatic Quality Control pipeline. It is executed during the Standard Product Generation process and as the result it provides Quality Report associated to the processed observation.
- The second one is the (Manual) Quality Control analysis. This phase consists in the inspection and evaluation of the Quality Report generated during the previous phase. The execution of this process depends also on the Standard Product Generation operational mode:
 - It is executed at least once in the systematic mode
 - Is is never executed for an on-demand processing⁴.

For its implementation, the Quality Control analysis is divided in four different phases:

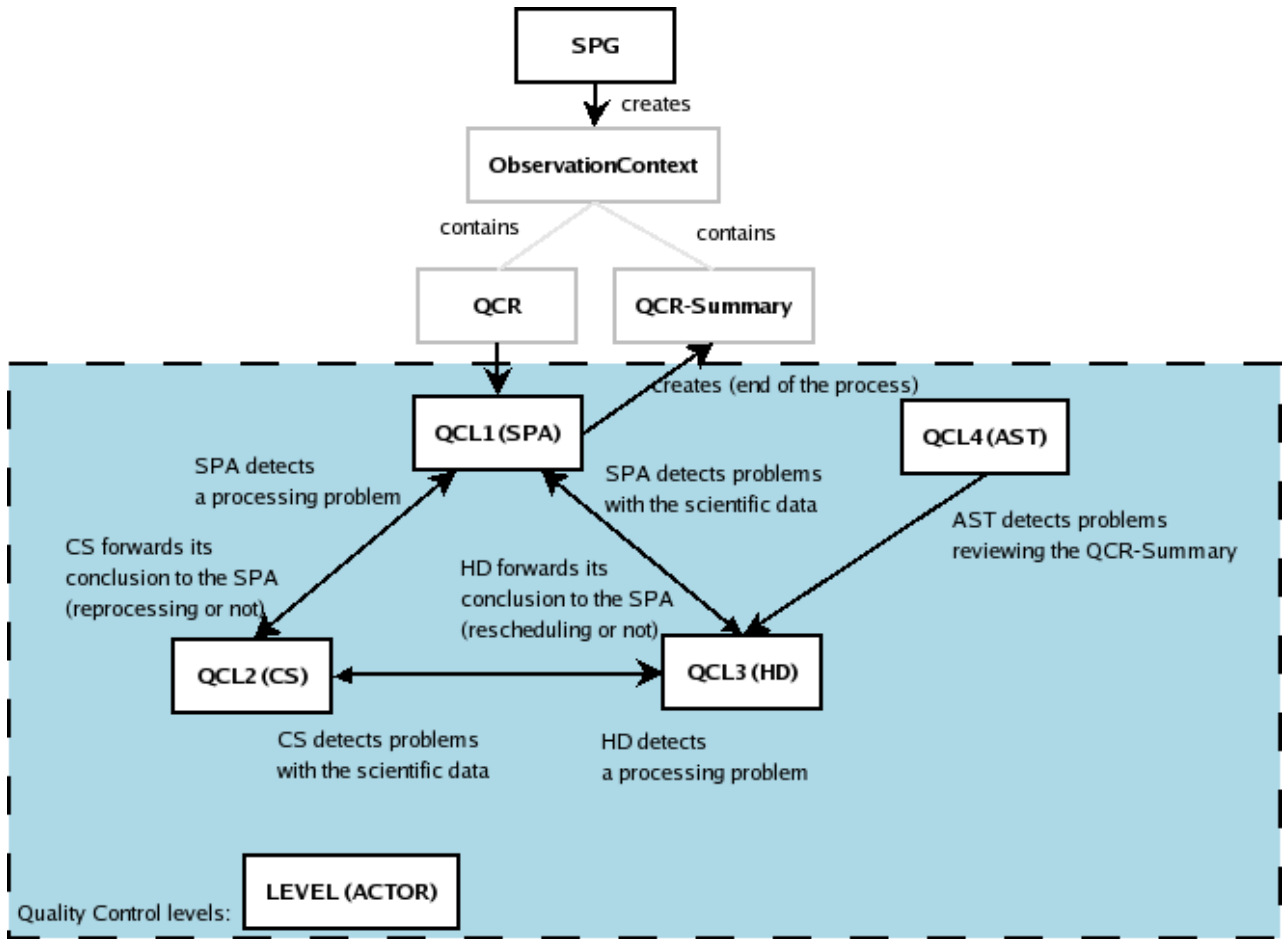
- Quality Control Level 1 (QCL1): This is the first step in the analysis of the data and is executed by the SPA. During this phase, some basic checks, using well known rules, are performed on the Quality Control Report (QCR). At the end of the process, the SPA decides if the observation pass or needs a deeper analysis (QCL2, QCL3).
- Quality Control Level 2 (QCL2): This analysis is performed by the Calibration Scientist (CS) on those observations forwarded by the SPA when some problems were found in the scientific data that may have been caused by a software error or instrument malfunction. The CS look at the data and determines if the system should be fixed and the observation reprocessed. To carry out this task, the CS is assisted by the Instrument Engineer and Scientific Software Developer. At the end of the process the CS forwards the observation and his/her conclusions to the SPA.
- Quality Control Level 3 (QCL3): This phase is performed by the Help Desk (HD) on those observations forwarded by the SPA or the CS where a problem with the scientific data is suspected. With all the information, the HD must decide if that observation must be re-scheduled. Once the decision is taken, the observation is forwarded again to the SPA.
- Quality Control Level 4 (QCL4): This phase represents those situations where the final astronomer (AST) believes that a given observations does not fit the quality standards due to processing problems given the current software or because a undetected artifact into the scientific data. In those cases the AST will contact the Help Desk system and report the problem.

All possible Quality Control analysis cases follow the next basic guidelines:

- SPA must look systematically at all the observations (true only for the SPG's systematic mode)
- SPA distributes problematic cases to the Calibration Scientist and the Help Desk (QCL2/QCL3 depending on the problem being into the instrument or the scientific data).
- All possible cases of rescheduling go to QCL3.

⁴ See [] for a more detailed explanation on the Standard Product Generation's different operation modes

The following diagram shows also this process:



See also APPENDIX A for a detailed description of the data flow.

6.2 Kayako eSupport

Kayako eSupport is the software chosen to follow up the different steps into the quality analysis process and the administration of the Quality Reports. Some of its main characteristics that made this software suitable for us are (see also RD-1):

- Departments: Your ticket starts with departments. You can maintain an unlimited number of departments (such as ESAC or Instrument departments) and enforce access permissions to each for individual staff users or across entire staff teams. Departments can be made either public (tickets can be submitted directly to the department by your support desk users) or private (for example, for internal purposes). Tickets can be moved between departments with ease.
- Ticket alerts: A ticket alert is processed (based on a set of criteria or rules) whenever a certain ticket-related action occurs, notifying by e-mail (or SMS) all staff users or one staff user of the event. For example, a ticket alert can be configured to e-mail staff users when a new ticket is created. Ticket alerts can be public or private. A public ticket alert is executed for all staff members, whereas a private ticket alert is executed only for yourself.

- Reports: A wide range of reports and data mines can be generated by a powerful reporting system in a clear, intuitive interface. Reports can be drilled down by time spans, departments and by individual staff users. Reports for tickets cover work reports (a daily diary of tickets handled), departmental summaries, service level reports (response time vs. SLA plan overviews) and response time reports.

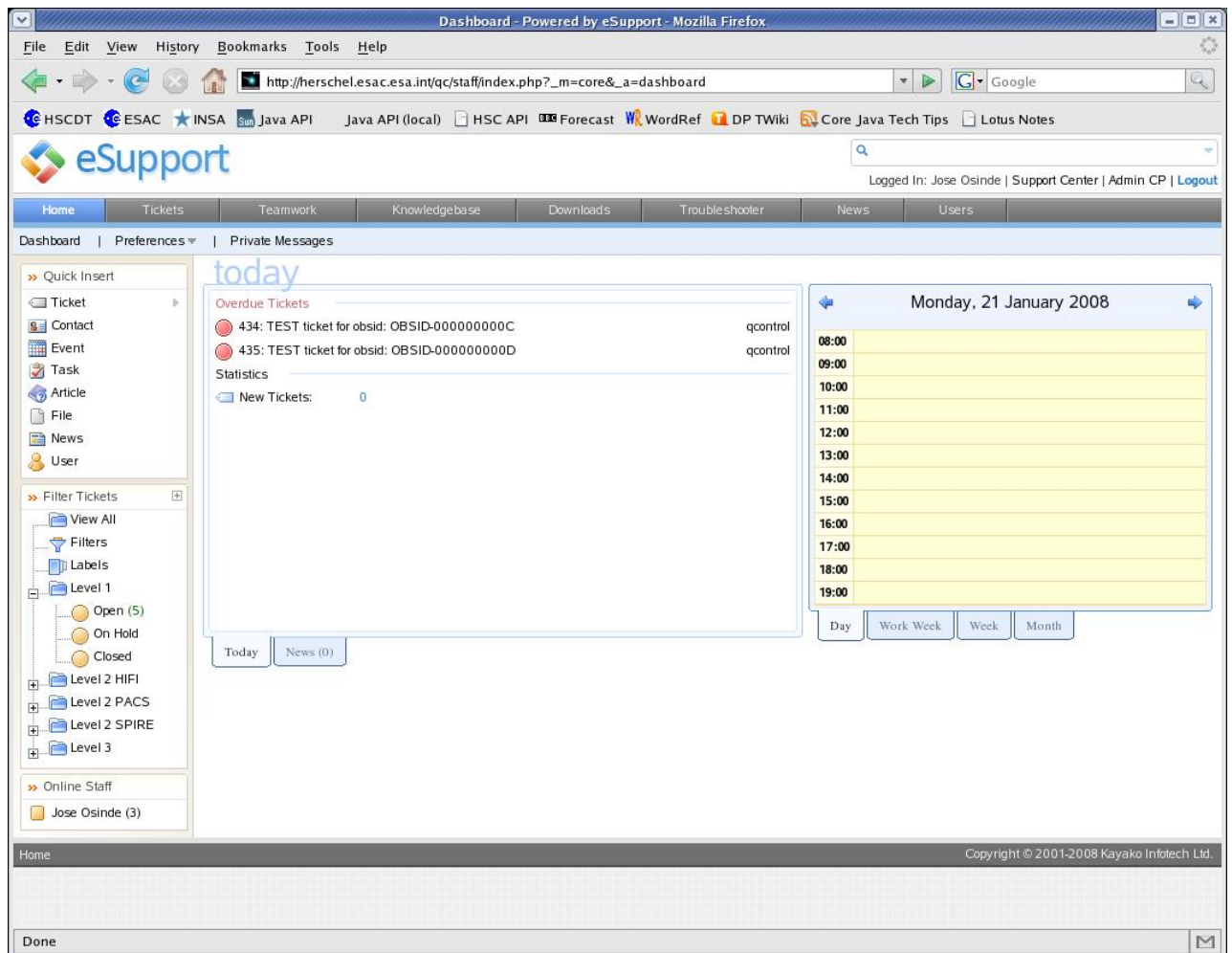
6.2.1 ACCESSING THE SYSTEM

Kayako eSupport is a web-based application and it can be accessed through a web browser from any computer with Internet access. To login the system, a user must be previously register by the administrator as a new staff member into the Kayako eSupport system.

Current information about the server URL used for quality control can be found in the next section.

6.2.2 MANAGING TICKETS

Staff users can log in to the staff control panel to review and manage the assigned tickets (review the quality data linked to a ticket, respond to tickets, change a ticket’s status, move tickets to other departments, etc).



See [RD-1] for further information on how to use the Kayako eSupport application.

The data flow that represents the steps that a given Quality Report can follow into the quality analysis is represented here as the transitions of a ticket between the different departments (TBC):

- **Level1**, the entry point for all the quality analysis is represented in Kayako eSupport as a new ticket into the Level1 department. Tickets under this department are assigned to the SPA. The SPA is responsible of reviewing the Quality Report linked to these tickets and proceed to its closure if nothing wrong was detected (tagging the observation as PASSED and closing the ticket) or moving/forwarding the ticket to a different department according the nature of the problem detected and the level of analysis required.
- Quality analysis **Level2** is mapped in three different departments (one per instrument). When a ticket is moved/forwarded to one of these departments, a Calibration Scientist for the corresponding instrument will be assigned to it. The CA can check the notes on the ticket and look into the Quality Report looking for information related to the problem reported.

During this process, the CA can also forward the ticket to a Instrument Expert into the instrument teams for a further analysis of the data. The IE then should inspect the Quality Report and notes attached to the ticket in order to find the possible problem.

The conclusions of this analysis should be reported back to the CA and the CA to the SPA following the ticketing system: The IE should forward the information back to the CA, adding the result of his/her analysis and, probably, attaching any useful data file. The CA should then reply to the SPA with this information and any additional comment he/she want to add.

Finally, the SPA will gather this information and update the Quality Report accordingly. If no further analysis is needed, the SPA closes the ticket. In other case, the SPA moves/forwards the ticket to the next Level of quality analysis.

- **Level3** of quality analysis is responsibility of the HelpDesk team. Whenever a ticket is moved to this level, one of the member of the team should be assigned to it for the analysis of the Quality Report associated in the same way the SPA and CA do in the other levels. All the information should be translated to the SPA through the ticketing system and the ticket returned to the Level1 once analysed. It is responsibility of the SPA to update the Quality Report and close the ticket if the analysis is finished.

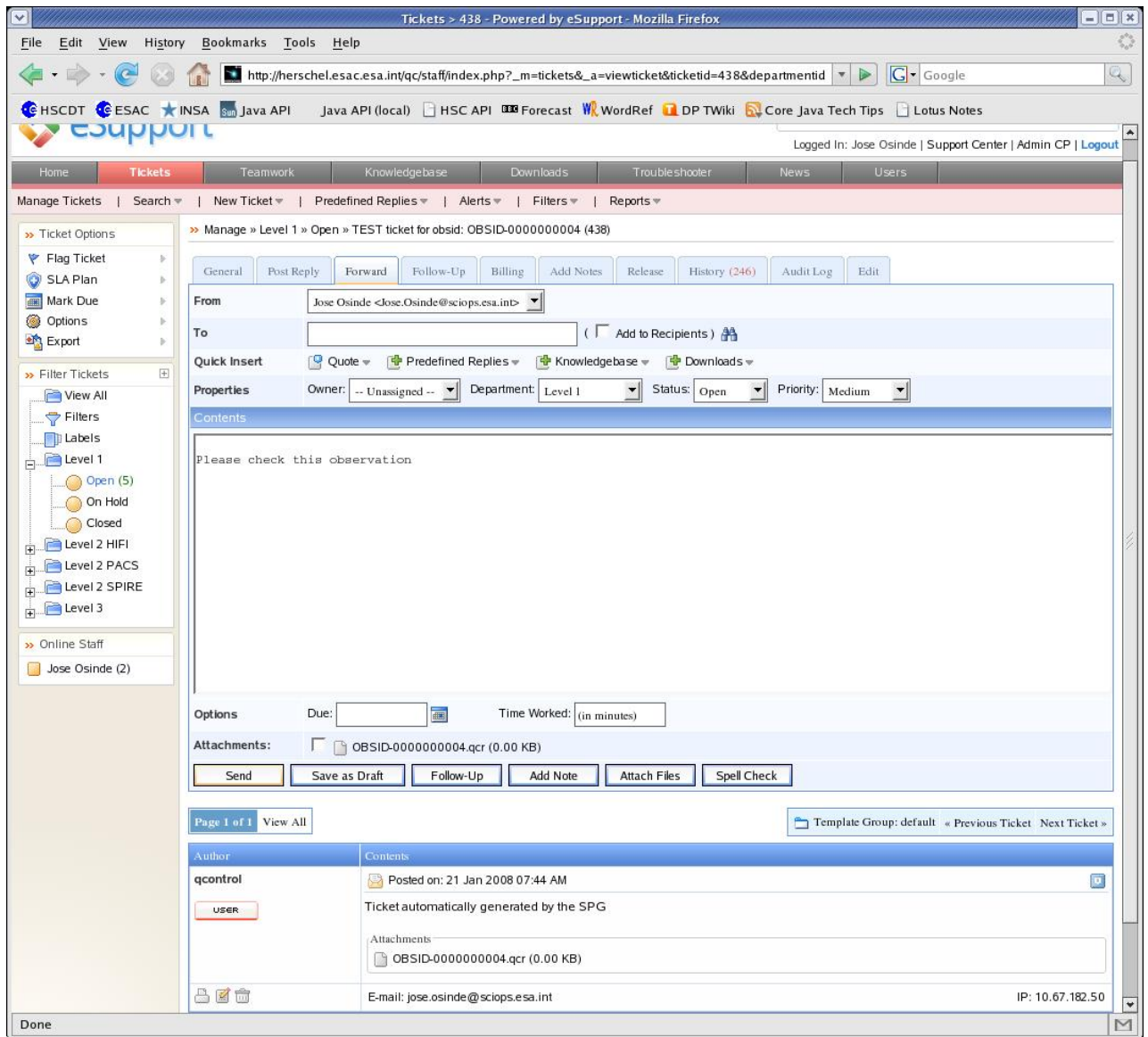


Image: Forwarding a ticket

6.2.3 CONFIGURING AN ALERT

A ticket alert in the Kayako eSupport system is processed (based on a set of criteria or rules) whenever a certain ticket-related action occurs, notifying by e-mail or SMS all staff users or one staff user of the event. For example, a ticket alert can be created to e-mail add staff users when a new ticket is created of priority urgent.

Ticket alerts can be public or private. A public ticket alert is executed for all staff members, whereas a private ticket alert is executed only for yourself. To read more about alert configuration into the Kayako eSupport system, please refer to the [RD-1].

7 PHYSICAL DESCRIPTIONS

7.1 Kayako eSupport

This application is deployed in one of the ESAC public servers under the following URL:

<http://herschel.esac.esa.int/qc/staff/>

8 ASSUMPTIONS AND OPEN ISSUES

IR-001: Products can only be declared public or private as a whole. One Product can not share public and private fields at the same time.

IR-002: Current interface with the HSA requires the use of the Java Message Service (JMS), but this software is not part of the HCSS reference platform at the moment.

OI-001: ICCs must specify the list of public and private flags used in their Quality Report. These flags must follow the Product Definition guidelines and must be approved by the Product Definition Group. Product Definition Group should standardize these flags unifying criteria and proposing a common set, if applicable.

OI-002: If applicable, ICCs must provide a map between private flags in the Quality Report and public flags in the Quality Report Summary.

OI-003: The procedure to create the Quality Report Summary from the original Quality Report must be specified. It can involve automatic but also manual steps.

OI-004: Proposed Quality Log categories must be agreed.

OI-005: Preview Product must be defined.

9 APPENDIX A: QUALITY CONTROL ANALYSIS FLOW

9.1 QCL0 -> QCL1 - No errors identified

Scientific Product Analyst (SPA) checks QCR generated on QCL0 and finds no errors.

- QCR is marked as analysed on QCL1
- QCR contains flag 'Passed'

9.2 QCL0 -> QCL1 -> QCL3 - MOC operations errors identified

SPA checks QCR generated on QCL0 and finds errors from the MOC operations reports.

- QCR is delivered to Help Desk (HD) for analysis
- QCR is marked as analysed on QCL1
- QCR is marked as delivered for QCL3

Help Desk is notified of the existence of an observation to be analysed for rescheduling:

Help Desk checks observation and decides it should be rescheduled

- QCR is marked as analysed on QCL3
- QCR contains flag 'Failed' ==> observation enters in MPS for rescheduling

Help Desk checks observation and decides rescheduling is not necessary

- QCR is marked as analysed on QCL3
- QCR contains flag as 'Passed' or 'Unknown'

9.3 QCL0 -> QCL1 -> QCL2 - Instrument errors with no rescheduling required

SPA checks QCR generated on QCL0 and finds errors related to an Instrument (malfunction, Out of Limits...)

- QCR is delivered to the Calibration Scientist for analysis
- QCR is marked as analysed on QCL1
- QCR is marked as delivered for QCL2

Calibration Scientist should be notified of the existence of an observation to be analysed.

Calibration Scientist checks observation and decides rescheduling is not necessary:

- QCR is marked as analysed on QCL2.
- QCR contains flag 'Passed'.

9.4 QCL0 -> QCL1 -> QCL2 -> QCL3 - Instrument errors with QCL3 required

SPA checks QCR generated on QCL0 and finds errors related to an Instrument (malfunction, Out of Limits...)

- QCR is delivered to the Calibration Scientist for analysis:
- QCR is marked as analysed on QCL1
- QCR is marked as delivered for QCL2

Calibration Scientist should be notified of the existence of an observation to be analysed.

Calibration Scientist checks observation and decides rescheduling is necessary:

- QCR is marked as analysed on QCL2
- QCR is marked as delivered for QCL3

Help Desk should be notified of the existence of an observation to be analysed.

Help Desk checks observation and decides rescheduling is necessary

- QCR is marked as analysed on QCL3
- QCR contains flag 'Failed' ==> observation enters in MPS for rescheduling

Help Desk checks observation and decides rescheduling is not necessary

- QCR is be marked as analysed on QCL3
- QCR contains flag 'Passed' or 'Unknown'

9.5 QCL0 -> QCL1 -> QCL2 - Processing errors with no reprocessing required

SPA checks QCR generated on QCL0 and finds Processing errors

- QCR is delivered to the Calibration Scientist for analysis
- QCR is marked as analysed on QCL1
- QCR is marked as delivered for QCL2

Calibration Scientist should be notified of the existence of an observation to be analysed.

Calibration Scientist checks observation and finds no problems

- QCR is marked as analysed on QCL2
- QCR contains flag 'Passed'

9.6 QCL0 -> QCL1 -> QCL2 - Processing errors with reprocessing required

SPA checks QCR generated on QCL0 and finds Processing errors

- QCR is delivered to the Calibration Scientist for analysis
- QCR is marked as analysed on QCL1
- QCR is marked as delivered for QCL2

Calibration Scientist should be notified of the existence of an observation to be analysed.

Calibration Scientist checks observation and finds it as a case for reprocessing:

- QCR is marked as analysed on QCL2
- QCR contains flag 'Processing Problem'
- QCR contains link to the pertinent SPR raised on the SPG problem

9.7 QCL4 -> QCL3 - User identified errors with rescheduling required

User checks observation and finds a problem:

- Help Desk mark QCR as analysed on QCL4

Help Desk checks observation and decides rescheduling is necessary:

- QCR is marked as analysed on QCL3
- QCR contains flag 'Failed' ==> observation enters in MPS for rescheduling

User receives a notification that the observation will be rescheduled

9.8 QCL4 -> QCL3 -> QCL2 -> QCL3 - User identified errors with no rescheduling required

User checks observation and finds a problem

- Help Desk mark QCR as analysed on QCL4

Help Desk checks observation and finds problems related to Instrument or SPG

- QCR is marked as analysed on QCL3
- QCR is marked as delivered for QCL2

Calibration Scientist is requested to analyse the observation.

Calibration Scientist checks observation and decides rescheduling is not necessary:

- QCR is marked as analysed on QCL2
- QCR is marked as delivered for QCL3

Help Desk marks observation as 'Passed' and notifies user

9.9 QCL4 -> QCL3 -> QCL2 -> QCL3 - User identified errors with QCL3 required

User checks observation and finds a problem:

- Help Desk mark QCR as analysed on QCL4

Help Desk checks observation and finds problems related to Instrument or SPG

- QCR is marked as analysed on QCL3
- QCR is marked as delivered for QCL2

Calibration Scientist is requested to analyse the observation.

Calibration Scientist checks observation and finds it as a possible case for rescheduling:

- QCR is marked as analysed on QCL2
- QCR is marked as delivered for QCL3

Help Desk is requested to analyse the observation.

Help Desk checks observation and finds it as a case for rescheduling

- QCR is marked as analysed on QCL3
- QCR contains flag 'Failed' ==> observation enters in MPS for rescheduling

Help Desk notifies user.

Help Desk checks observation and find it is not a case for rescheduling:

- QCR is marked as analysed on QCL3
- QCR contains flag 'Good' or 'Unknown'

Help Desk notifies user.

9.10 QCL4 -> QCL3 -> QCL2 -> QCL3 - User identified errors with reprocessing required

User checks observation and finds a problem:

- Help Desk marks QCR as analysed on QCL4

Help Desk checks observation and finds problems related to Instrument or SPG

- QCR is marked as analysed on QCL3
- QCR is marked as delivered for QCL2

Calibration Scientist is requested to analyse the observation.

Calibration Scientist checks observation and finds it as a case for reprocessing:

- QCR is marked as analysed on QCL2
- QCR contains flag 'Processing Problem'
- QCR contains link to the pertinent SPR raised on the SPG problem
- QCR is marked as delivered for QCL3

Help Desk is requested to analyse the observation.

Help Desk notifies user.