An Introduction to Quality Control

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Purpose of the QC

➤ **The final purpose of the QC is to provide an "innocent user" with a full characterization of the observation. This includes whether:**

✓ **The observation was successfully performed**
  Monitor the state of the spacecraft
  Monitor the state of the instruments
  Space weather information

  and processed
  Monitor the state of the pipelines

? **The intended science goals were achieved.**
  Was the observation executed with problems that could affect the science?
  More than: Was the science goal achieved?

➤ **All this information must be compiled in a "Quality Control Report" during the QC procedure and presented to the user in an understandable form ➔ "Quality Control Report Summary"**

QC Meeting: Introduction

QC Procedure

➢ **QC Level0** **An automatic QCReport is generated by the QCPipeline which contains:**

- • **Spacecraft general information**
- • **Pointing problems information**
- • **Space weather information** → **QC (Private/Internal) Flags**
- • **Instrument malfunctions, out of limits, telecommand errors**
- • **Problems during the processing**

➢ **QC Level1** **The QCR is analysed by an operator who will deliver the observation for further analysis to level 2 or level 3 following <u>very strict rules given by the internal flags</u>.**

➢ **QC Level 2** **The observation is delivered by the operator to the calibration scientist for further analysis (related to instrument performance and processing).**
   Any problem should be translated to one or more QC (Public) Flags
   Appropriate comments and explanations added to the QCR

➢ **QC Level 3** **The observation is delivered by the operator to the Community Support Astronomer for further analysis (in relation with the science case).**
   Any problem should be translated to one or more QC (Public) Flags
   Appropriate comments and explanations added to the QCR

➢ **QC Level 4** **The owner of the observation found a problem and via Helpdesk ask for further analysis.**

QC Procedure Flow

All observations will be manually inspected at least once during the mission
Under on-demand reprocessing, QC analysis will not be performed
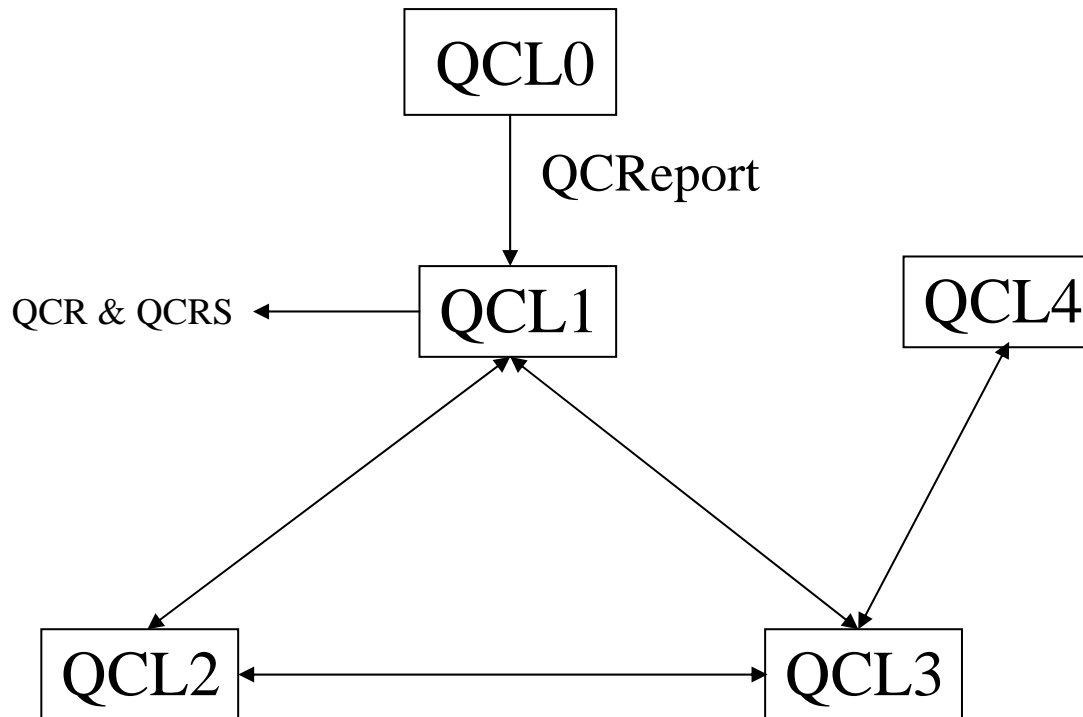
The result of the analysis in L2 and L3 always return to the SPA (L1)
Once the analysis is completed the summary report (QCRS) is generated

QC Meeting: Introduction

Private/Internal flags

What are they?

Messages and/or metadata==flags coming from the AUX products
Messages and/or metadata==flags coming from the SPG and QCP

What are they for?

They are needed for the QC analysis at:
- **L1 ➔ SPA to know when to deliver the observation to L2 and L3**
- **L2 ➔ CS to know whether the observation should be reprocessed**
- **L3 ➔ CSA to know whether the observation should be rescheduled**

QC Meeting: Introduction

Public flags == queriable flags

What are they?

They are self-explanatory and clear flags about the execution and processing of the observation

What are they for?

They constitute the final assessment of the observation as it will be seen by the proposers/users
They can be comple(men)ted by free text messages with all the appropriated explanations/values
They go into the QCReport Summary

```
++++++++++++++++++++++++++++++++++++++++++++++++
+++++                                      +++++
+++++    OLP QUALITY CHECK LEVEL 2    LIDT  +++++
+++++                                      +++++
++++++++++++++++++++++++++++++++++++++++++++++++


        TDTNR 28000450            AOT   L02
        START 96/235-18:24        DURATION (min)   19
        TARGET    NGC 4945 SW
        OBS_ID:      HSMITH
        PROP_ID:     IRBGALS
        Prepared by DP
```

ISR INFORMATION

```
        ISRWARN = OK

        NOOSL = 0        NOOHL = 0       NMW = 1        NCVW = 1
        NBTW = 0         NMVW = 0        SQLA = 0
        QL01 = 44        QL02 = 24       QL03 = 8       QL18 = 4        RCVE = 2        RM
```
+ ᴗE = 2

PIPELINE INFORMATION

```
        ERD
          VOLP        OLP_622   OLP software version number
          EXIT      DERIVE_ERD  Normal termination
        SPD
          VOLP        OLP_622   OLP software version number
          VCAL        CALG_31   CAL-G files version number
          EXIT                  Normal termination
        AAR
          VOLP        OLP_622   OLP software version number
          VCAL        CALG_31   CAL-G files version number
          LCHA          ADET    Value changes during scan
          EXIT                  Normal termination
          LEVEL-2 CHECK NEEDED - PLEASE INFORM LIDT
```

[handwritten: Sca-23]

[handwritten: Scan count resets at]

[handwritten: 253985199]

[handwritten: 5 lines.]

PREVIEW INFORMATION (see attached print-out)

```
            ------------------------------------
            IDT COMMENTS FOR THIS OBSERVATION
            ------------------------------------
```

[handwritten: A problem occured during the SPD stage which caused the scan counter to reset when it should not have done. This has already been reported as SPR 2480, which has been fixed for OLP v7. The SPD and AAR results are valid, except that the scan counter is not correct. Reprocessing with OLP v7 will correct this.]

```
        Last successful pipeline step? (TFS  (ERD)  SPD / AAR)
        Reprocessing ? Y/N  with version 7
        Rescheduling ? Y/N
        QC L3 needed? Y/N
```

```
        Date:  3/2/98          IDT Signature    A. Harwood
```

INFRARED SPACE OBSERVATORY eesa

Data Quality Report

Observation number: 521009040

Observation flags:

High glitch rate

Pipeline data reduction flags and caveats:

Caveats

Highly Processed Data Products are the result of further processing beyond the pipeline and/or using new, refined algorithms for which some of the pipeline data reduction flags and caveats may no longer be applicable:

Recommended HPDP (Default Dataset)

List of all HPDP available for this observation

Comments:

```
 High glitch rate. ~50% saturation level due to space weather leading to noisy data.
The source detection is on a 1-2 sigma level only.
```

QC Meeting: Introduction

QCR product == Quality Context

Field	Comments
Observation Id	Reference to the observation this instance belongs to
Software version	HCSS version, pipeline's version, ... (TBD)

State	Possible states are:
	   PENDING
	   PASSED
	   FAILED

Action	Legal actions depend on the value of the QualityContext's state. When the state value is "PENDING" the possible actions are: * DELIVERED FOR QCL1 * DELIVERED FOR QCL2 * DELIVERED FOR QCL3 When the state value is "FAILED" the possible actions are: * DELIVERED FOR RESCHEDULING * DELIVERED FOR REPROCESSING * DISCARD When the state value is "PASSED" the only possible action is NONE.

QC Meeting: Introduction

QCR product == Quality Context

Quality Flags	Most of the quality information generated during the SPG processing should fall under this category. A pre-defined list of quality flags should be defined per instrument. These flags will be stored as METADATA into the QualityContext as they should be composed of simple types (strings, numbers and booleans), but also allowing them to be part of the searching fields in any possible query. Two possible solutions are proposed: First proposal: * All the quality flags are defined as string METADATA parameters. * The METADATA tag constitutes the actual quality flag, ie: "SAT_TEMP_OUT_OF_RANGE" * The METADATA value will be a string with an optional comment., ie: "temp value X for a range of [a, b]" Second proposal: * Quality flags can be declared of any of the legal METADATA types * The METADATA tag is just a flag identifier, ie: "SAT_TEMPERATURE" * Quality information is included as a string, number or boolean into the METADATA value, in this example: LongParameter(18). Also common to the two proposals (TBC): * Only the flags that are meaningful for the current observation are included into the QualityContext. * Quality flags can be declare public or private.

QC Meeting: Introduction

QCR product == Quality Context

Pipeline's logs	**A table containing all the logs produced during the pipeline's execution, including those in the pre and post-processing SPG phases.** **The HCSS framework provides also additional categories to use into the Loggin 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).**
Previews	**Previews or snapshots of the scientific data. TBD**
Users' comments	**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 QualityContext, the SPA is the responsible of updating the QualityContext whenever a new input must be included. The fields stored for every comment are:** *** Time stamp: when the comment was created** *** User: Identifier of the person writing the comment** *** Text: the comment itself as a string** **As for the quality flags, these comments can be tagged as public or private.**