HiCat User Scenarios

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Version History:
1.00 23JAN04 Keszthelyi
1.01 27JAN04 Keszthelyi
1.02 28JAN04 Keszthelyi – incorporating earlier documents.
1.03 28JAN04 Keszthelyi – deleting some obsolete queries from the earlier documents.
1.04 10FEB04 Keszthelyi – adding discussion from HiTECH telecons, e-mails.
1.05 20FEB04 Keszthelyi – incorporating results of first test queries. Started reformatting document, moving some queries to new categories.
1.06 23MAR04 Peng – filling parts of query solutions.
1.07 25MAR04 Keszthelyi – editing version 1.06
1.08 31AUG04 Keszthelyi – updating document.

Objective: This document is intended to provide examples of the types of queries that the science team expects to request from HiCat during its lifetime. This includes ground calibration, ATLO, cruise, and Mars orbit.

Organization: The queries are divided into 7 major categories. These are (1) Finding a place on Mars to Image, (2) Co-I Planning Activities, (3) Sequence Planning, (4) Commanding the Camera, (5) Producing Image Products, (6) Validating Products, (7) Finding that HiRISE Image I Want!

Color codes: **Green** = Operational on HiCat_Test. **Blue** = tested, but not operationally. **Dark red** = partially/incompletely tested. **Red** = failed test. **Black** = untested. In theory, this document's colors should be reset to black after each version of HiCat is released.

I. FINDING A PLACE ON MARS TO IMAGE

Note: These queries will come via HiWeb.

1. *Plain English*: **Input user registration information (name, e-mail address, limited personal information).**

SQL:
```
INSERT INTO HiRISE_Test.People(Username,First_Name,Last_Name,
            Email_Address, Zipcode, Country, Occupation, Password,
            Grade_Level)
VALUES ("weiki", "Weiki", "Bordona", "weiki@email.arizona.edu",
        "85719","USA","Doctor", "success", 26);
```

Notes: Example insert. Actual insert will be done by HiWeb.

Status: Insert function verified and utilized by HiWeb.

2. *Plain English* **:Determine if the 4 corner lat/lons for a potential suggestion overlap with an existing suggestion (e.g., left lower lat/lon of the potential suggestion is between the max and min lat of an existing suggestion and is between the min and max lon of the same existing suggestion). (note: this is to alert a user that the location has already been suggested).**

SQL:
```
SELECT *
FROM   HiRISE_Test.Suggested_Observations
WHERE Max_Latitude >=40.72
      AND Min_Latitude <= 40.56
      AND Max_Longitude >=78.88
      AND  Min_Longitude <=78.81
```

Notes: Suppose the 4 corner lat/lon is: Max_Latitude =40.72 AND Min_Latitude = 40.56 AND Max_Longitude =78.88 #AND Min_Longitude =78.81. Actually query will be handled by HiWeb.

Status: Query functions, but has not been executed by HiWeb.

3. *Plain English*: **Input suggested image parameters (min/max lat/lon, minimum resolution (i.e., max binning mode), viewing geometry, seasonal constrains, science rationale, etc.).**

SQL:
```
INSERT INTO HiRISE_Test.Suggested_Observations
            (Max_Latitude,Min_Latitude,Max_Longitude, Min_Longitude, Max_Binning,
             Max_LsubS,Min_LsubS,Science_theme,Science_Rationale,Suggestor)
VALUES      (98.3,84.5,45.7,34.6,8,23.7,19.8,"fluvial and hydrothermal processes","fluvial and
             hydrothermal observation","Chris");
```

Notes: Example insert.

Status: Insert tested and functions. Need to verify that users cannot affect existing suggestions (unless they are the suggestor). HiWeb has executed these inserts. Final decisions on ability to edit one's own suggestions pending (HiWeb issue).

4. *Plain English*: **Locate all image suggestions within a lat/lon range. Return the lat/lon of the 4 corners of each.**

SQL:
```
SELECT   Image_suggestion_ID,Max_Latitude,Min_Latitude, Max_Longitude,
         Min_Longitude
FROM    HiRISE_Test.Suggested_Observations
WHERE  Max_Latitude <=90
       AND Min_Latitude >=0
       AND Max_Longitude <=90
```

```
                    AND Min_Longitude >=0;
```

Notes: Suppose the lat/lon range is : Max_Latitude <=90, Min_Latitude >=10, Max_Longitude <=90 , Min_Longitude >=20. Users can change range values as they need.

Status: Internal tested. Currently under testing with HiWeb.

5. *Plain English*: Locate all the validated image products within a lat/lon range. Return the lat/lon of the 4 corners of each.

SQL:
```
SELECT   S.Image_suggestion_ID,SP.Observation_ID,Max_Latitude,Min_Latitude,
          Max_Longitude, Min_Longitude
    FROM    HiRISE_Test.Suggested_Observations AS S,
            HiRISE_Test.Suggestion_Planned_Observation_Relation AS SP,
            HiRISE_Test.Planned_Observations AS PO
    WHERE   S.Image_suggestion_ID= SP.Image_suggestion_ID
            AND   SP.Observation_ID = PO.Observation_ID
            AND   PO.Success_AcquiredTime NOT LIKE "0000-00-00 00:00:00"
            AND   Max_Latitude <=90
            AND   Min_Latitude >=0
            AND   Max_Longitude <=90
            AND   Min_Longitude >=0
    ORDER BY SP.Observation_ID;
```

Notes: This may need to look at the products table? The 4 corners are 4 pairs of lat/lon. This may fail to return images that are acquired, but not processed.

Status: Not tested in a meaningful way.

6. *Plain English*: Identify all the suggestions made by the current user. (note: This is needed if we are to allow the user to edit her/his suggestions).

SQL:
```
SELECT SO.Image_suggestion_ID,SO.Suggestion_Date,SS.Username
 FROM  HiRISE_Test.Suggested_Observations AS SO,
       HiRISE_Test.People AS P,
       HiRISE_Test.Suggestion_Suggestor_Relation AS SS
WHERE P.Username = SS.Username AND
       SO.Image_suggestion_ID= SS.Image_suggestion_ID
       AND P.Username like "%Tom%";
```

Notes: Suppose the user name is Tom. Users can change Suggestor name values as they need._{We do not want th user to be able to change the suggestor name.}

Status: Not tested in a meaningful way.

7. *Plain English*: Provide the number of unfulfilled suggested observations in the catalog. (The project wants us to keep track of what percentage of the suggestions we have imaged.)

SQL:
```
SELECT COUNT( DISTINCT S.Image_suggestion_ID) AS
                 Unfulfilled_Suggested_Observation_Number
    FROM    HiRISE_Test.Suggested_Observations S
            LEFT JOIN
            HiRISE_Test.Suggestion_Planned_Observation_Relation AS SP
            ON S.Image_suggestion_ID= SP.Image_suggestion_ID
            LEFT JOIN
            HiRISE_Test.Planned_Observations PO
            ON SP.Observation_ID = PO.Observation_ID
```

```
WHERE   PO.Success_AcquiredTime  LIKE "0000-00-00 00:00:00"
           OR PO.Success_AcquiredTime IS NULL
```

Notes: {This seems excessively complicated... “Not planned” is good enough to be called “unfulfilled”.}

Status: Not tested in a meaningful way.

8. *Plain English*: Provide the number of acquired images. (7&8 are needed to compute the raw probability that a given suggestion will be acquired)

SQL:

```
SELECT COUNT(*) AS ACQUIRED_OBSERVATIONS
FROM   HiRISE_Test.Planned_Observations
WHERE  Success_AcquiredTime NOT LIKE "0000-00-00 00:00:00"
ORDER BY Observation_ID;
```

Notes: Will be executed by HiWeb.

Status: Query tested. May need to be retested if field properties and default values change. Not executed by HiWe

9. *Plain English:* Confirm that all suggestions are made by valid users (i.e., they exist in the People table).

II. CO-I PLANNING ACTIVIES

Note: This excludes using HiWeb to examine locations on Mars.

1. *Plain English*: Identify all the unprioritized suggested observations with my science theme. Return the suggested image positions, suggested imaging parameters (including the need for color and/or stereo), the science justification, and the grade-level of the suggestor. (note: this is only allowed for Co I's and only for their given science theme).

SQL:

```
SELECT Center_Latitude, Center_Longitude, Max_Latitude, Min_Latitude,
        Max_Longitude, Min_Longitude, Need_Stereo, Need_Color,
        Science_Rationale, SO.Science_theme,Priority,Suggestor,Grade_Level
FROM    HiRISE_Test.Suggested_Observations AS SO, HiRISE_Test.People
WHERE Priority=0 AND SO.Suggestor=People.Username AND
        SO.Science_theme="fluvial and hydrothermal processes";
```

Notes: Will be executed by HiWeb. The SQL above lacks the imaging parameters (binning, seasonal constraints, viewing geometry constraints, etc. Open debate about whether Co-I's will be able to see/edit priorities for suggestions that are not under their science theme.

Status: Testing inadequate.

2. Allow me to input a priority for a given suggested observation.

SQL:

```
UPDATE HiRISE_Test.Suggested_Observations
SET       Priority=4, Date_Prioritized="2004-04-22 14:18:57"
WHERE  Science_theme="fluvial and hydrothermal processes"
          AND
          Image_suggestion_ID=7;
```

Notes: Will be executed by HiWeb. Suppose the Co-I's science theme is "fluvial and hydrothermal processes", the suggestion he/she want to prioritize is 7.

Status: Query tested, but not executed by HiWeb.

3. *Plain English:* List the top priority suggested observations in my science theme. Return the central latitude and longitude, predicted image size (in MBytes), science justification, lighting and seasonal constraints, and whether color or stereo is requested. (note: this is in preparation for the pre-TAG science team telecon).

4. *Plain English:* List the images acquired in the last planning sequence that pertain to my science theme. Return the data volume and present status of the processing of these images. (note: this is in preparation for the pre-TAG science team telecon).

III. SEQUENCE PLANNING

Note: Many of these queries will come via HiPlan.

1. *Plain English:* Find suggested stereo observations for which one observation has already been sequenced. Return suggested imaging parameters for this observations. (note: query from HiPlan)

2. *Plain English:* Find all suggested, but not sequenced or acquired, HiRISE observations within a range of longitude for a given latitude. Provide the suggested observation's center latitude and longitude, width, and length. List in order of decreasing priority. (note: query generated by HiPlan)

3. *Plain English:* Identify any observations or imaging parameters in the IPTF that are different from what w had planned.

4. *Plain English:* Identify any observations we thought we commanded that are overdue on the ground. List them by time order, including the Observation_ID, the time we sent the command to JPL, the time they acknowledged it, when they were supposed to have radiated it, and when we expected the data on the ground.

IV. COMMANDING THE CAMERA

Note: These queries will come from HiPlan/HiCommand

1. *Plain English:* Insert a new planned observation, linked to the suggestion(s).
Status: The HOGG does this.

2. *Plain English:* Insert imaging parameters (e.g., which CCDs to turn on, the TDI and binning modes for eacl the compression type, number of lines, and line time).
Status: The HOGG does this.

3. *Plain English:* Given an Observation_ID retrieve the planned imaging parameters.
Status: The HOGG does this.

4. ***Plain English:* List any CCDs that are listed as "on" but do not have imaging parameters specified.**

V. PRODUCING IMAGE PRODUCTS

Note: Many of these queries will come via the *Conductor* pipeline.

1. *Plain English*: List raw data files that were acquired (transferred from the RSDS) over a specified time range.

SQL:
```
SELECT Source_Pathname,Last_Update AS Raw_File_Received_Time
   FROM HiRISE_Test.HiDOG_Sources
  WHERE YEAR(Last_Update)=2004 AND MONTH(Last_Update)=2 AND
             DAYOFMONTH(Last_Update)=19
```

Notes: This is a common query that the HiROC staff will have to monitor the status of the processing pipeline The SQL above will return all raw files that the HiDOg conductor process modified in any way during the specified time period.

Status: Not verified on HiRISE.Test catalog.

2. *Plain English*: List any raw data file transfers that HiDog reported errors for during a specified time range Return the path to the log file containing the details of the errors.

SQL:
```
SELECT  Source_ID, Source_Pathname,Status,Last_Update
AS Last_Process_Time
FROM HiDOG_Sources
WHERE YEAR(Last_Update)=2004 AND MONTH(Last_Update)=2
    AND DAYOFMONTH(Last_Update)=19 AND
    (Status like '%1(%)' OR Status like '%-_')
```

Notes: This is required for the HiReport software which provides the user-friendly GUI for notifying HiROC staff of errors in the processing pipeline. The SQL above will work unless the conductor process is changed such that values other than “1” are used to indicate that a process failed.

Status: Not verified on HiRISE.Test catalog.

3. *Plain English:* Which acquired observations still do not have all the expected raw data files transferred from the RSDS to HiROC?

SQL:
```
SELECT Observation_ID, CCD_ID, Channel_0_Acquired__Identified_Time,
    Channel_1_Acquired_Identified_Time
    FROM   HiRISE_Test.Planned_CCD
    WHERE  Channel_0_Acquired__Identified_Time='0000-00-00 00:00:00' OR
               Channel_1_Acquired_Identified_Time='0000-00-00 00:00:00'
   ORDER BY Observation_ID,CCD_ID
```

Notes: This is needed to determine when RDR processing can begin.

Status: Unknown

4. *Plain English:* For a specified time period, list the EDRs that failed processing. Provide the name and location of the log file.

SQL:
```
SELECT  Source_Pathname,Log_Pathname,Status AS Error_Flag
    FROM HiRISE_Test.EDR_Sources
    WHERE YEAR(Last_Update)='2004' AND MONTH(Last_Update)='2' AND
  (Status like '%1(%)' or Status like '%-_')\G
```

Notes: This provides the information needed by HiReport to follow the processing pipeline.

Status: Unknown

5. ***Plain English:*** Provide a list of SPICE kernels that have been downloaded from NAIF for a specified time period. List “predict” and “reconstructed” SPICE independently.

SQL:

Notes: Eric also wanted "For each time kernel provide: (1) How many data gaps exist in the reconstructed CK and SPK files, (2) What is the time range for the reconstructed SPICE, and (3) What is the start date/tim of the most recent predict SPK kernel." The latter may require tools outside of HiCat? This query is necessary during RDR processing.
Status: Untested.

6. *Plain English* Identify the RDR products that will need to be reprocessed when an updated reconstructed SPICE kernel replaces an old kernel.
SQL:
Notes: This query will be run often to reintroduce EDRs into the RDR processing stream when new SPICE da has arrived.
Status: Untested.

7. ***Plain English:*** Identify which orbits are associated with the coverage of a given predict or reconstructed kernel.

8. ***Plain English:*** For a given observation, what are the reconstructed SPICE files that covers this observation? (note this query will be generated by RDRGen)

9. ***Plain English:*** What is the time range that a given "moving parts" or "gyro" file applies to?

10. ***Plain English:*** Given an observation, which "moving parts" and "gyro" files cover the time period of the observation?

VI. VALIDATING PRODUCTS

Note: This includes automated "verification" of the data products and input from manual product validation via the HiVali tool(s).

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1. *Plain English:* For a specified time period, return the list of EDRs produced with the raw data files used to produce them and the file with the commands that were transmitted to the spacecraft to acquire these observations.

SQL:

Notes: This is the first step in collecting the information to verify the information in the EDRs.

Status:

2. *Plain English:* Compare the image parameters in the science data header with what was planned. Return only the names and values of fields that are different. (note: this may be part of EDRGen)

3. *Plain English:* Provide a list of image products that have been processed without errors but have not yet been validated by a human. Provide links to these products. (note: this should be part of HiVali)

4. *Plain English:* Search for products with >1% saturated pixels. Provide the predicted SNR, and the maximum, mean, and minimum DN value of the image product. (note: this would be an unusual manual quer for unusual troubleshooting)

5. *Plain English:* Sort mean dark pixel DN value as a function of one of the focal plane array temperature (as reported in the science data channel header). Restrict search to images that did not use a LUT (i.e., were in 14 bit/pixel mode). Return observation date, TDI mode, binning mode and line time along with the mean dark pixel DN value and the focal plane array temperature. (note: this type of manual query will be used to calibra the camera)

6. *Plain English:* Locate images with the first CCD (CCD RED0) powered on. Return links to image products (note: manual search during trouble shooting).

7. *Plain English:* List images validated during a specified time period, return name of image products with name of validator, problems noted by validator, and interesting features identified by the validator.

VII. FINDING THAT HIRISE IMAGE I WANT!

Note: many of these requests will come via HiWeb, but other requests may come from the science team.

1. *Plain English:* Search image products using specified ranges in the following parameters: Photometric angles (incidence, emission, phase), Image coordinates (center and corners), Pixel resolution, Pixel aspect ratio Observation dimension (in pixels and kilometers), Instrument operating modes, Instrument operating temperatures, Data compression type (compressed or uncompressed), Pixel type (8 or 14 bit), Time (SCET & SCLK), Season (LsubS), Local time, Mission Phase, Target (Mars, Star, Sky, Stim lamps, Phobos, Diemos), Spacecraft altitude, Target_center_distance, Slant Distance, North Azimuth, Sub-Solar Azimuth, Sub-Solar point (lat, lon), Sub-Spacecraft point (lat, lon), Solar Distance, Image skew, Data quality parameters. Return link to image(s). (note: HiWeb should generate this query)

1a. Restrict search to color images that cover a specific latitude-longitude coordinate. Return link to image (note: HiWeb should generate this query)

1b. Restrict search to only images with data at less than 1 m/pixel that cover a specific latitude-longitude coordinate. Return average SNR of image and links to images. (note: this may be a manual, rather than HiWeb, query)

1c. Locate images of Phobos. Return links to images.

2. *Plain English:* Locate images with Polar Science as the main science theme taken in springtime (Ls 0-90) th have overlapping MOC or HiRISE coverage and were taken in high-stability mode. Return links to images and notes from validators. (note: this would be a manual query)

3. *Plain English:* I have an image product that I know is supposed to be part of a stereo observation. Find the other observation of the stereo pair. (note: this query should be possible via HiWeb).

4. *Plain English:* List all the stereo pairs acquired to date, with their associations (i.e., return pairs of images that together make a stereo observation). (note: this query should be possible via HiWeb)

5. *Plain English:* For a given range of latitude and longitude, return all acquired stereo pairs with the followin information: phase, emission, and incidence angles, resolution, availability of color, validator's notes on image quality, and the coordinates of the 4 corners. (note: this query should be possible via HiWeb)

6. *Plain English:* Provide a report of the % of the file that is fill data for a specified product file.

SQL:

Notes: This helps a science user know if the image is worth downloading.

Status: