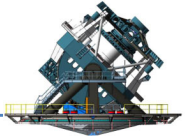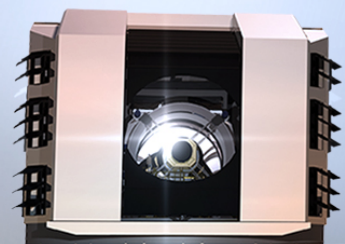**RFC-441 Status**

May 22, 2018

DMLT UW May 22–24, 2018

Request to adopt HiPS and MOC as standard DM data products

- RFC-441 has been adopted

- Two implementation tickets created for consequential document updates
  - DM-13967 Propose LCR adding HiPS and MOC to DPDD & DMSR as standard LSST DPs
  - DM-13978 Update LDM-151 to describe production of HiPS and MOC data products

- SUIT accomplishment so far
  - Access the HiPS registry services to get a list of HiPS images
  - Allow application to configure its 'featured' HiPS images list
  - Display HiPS up to level 25, along with FOV and HiPS pixel size readout
  - Display HiPS cubes and the proper 3rd axis value
  - Transition between HiPS images and regular FITS images when zoom in/out
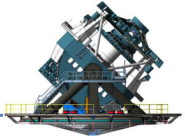 - HiPS grid drawing, DS9 region overlay on HiPS
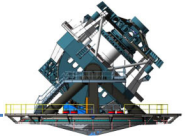
This requirement can now be edited to make the choice of HiPS clear

1.4.19 All-Sky Visualization of Data Releases

ID: DMS-REQ-0329 (Priority: 2)

Specification: Data Release Processing shall generate co-adds suitable for use in all-sky visualization tools, allowing panning and zooming of the entire data release.

Discussion: For example, this could mean HEALPix tiles suitable for use in a HiPS server. The exact technology choice has to be confirmed before understanding which format is required.

Recent Discussions

- See
  https://confluence.lsstcorp.org/display/DM/HiPS+discussion+at+Spring+2018+JTM

- Fairly extensive discussion of detailed questions and options

- Some salient ones are featured in the following slides
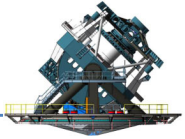
Refinement decisions needed

- HiPS creation
  - One for each band and for one reference colorization?
  - What maximum HiPS order (minimum pixel size) will be used for the precomputed maps? (Affects the storage requirements.)
    - High-order (fine-grained) tiles could be computed on the fly by an enhancement to the cutout service.
    - The Firefly HiPS implementation has the ability to "zoom in" from the highest resolution layer of a HiPS image to associated source images (e.g., our coadd patches).
  - Will we create statistical summary data (e.g., depth maps) in HiPS format?
  - Will we use hipsgen or write our own code?

- HiPS service
  - This becomes a new DAX service
    - Requires some basic registration steps to be performed in addition to providing the service itself
  - Relatively trivial if it is just serving static files via HTTPS
    - Must enforce data access rights
      - Will we expose HiPS data above a certain pixel scale to the world?
    - Less trivial if we dynamically serve the higher-order tiles

Refinement decisions 3

- MOC
  - Creation of MOCs is intrinsic to building HiPS images with hipsgen
  - We should ensure that our tools also do this
- Special programs issues
  - Creation of HiPS maps for deep drilling data, MOCs for special-programs regions of the sky
- HiPS catalog support
  - HiPS catalog service enhances the usefulness of community tools
  - A stripped-down Object catalog including Object IDs could provide a useful gateway for other tools to seed detailed queries into LSST data
  - Firefly can already overlay ordinary catalog queries on HiPS images
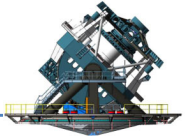
Refinement decisions 4

- HEALPix in the data products
  - Will we compute and store HEALPix coordinates for our catalog entries? Will we index on them?
    - Indexing on them should facilitate intersection of our data with MOCs from other surveys
    - Will Qserv be able to use a MOC to spatially constrain a search?
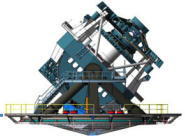
Further possibilities

- Use of HiPS to support visualizing focal-plane images
  - This is a reasonable solution both as a stopgap and as a final format for visualizing FP images on-sky
    - We are experimenting with this now – relies on the Firefly zoom-in-to-source-image behavior already implemented
    - Would we persist focal-plane HiPS images for every visit?
  - As an engineering tool, it may be preferable to zoom through a hierarchy on a nominal square grid of pixels representing the full focal plane. (Much of the Firefly HiPS implementation would be usable.)

- Time-dependent coverage possibilities
  - Generate a MOC and a HiPS catalog of alerts for each night

Plans

- Under DM-13967, we will file an LCR in June to put the basics into the DPDD and LSE-61
    - This will include a cost estimate for the disk space impact of the statically generated HiPS (and MOC) data. We will use the LCR process for the decision-making on the HiPS order to support.

- The consequential RFC on LDM-151 (see DM-13978) can then be used to evaluate some of the finer-grained options