



An Overview of DKIST Operations Commissioning & Tools

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National Solar Observatory

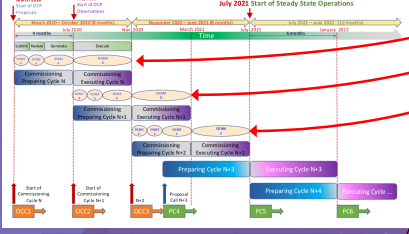
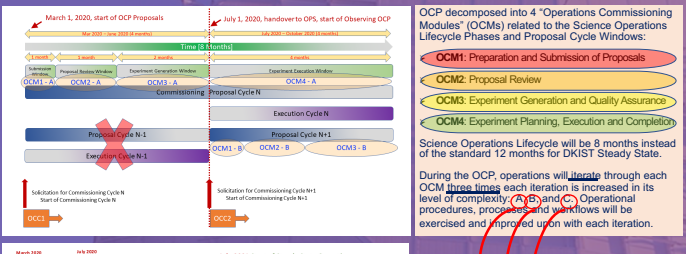


Abstract: The Daniel K. Inouye Solar Telescope (DKIST), a 4-meter class solar telescope, is nearing the end of construction on the summit of Haleakalā on the island of Maui in Hawai'i. It will be the largest solar telescope in the world when completed in summer 2020.

We present an overview of the DKIST Operations Commissioning Phase (OCP) which starts in July 2020. This phase will allow science operations to ramp up and transition into full, steady-state operations over the course of approximately one year. During this phase, Science Operations will specifically integrate, test and streamline its procedures by exercising through all steps of the DKIST's Science Operations Lifecycle. The Operations Commissioning Phase will also be used to complete documentation, procedures, and general workflow processes. The tools needed for the OCP will also be discussed in detail.

DKIST Transition: Construction to Operations Commissioning Phase

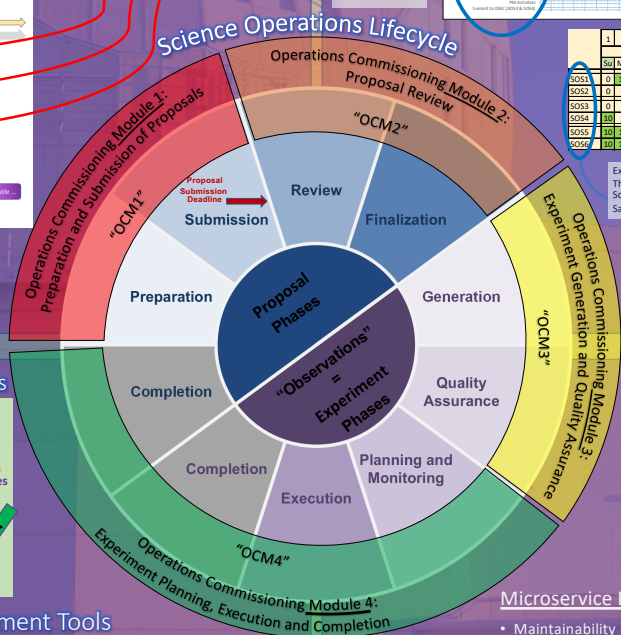
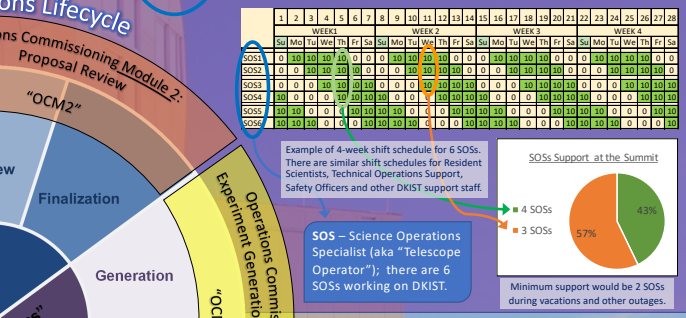
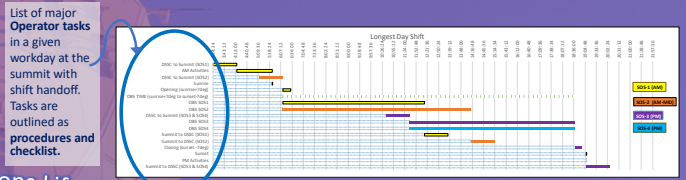
When?	Transition Phases of DKIST
June 2020	Construction ends. Includes completion Scientific Verification of DKIST instruments. Does not demonstrate full capabilities; does not use the DKIST Data Center; first call for proposals will be a "shared effort".
July 2020	Operations Commissioning Phase (OCP) "Observing" starts. Ramp up instrument usage and configuration complexity; validate instrument pipelines; commission the Data Center; adapt Critical Science Plan user cases into initial proposals in shared effort mode.
July 2021	Regular "Steady State" Operations starts. Regular call for proposals 2 times per year following the full Science Operations Lifecycle; all instruments are available; DKIST Data Center delivers level-1 products.



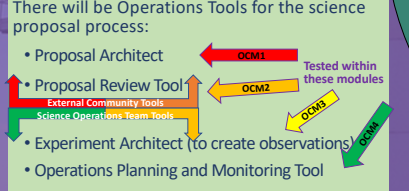
Glossary of Terms:
 OCC – Operations Commissioning Call (for proposals)
 OCP – Operations Commissioning Phase
 OCM – Operations Commissioning Module
 PC - Proposal Call

DKIST OCP Schedules/Shifts, Training, Procedures, Processes

- Need to **coordinate** a large number of staff daily at the **three DKIST sites**, all following their own procedures:
 - Maui, Hawai'i; DKIST Summit & DKIST Science Support Center (DSSC)
 - Boulder, Colorado: DKIST at the NSO Project Office
- Scheduling needs to factor in the needs of **science vs observatory maintenance**
- Need to manage and **coordinate summit support** for operations, provided by:
 - Technical Operations group ("TOPs")** - technicians and engineers with different backgrounds
 - working in shifts for morning activities (AM) and afternoon activities (PM)
 - covering almost the entire day supporting operations
 - Science Operations group ("SOPs")** - science operations specialists (SOSs), resident scientists (RSs)
 - working in two 10 hour shifts, at least two SOSs will provide daily support to perform observations
 - working in shifts, at least two RSs will support the SOSs
 - observing between sunrise (7→10 degrees) and sunset (7→10 degrees) of the position of the sun
- The **year** leading to the OCP is being used for SOS & RS training on procedures and tools, working closely with the Construction Integration, Test & Commissioning Team.



Proposal-related Tools for Operations



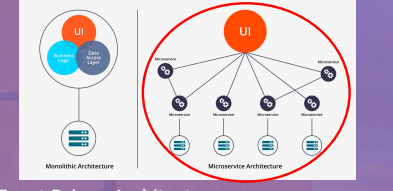
DKIST Science Operations Management Tools

Tool/Software	Description	Use
Confluence	A content management system; a wiki	For documentation, content management, communication, development Sprint management, SciOps procedures, etc.
Jira	An issue tracking system; integrates well with Confluence	For bug tracking and agile project & task management
Jira Service Desk	A helpdesk request tracker; integrates well w/Confluence and Jira	For receiving, tracking, managing requests/bugs from customers
Slack	A Cloud collaboration hub with Instant Messaging (IM), screen sharing, file sharing, voice and video calls	For making announcements, sharing information, text chatting with colleagues, getting quick responses from staff, for quick (video) calls with screen share for troubleshooting problems
Calendar for Jira	A tool set for managing staff schedules, shift times	For scheduling coverage of operations on the summit as well as support staff at other DKIST locations
DropBox	A file hosting service; Cloud storage with file synchronization and client software	For the DKIST documentation repository; Construction project documentation delivery repository; file sharing for staff

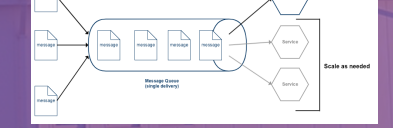
Researching Additional Science Operations Management Tools

- Reviewing tools with the following parameters:
- Possible integration with Google Calendar/GSuite
 - Possible integration with Jira and/or Confluence
 - Shareable & easy to use by both Science and Technical Operations
 - Calendar/Shift Scheduling software with statistical reporting/summary tools
- FacilWorks & Hippo** for Technical CMMS (Inventory) Atlassian add-on Apps:
- Forms within Jira/Confluence
 - Facility management within Jira
 - Connectivity to Google Drive & Sheets
 - Connectivity to DropBox & Box
- Researching These Tools**
- ** NEED Help Finding: Documentation Management System solution ****

DKIST Data Center: Microservice Design



Microservice Event Driven Architecture



Variety of COTS Tools/Systems across DKIST Operations

