# LESSONS LEARNED

## Kepler

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25 April 2012

# Basic parameters

| | |
|---|---|
| mission duration | 3.5 yr prime, extended by 4 yr |
| user base | Exoplanet, stellar & extragalactic communities |
| archive data volume | 3 yrs of time-series, 1.3 TB, 3.6 million light curves, 350 million retrievals |
| instruments | 116 sq deg CCD array, white filter |
| wavelength coverage | 420-900 nm |
| program model | survey and GO modes |
| proposals/cycle | ~100 |
| users/cycle | ~600 |
| funding model | Participating Scientists and GOs |
| default proprietary data period | none |

# Kepler's extended mission phase

- Prime mission ends in Sep 2012.
- From FY13, Kepler will deliver exoplanet survey data product to the whole community rather than a PI-led team.
- GO and community programs in planetary, stellar and extra-galactic astrophysics will continue as add-on science to the prime mission.
- No data collected will have a proprietary period.
- Kepler's extended mission challenges are to:
  - Develop and support a new and open exoplanet community that can deliver project goals.
  - Re-align an existing workforce, recruited originally to service a PI mission to service an open community.
  - Deliver data product that services both the exoplanet survey and other astrophysics.
  - Find the correct balance of resources between survey production and community support.
  - Retain the expertise of the previous PI-led Science Team.

# WHAT'S BEING DONE WELL?

# Highlight 1: Community Interaction

1. The prime, PI-led mission, was not scoped to interact with a community except through archive delivery and paper publication. Nevertheless, 79% of journal publications have come from a growing community with mostly un-scoped community support within the Project.

2. Community-driven success has led to radical evolution of product and direction within the Kepler Project during the prime mission.

3. Exploitation of the Kepler extended mission, both exoplanets and astrophysics, will be community-led.

# Highlight 2: Data Archives

1. Archive development and support was under-scoped in the prime mission. Kepler has depended upon the existing infrastructure at MAST to deliver data products to the community and development at NExScI to deliver products to the Science Team.

2. In quality and number, data products have evolved considerably at MAST in response to community exploitation of the archive. The combination of data products and open source tools now supplies a platform for the extended mission community.

3. Partnership with NexScI has allowed the creation of what will be a dynamic exoplanet characteristics archive and follow-up data sandbox.

# Highlight 3: User Support

1. Kepler provides unique and unforeseen resources for stellar and extra-galactic astrophysics. Numerous new user communities have developed before and since mission launch. These have grown both with and without project support. Even in it's PI-led phase, the Kepler project was redirecting resources to support a larger than anticipated user base, e.g. with a GO Office, archive scientists and sensitivity to conserving astrophysics within the data reduction pipeline.

2. No Kepler data will have proprietary period after FY12.

3. Open source software has been developed, and is in development, for community-led data analysis. This was not in the scope of the prime PI-led mission.

# WHAT ARE THE CONSTRAINTS IN CURRENT POLICIES?

# Suggestions and Concerns I
# Who does the mission serve?

1. Conversion from a PI mission to a community mission is not trivial and cannot provide a best-fit for the new community. Infrastructure, software, databases, workforce are no longer optimal.

2. There is workforce trauma and Science Team trauma converting from a PI mission to a community - individual rewards for staff working on a community mission are different.

# Suggestions and Concerns II
# How does Kepler select best targets? Current scheme is complex

- Guest Observer Program
  - Targets nominated by: anybody
  - Nominations assessed by: community TAC
- Kepler Asteroseismological Science Consortium
  - Targets nominated by: KASC members
  - Nominations assessed by: KASC oversight committee
- Primary Mission Survey
  - Targets are: pre-existing
  - Target quality assessed by: Science Office
- Other short cadence exoplanet targets
  - Targets nominated by: *TBD*
  - Nominations assessed by: *TBD*

# Suggestions and Concerns III
# TAC Support

1. Kepler proposal support staff are prevented by NASA from being GOs. This is unhealthy for their careers and Project development.

2. The legal concerns of NASA HQ over staff participation in the GO program and GO program review is a staffing challenge for the Project.

3. Support staff's scientific biases become hidden rather than out in the open.

# Summary

1. The timing of this meeting is convenient. Kepler is designing new management and procedures for a community extended mission.

2. The Kepler project has never seen guidelines over the operation of a community mission.

3. Kepler needs models and advice on which to base a conversion from a PI-led mission to a community-support mission.