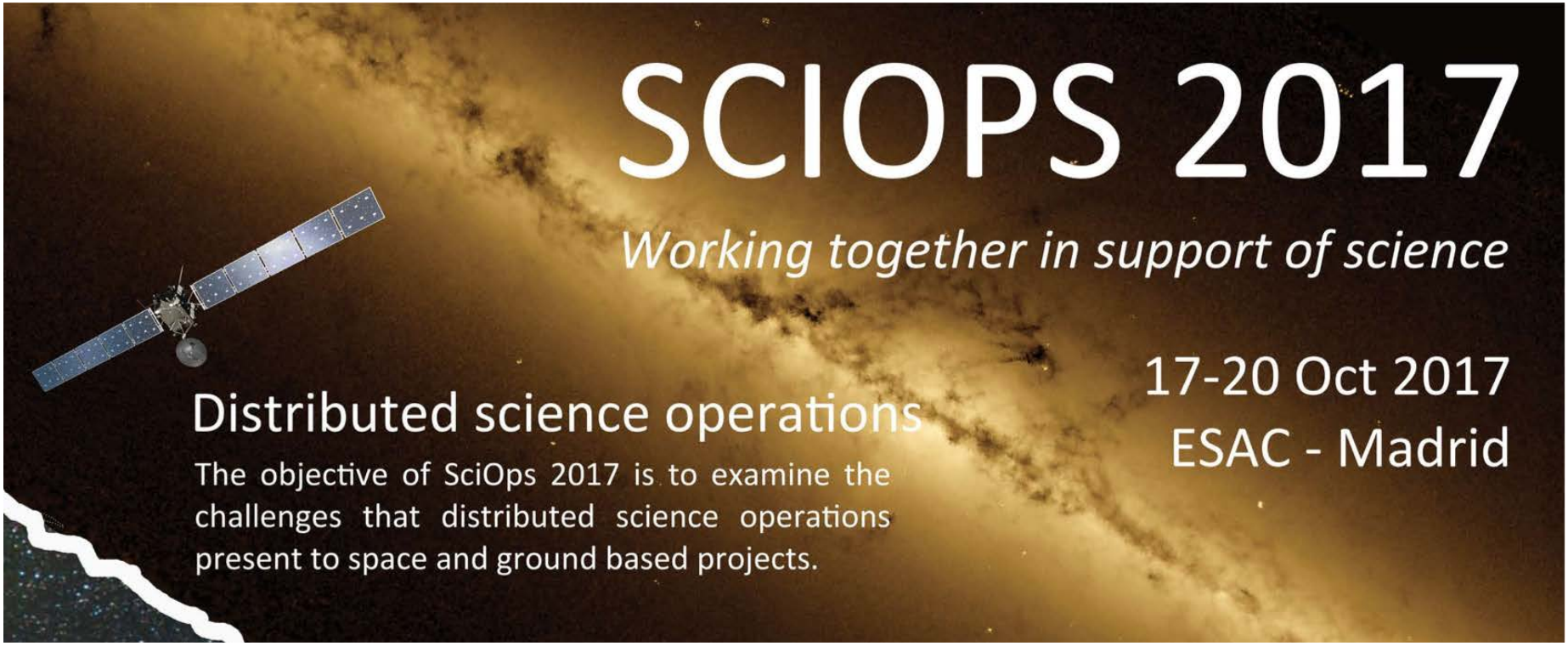
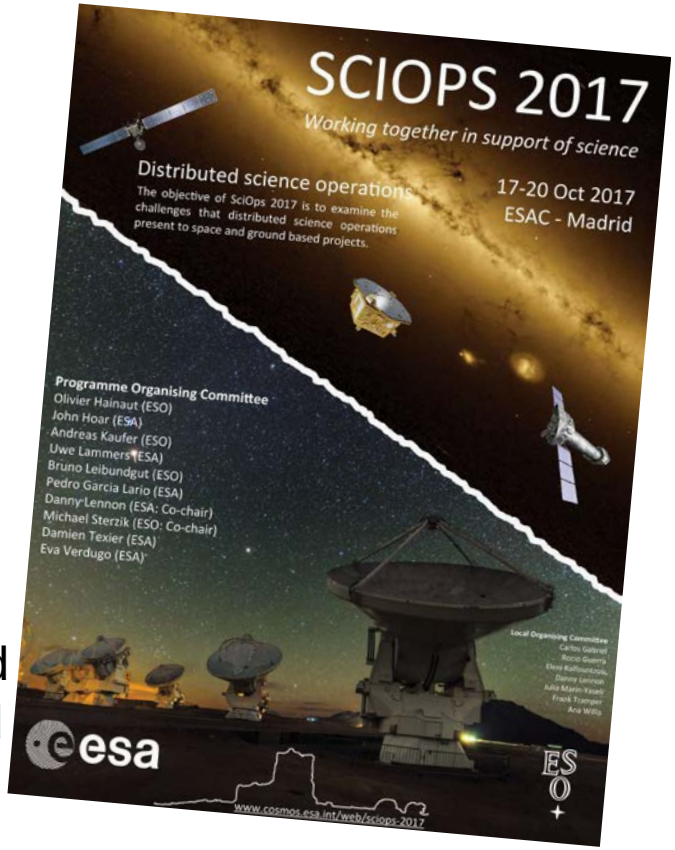



# Final Discussion and Concluding Remarks

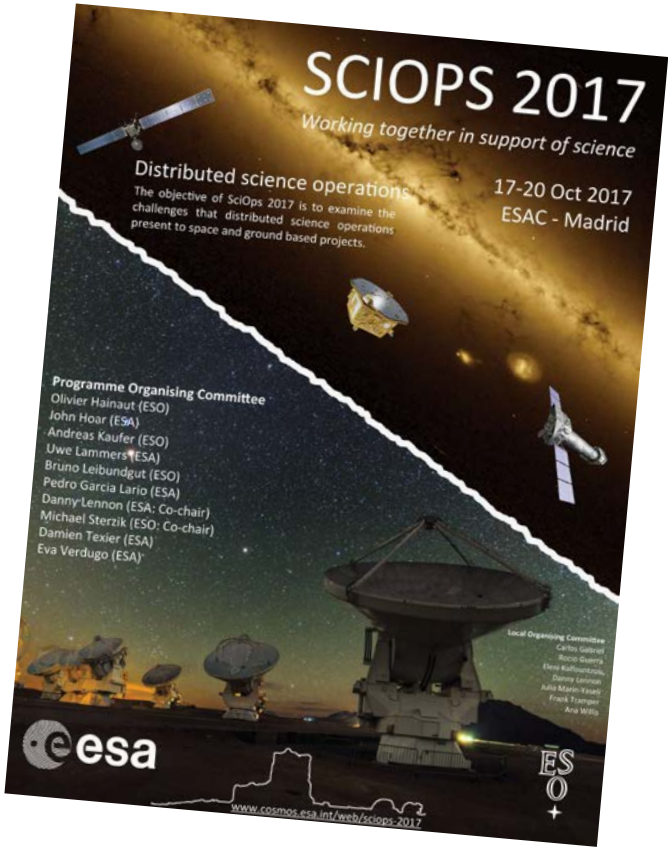
# Aims

- Examine the challenges that distributed science operations present to space and ground based projects
  - Compare and improve our processes and approaches.
  - Foster innovations.
  - Enable a more efficient use of our resources.
  - Establish and intensify collaborations, specifically exploring ways to enhance the value of the data through common strategies and practices.
  - Establish ways to collect community feedback and gauge the success and limitations of implemented solutions.
  - Explore synergies and mutual support of science operations for ground and space missions.



# Projects

- Heard from a range of exciting projects!
  - Euclid
  - Plato
  - LSST
  - SKA
  - CTA
  - 4MOST
  - ELT
  - LISA
  - Gaia
  - Rosetta
  - Mars Express
  - Solar Obiter
  - JWST
  - .....



# Topics

- Different projects have different levels of distributed operations
  - One-size does NOT fit all. Adapt processes and solutions.
  - Operation frameworks/interfaces/architecture/data model require early definition and standards. Same for SW.
  - Keep it simple. Don’t allow processes to get too complex.
  - Importance of functional CCBs to track changes
  - Trust: difficult to build, easy to destroy
  - Communication. Communication. Communication.
  - Efficiency vs Redundancy. Costs!
  - Mgmt of distributed teams requires (additional) resources. Costs!

# Topics

- Synergy between space & ground-based missions
  - Plan ahead!
  - Mission critical calibrations vs science harvest
  - Observatories vs Surveyors
  - agreed processes? (Gaia!, Euclid!!, Plato!!! 0$ for gbs)
  - Scientific carrots…
  - What other mechanisms we can use?
- Towards multi-messenger astronomy (GW, nu; EM)
  - are we ready/what is missing?

# Topics

- relevance of data curation/stewardship
  - Leverage greater legacy value and science impact through PI teams contributions of high level products
- Data access layers
  - ESASky: great look&feel, great usability!
  - ESO Science Archive Interface: (hopefully) great functionality (aggregated/facetted search,…)
  - Convergent technologies: Aladin (light), HIPS, VO…
  - Code to data: LSST, Euclid, SKA, etc... , jupyter
  - Towards  e-Sky …
  - How many kinds of user are there? How many axes?
  - How should we coordinate development?

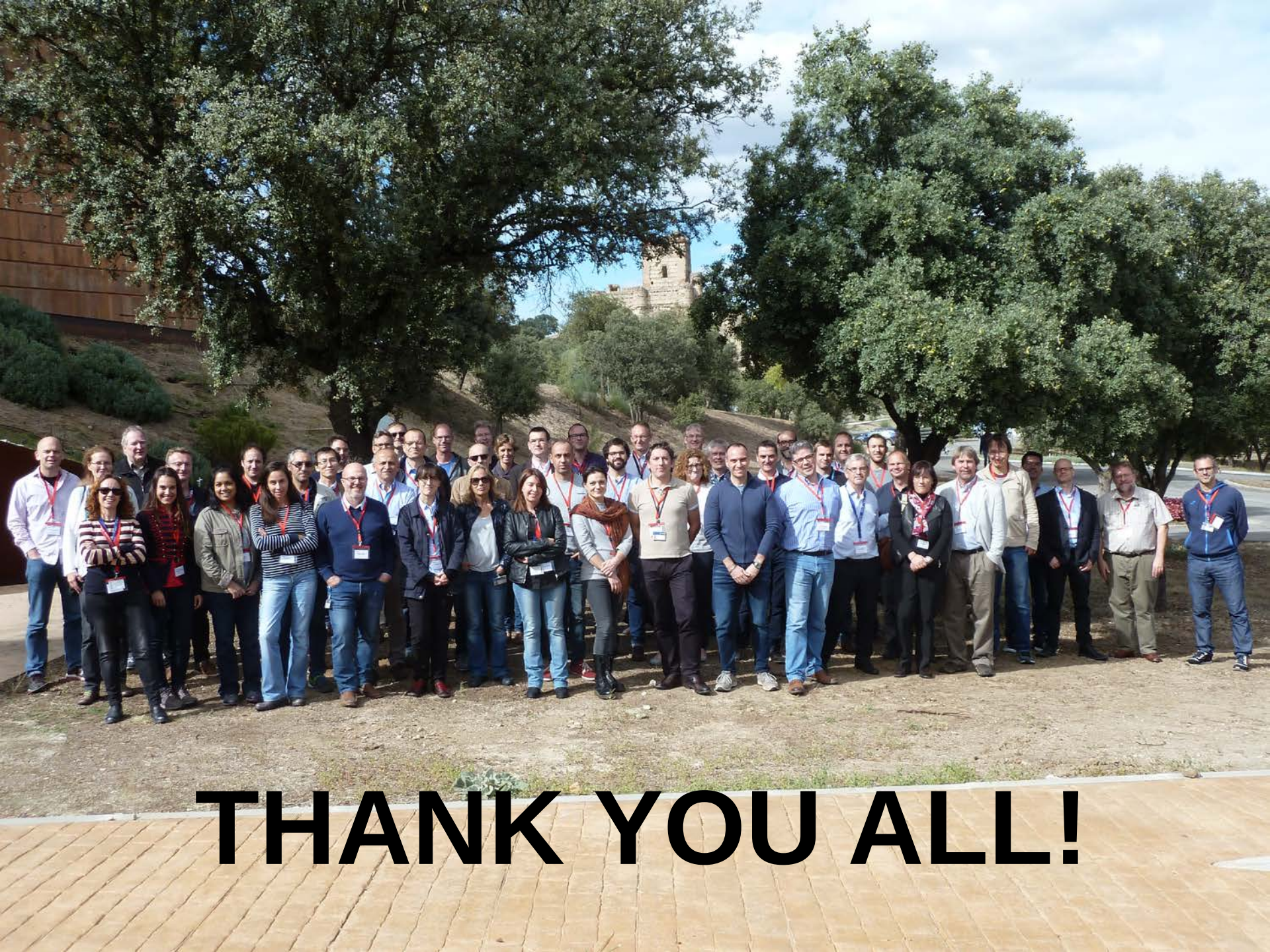
# Followup

- Share with the Community
  - workshop report (Messenger)
- ESO internal
  - Operation preparation and developments towards ELT
  - Keep coherence, adapt, and embrace innovation…
- ESA internal
  - ‘By design’ our missions are distributed and collaborative
  - Trend in Astronomy to greater complexity and greater synergy with ground based observations, planetary missions have been like this ‘forever’. (Will this change?)
- ESA + ESO
  - Maintain interactions
    - Scientists & Developers
    - Managers

# What's next?

- Next workshop
  - In about 2 years
- Topic?
  - What makes a mission/project successful beyond usual publication metrics?
  - Add your idea here….

# THANKS TO THE POC & LOC


THANK YOU ALL!