Context: “Community Initiatives” at STScI

General goal: facilitate broad community science, complementary to GO process
(see https://outerspace.stsci.edu/display/HPR maintained by Neill Reid) - includes:

- HST-ACS Ultra Deep Field (2003-4)
- Solar System Advisory Committee (2014)
- Exoplanet Advisory Committee (2016)
- HST Observations of Europa Advisory Committee (2017)
- Fundamental Physics with Hubble Working Group (2017)
- HST-LIGO Follow-up Working Group (2018)
- HST Ultraviolet Legacy DD program (2019)
- HST-TESS Advisory Committee (2019)
- Dual Anonymous Review Workshop (September 25, 2019)
HST Ultra Deep Field (HUDF) and Frontier Fields (HFF): Initial steps

• Each project involved discussions (and ongoing iterations) between STScI, Project, and community (including STIC/STUC)

• Overall identification of scientific need for each program, supported by community

• External Scientific Advisory Committees set up to define/recommend science goals:
  – HUDF Scientific Advisory Committee 2002 (chair: Ron Ekers)

• The HDFI Working Group solicited white paper input from broad community (due Aug 2012):
  – science inputs included: deep COS spectr.; grism spectr.; another HUDF; cluster lens fields; and others

• With external committees having defined and recommended overall science goals, STScI would then become responsible for:
  – Implementation of the program (incl. instrument-specific details)
  – Execution of the observations (STScI Scheduling Working Group)
  – Calibration and data processing through to final science products (STScI Data Working Group)
  – Distribution of high-level science data archive products (STScI Science Products Working Group)
  – Frontier Fields also had additional coordination with Chandra and Spitzer, and solicitation of theoretical model work by external community Lens-model teams (also delivered to STScI archive)
HFF model for Community Science Planning and Implementation

HDFI Science Working Group
- review white papers;
- collect community input
- set science goals, strategy
- set obs. requirements (number of targets, depth, ..)
- science advisory group

Astronomy Community
- write white papers
- informal input to target selection, obs. plan
- related HST GO/archival/theory programs
- funded + unfunded lensing models
- ancillary programs (ALMA, Chandra, VLT, ..)
- review committees (STUC, TAC, mid-term)
- analyze public data with public models; do science!

STScI Implementation Team
- observational planning (target choice, detailed design, scheduling)
- data pipeline + calibration (multiple versions/releases; improved calibration)
- lensing model funding + coordination
- data & model releases
- cross-observatory coordination (Spitzer; Gemini)
- ancillary data clearinghouse
- communication with community (blog, email list, public talks, formal reviews)

(from a presentation by J. Lotz)
HST Ultra Deep Field (HUDF) and Frontier Fields (HFF): Implementation

Implementation of these large programs led to long term benefits for the community:

- Resolving scheduling challenges led to solutions that benefited full community:
  - eg, improvements in scheduling to reduce impact of bright source persistence on subsequent observations

- Resolved calibration challenges were incorporated in pipelines (benefiting future GO/AR programs):
  - HUDF led to improvements in low-level bias, flatfield, and distortion calibration
  - HFF led to improvements in persistence modelling and removal, mitigating the impact of time-variable sky emission lines, and astrometric alignment improvements
  - resulting improvements in code also made available to community for their use in other programs

- Archive distribution mechanisms were improved to enable broader community science:
  - mosaics all aligned to a common pixel grid, matching catalogs and other products (incl HFF lens models)

Resulting high quality science data products enabled immediate science by community:

- community-led papers submitted starting immediately after data release in each case, also many subsequent proposals by community on all major ground+space facilities
- subsequent projects leveraged the original datasets and theoretical models delivered by community
HST Ultra Deep Field (HUDF) and Frontier Fields (HFF): Outcomes

- Implementing these observational programs as community initiatives freed up the community to focus their resources on the science, and on a “level playing field”
- Providing all the high-level science data products to the entire community, as soon as they were available, helped ensure more equal access to the resulting science, to all researchers
- Solutions to challenges in implementing and execution could be propagated to the broad community (incl improvements in scheduling, calibration, and data reduction software)
- Follow-up with other facilities more easily enabled by having the high-level data products distributed as soon as they were available.

Frontier Fields full mosaics (prime + parallel fields)

HFF lensing models (from external teams)