



4MOST – 4m Multi-Object Spectroscopic Telescope

Science Operations

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www.4MOST.eu



ASTRON



Principles of operations for participating surveys

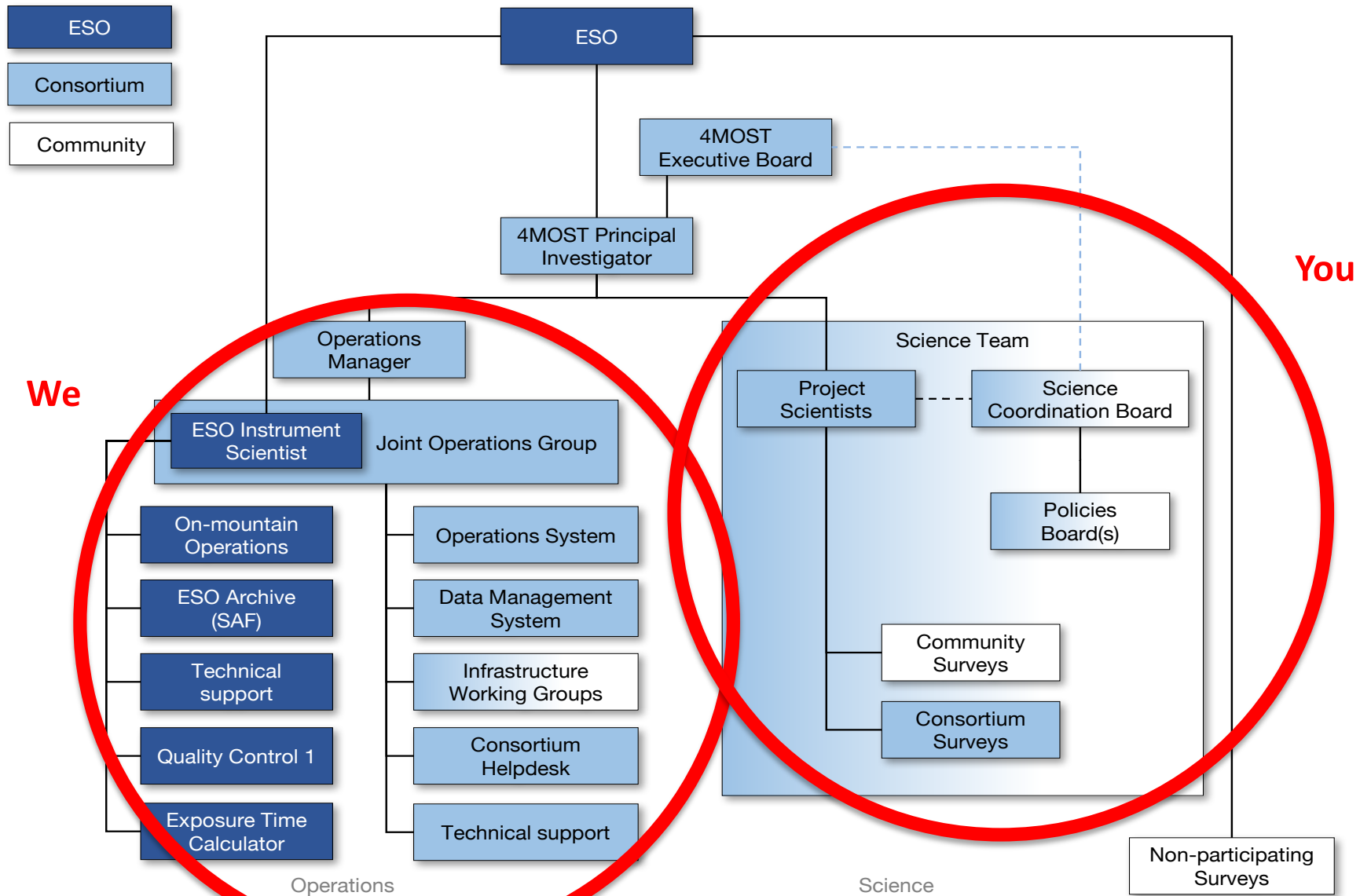
- All participating surveys collaborate in the **Science Team**, also on science infrastructure
- Consortium **Operations Group** takes over tasks normally carried out by scientists
- **Progress reporting and survey strategy parameterization** allow ESO to exercise oversight role

“Science Operations”



- “Joint Operations Group“ (JOG): A group of people from the consortium who will run 4MOST operations in Europe.
- Separate from, but closely linked to ESO, who will run the instrument, VISTA, a public archive, select proposals, etc.
- The precursor to the JOG is called the “Operations Development Group” (ODG): talking to you now.

Organisational view

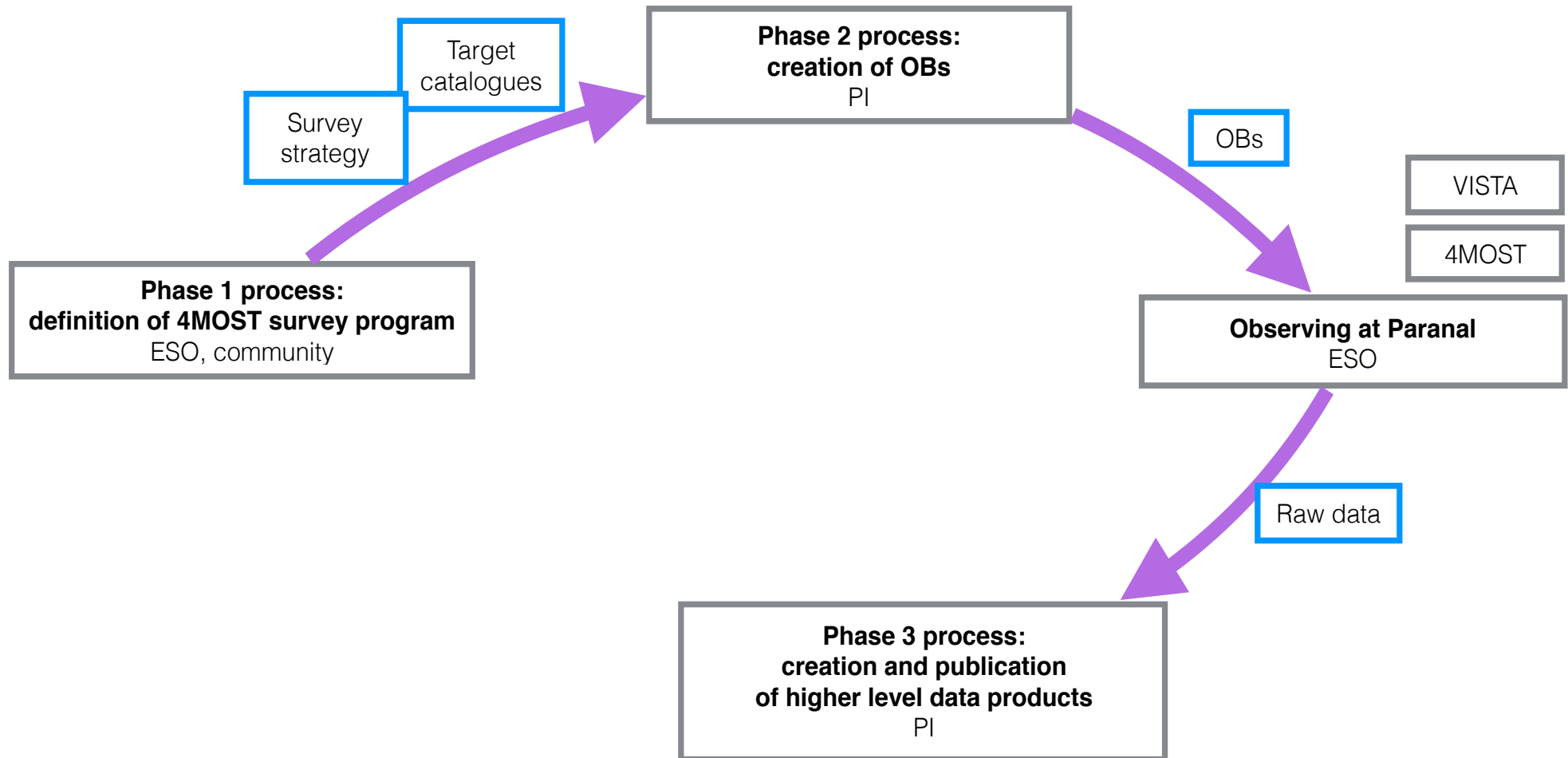


Distinction between GTO and other surveys

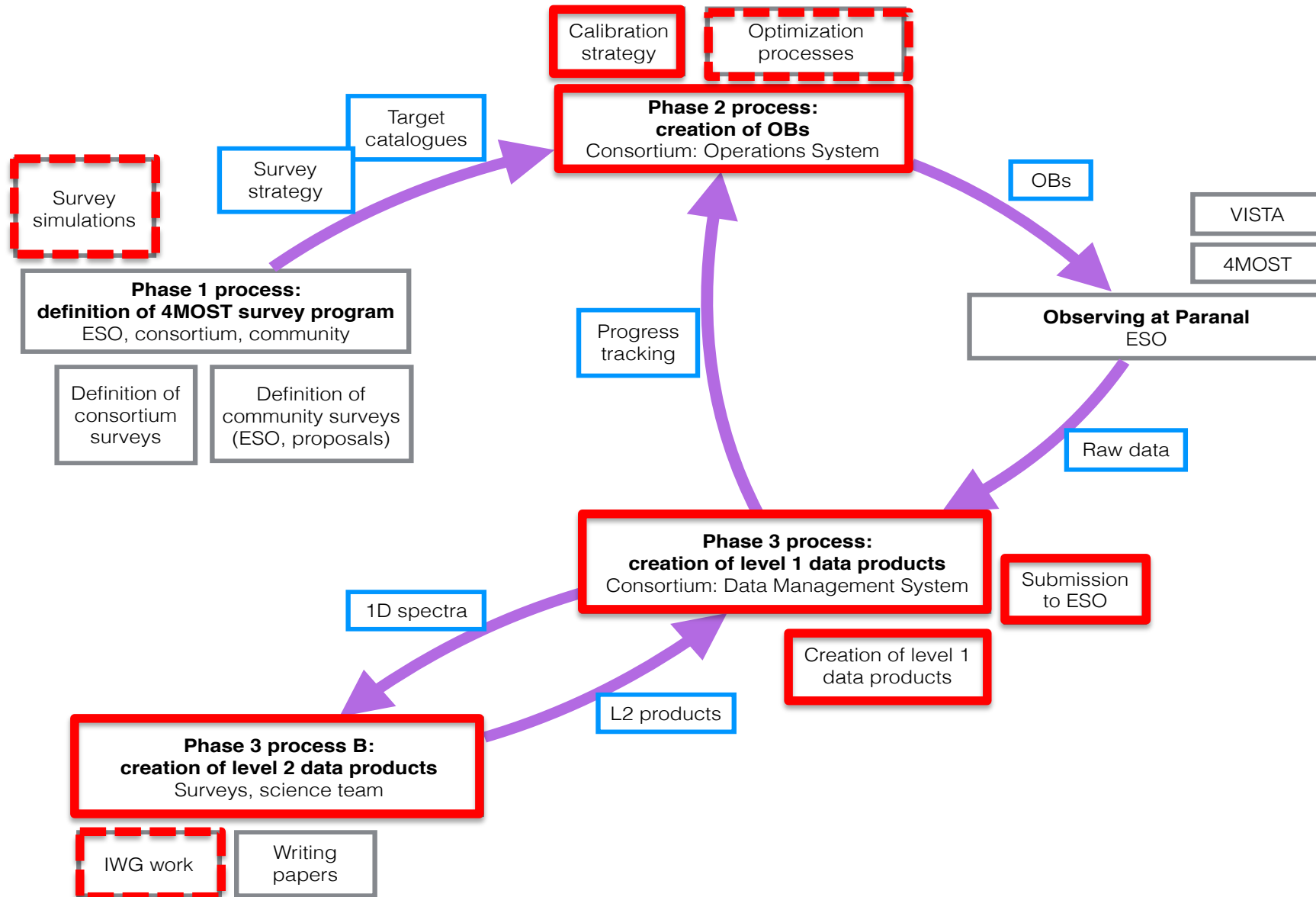


- ESO requirement: *No such distinction shall be made at any operations level.*
- We are committed to this requirement.

How it would be if it was normal ESO operations



Services for participating surveys




Front-end: Preparing observations



- **Operations System** with components
 - Target catalogue submission interface → **Talk by Thi, Comparat, Merloni**
 - 4MOST Facility Simulator (4FS)
 - Heavy duty ETC (4FS-ETC) → **Talk by Thi, Micheva**
 - Operations Simulation (OpSim) → **Talk by E. Tempel**
 - Observer Support Software (makes OBs)
 - Target and survey progress database
- **IWG2 Survey Strategy**
 - Development of requirements to survey strategy
 - Survey plan optimization → **Talk by P. Norberg**

Calibration data



- Covered by regular calibration plan and L1 pipeline:
 - Day-time calibrations
 - Twilight flats  Talk by Micheva / Irwin
 - Night-time wavecal and fiber flat
 - Sky fibers and telluric standards
 - Use of Gaia targets for flux calibration
- Quality monitoring fields
- Any other calibration (e.g. standard stars) have to be submitted as (part of) OBs
 - Twilight calibrations (ca. half hour) are not counted
 - Night time calibration comes out of science time (includes attached wavecal and fiber flat)

L0: Running observations



- VISTA+4MOST run by ESO.
- Participating surveys do not choose conditions (e.g. seeing) per target. Exposure time adaptation to conditions, sky coverage according to survey plan.
- Optimal way of picking next OB still being discussed (area, depth, cadence).

L1: Spectra

- **Data Management System** with major components
 - L1 pipeline
 - Progress measurement
 - Operational Repository
 - Public Archive
- Instrument Scientist / Quality Control Scientist / Survey teams provide QC

L2: physical properties



- Advanced pipelines
 - 4MOST Selection Functions pipeline (4SP) → Talk by E. Tempel
 - 4MOST Galactic Pipeline (4GP) → Talk by R. Church
 - 4MOST eXtragalactic Pipeline (4XP) → Talk by L. Davies
 - 4MOST Classification Pipeline (4CP)
- L2 products that are to be delivered to ESO in Phase 3 are deliverable L2 (DL2) products
 - Any survey may additionally generate additional L2 (AL2) products.
- Instrument Scientist / Quality Control Scientist / Survey teams provide QC

L2: Processing data (IWGs)

Infrastructure Working Groups



- IWGs are organizationally under operations
 - close coordination with L1 pipeline
 - make sure data flow work throughout
 - apply best practices for heavy duty software systems
- The work is about science analysis and requires surveys to take interest
- The human resources for IWGs
 - come from the surveys (e.g. postdocs)
 - are delegated to operations



Talk by S. Feltzing

How to get help



- ESO USD
 - Usual level of support as for any other instrument
 - May use consortium Helpdesk as back-office
- Consortium Helpdesk
 - Reachable through mail (help@4most.eu) and through the website www.4most.eu click on help.
 - Open to anyone: proposers, accepted surveys and scientists, archive users, general public.
 - FAQ page and glossary.
 - This is the preferred way to address questions from any science user: monitored, minimizes overheads.



Non-participating (NP) surveys



- Some surveys may be able to fill all fibers of 4MOST within their sky area
 - No need for parallel observing
 - No common observation preparations
 - No common selection function computation
 - No cross-talk on CCD, sharing of 1D spectra
 - No participation in Science Team activities
 - Some consortium services not applicable

Services for non-participating surveys



- Provide Observer Support Software (OpSys)
 - Can be used to create Observation Blocks (alternative to P2 web interface)
 - Training by consortium
 - NP-surveys have to run themselves
- Provide reduced L1 data (DMS)
 - Exact same data reduction procedures as ST
 - Assumes calibration strategy is same as ST
 - L1 data contain all calibration and provenance info
 - QCS for feedback in case of problems

Service NOT offered to NP-surveys



- Front-end
 - No operations simulations beyond online 4FS, no support in survey strategy development
 - No target and progress database / completion tracking
- Back-end
 - No processing beyond calibrated spectra per arm, all additional processing science-specific
 - No measurement of success per OB or per target
 - visitor mode!
 - No submission of Phase 3 on behalf of NP-survey
 - No access to Science Team L2 pipelines