

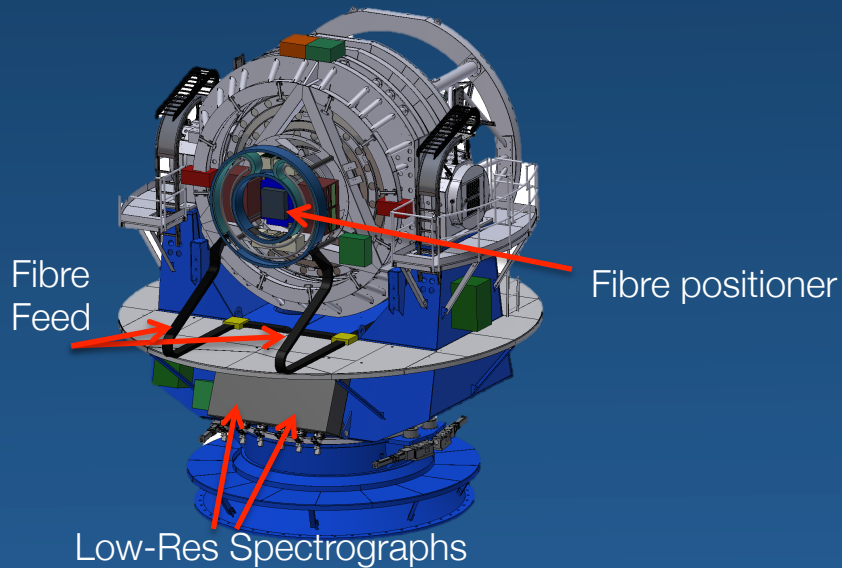


4MOST – 4m Multi-Object Spectroscopic Telescope

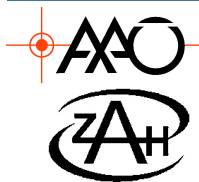
4MOST spectroscopy for eROSITA

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4MOST PI



www.4MOST.eu

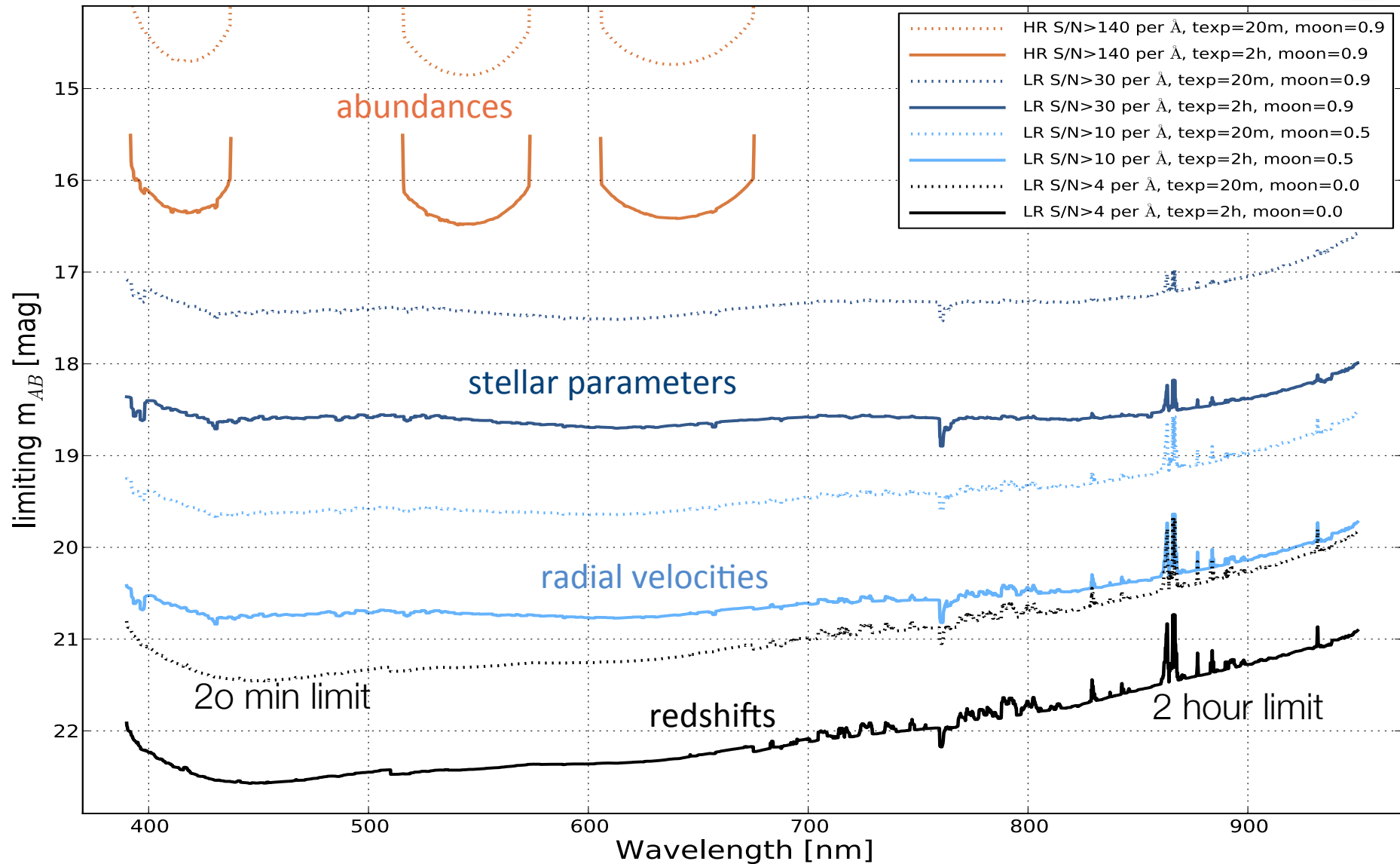


Specification



| Specification | Design value |
|--------------------------------------|---|
| Telescope | VISTA (4m-class survey telescope) |
| Field-of-View (hexagon) | >4.0 degree ² ($\phi > 2.5^\circ$) |
| Multiplex fiber positioner | ~2400 |
| Medium Resolution Spectrographs (2x) | R~5000–7000 |
| # Fibres | 1600 fibres |
| Passband | 390-930 nm |
| Velocity accuracy | < 2 km/s |
| High Resolution Spectrograph (1x) | R~20,000 |
| # Fibres | 800 fibres |
| Passband | 392-437 & 515-572 & 605-675 nm |
| Velocity accuracy | < 1 km/s |
| # of fibers in $\phi = 2'$ circle | >3 |
| Fibre diameter | $\phi = 1.4$ arcsec |
| Area (first 5 year survey) | >2h x 16,000 deg ² |
| Number of science spectra (5 year) | ~75 million of 20 min |

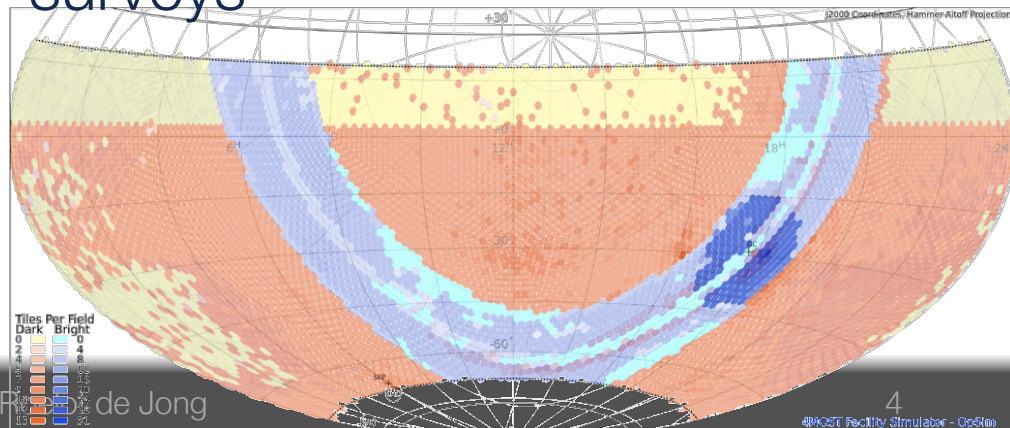
Magnitude limits for typical science cases



How are we going to run 4MOST?



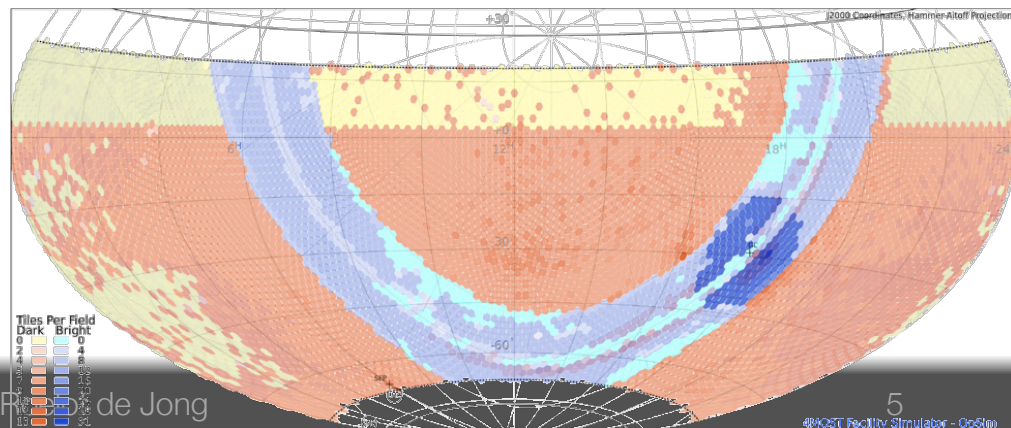
- Unique operations for MOS instruments that allows observations *for most* science cases
- 4MOST program defined by *Public Surveys* of 5 years
- Surveys will be defined by *Consortium* and *Community*
- All Surveys will run *in parallel*
 - Surveys share fibres per exposure for increased efficiency
- *Key Surveys* will define observing strategy
 - Millions of targets all sky
- *Add-on Surveys* for smaller surveys
 - Small fraction fibers all sky
 - Dedicated small area
 - 10^3 to 10^6 targets



How are we going to run 4MOST?

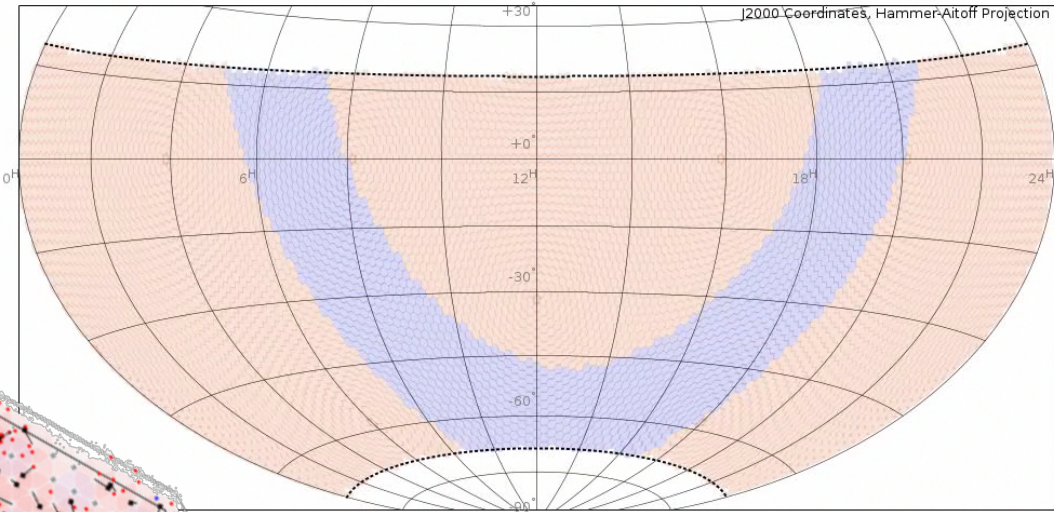
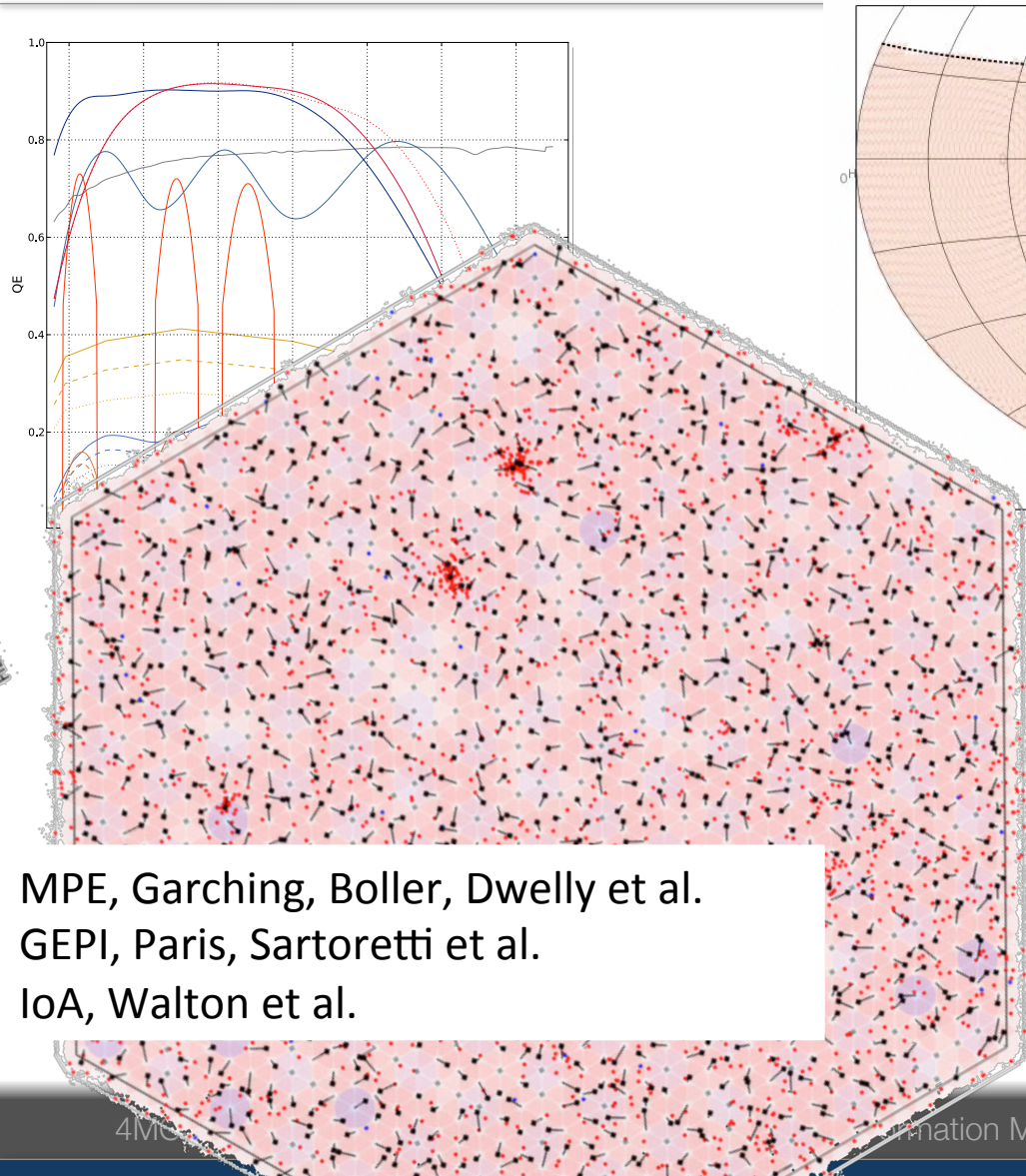


- Consortium Surveys will ensure whole hemisphere covered with at least ~ 120 minutes total exposure time
- Each exposure 20 minutes, repeats possible
- Total exposures times per target between 20 and 120 min (and more) possible till required S/N
- Areas with more targets get visited for more than 120 min



Simulate throughput, fibre assignment, survey strategy and verify total survey quality

night number: 0000



MPE, Garching, Boller, Dwelly et al.
 GEPI, Paris, Sartoretti et al.
 IoA, Walton et al.

| Science case | S/N / Å | r_{AB} -mags | # Targets |
|-----------------------|---------|----------------|----------------|
| MW halo HR | 140 | 12–15.5 | 0.07M |
| MW halo LR | 10 | 16–20.0 | 1.5M |
| MW disk/bulge HR | 140 | 14–15.5 | 2.1M |
| MW disk/bulge LR | 10–30 | 14–18.5 | 10.7M |
| X-ray galaxy clusters | 4 | 18–22.0 | 1.4M |
| X-ray AGN | 4 | 18–22.0 | 0.7M |
| BAO+RSD galaxies | 4 | 20–22.5 | 12.8M |
| Total | | | >29M |

Review science requirements



- Resolution
- S/N
- Wavelength range
- Absolute/relative flux calibration
 - line ratios?
- Sky subtraction accuracy
- Target densities
 - Galaxy clusters

Survey strategy



- Target selection
- Imaging data
- Dark/grey/bright time
- Area
- Completeness
- Repeats, cadence, timing
 - variability

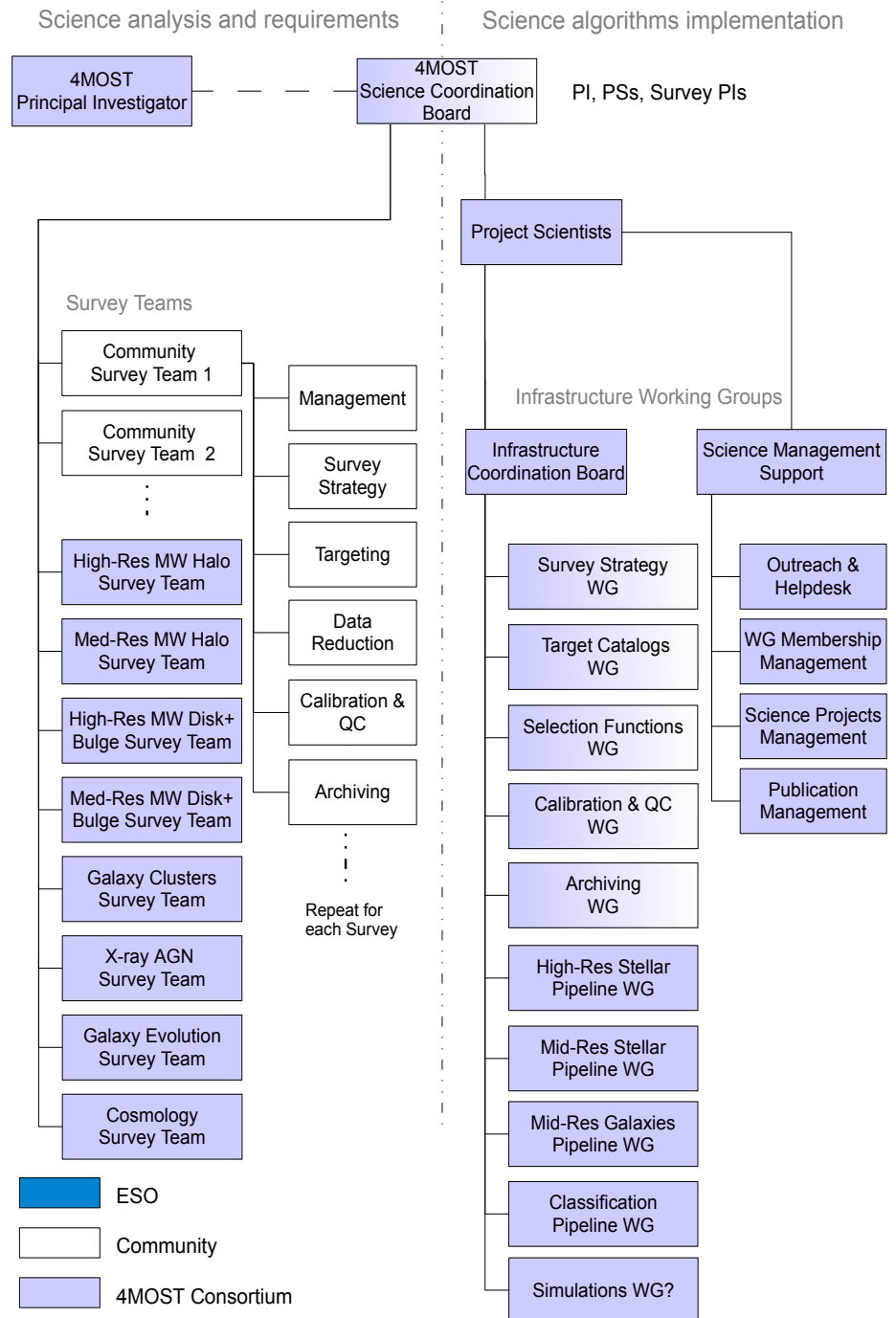
Simulator



- Input
 - Mock catalog: positions, target types, weights
 - Template spectra: types, S/N requirements
 - Survey figure-of-merit: number of targets, area, completeness, redshift/mag distribution
- Output (for different instrument configurations)
 - Simulated spectra
 - Observed target numbers and completeness fractions:
 - type, mag, redshift, sky position,
 - Instrument efficiency
 - Total FOM
- Analysis
 - Does the FOM reflect what you need at spectral and survey level?

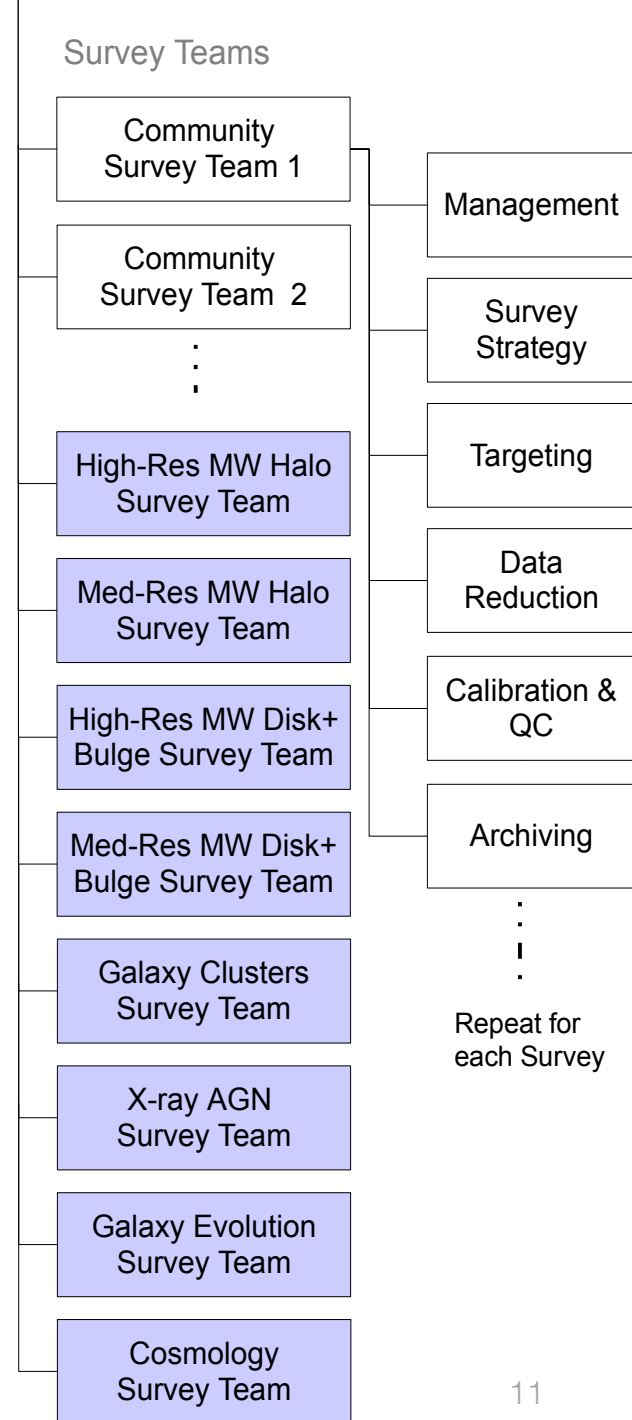
Science organization

- Survey Teams
- Infrastructure Working Groups



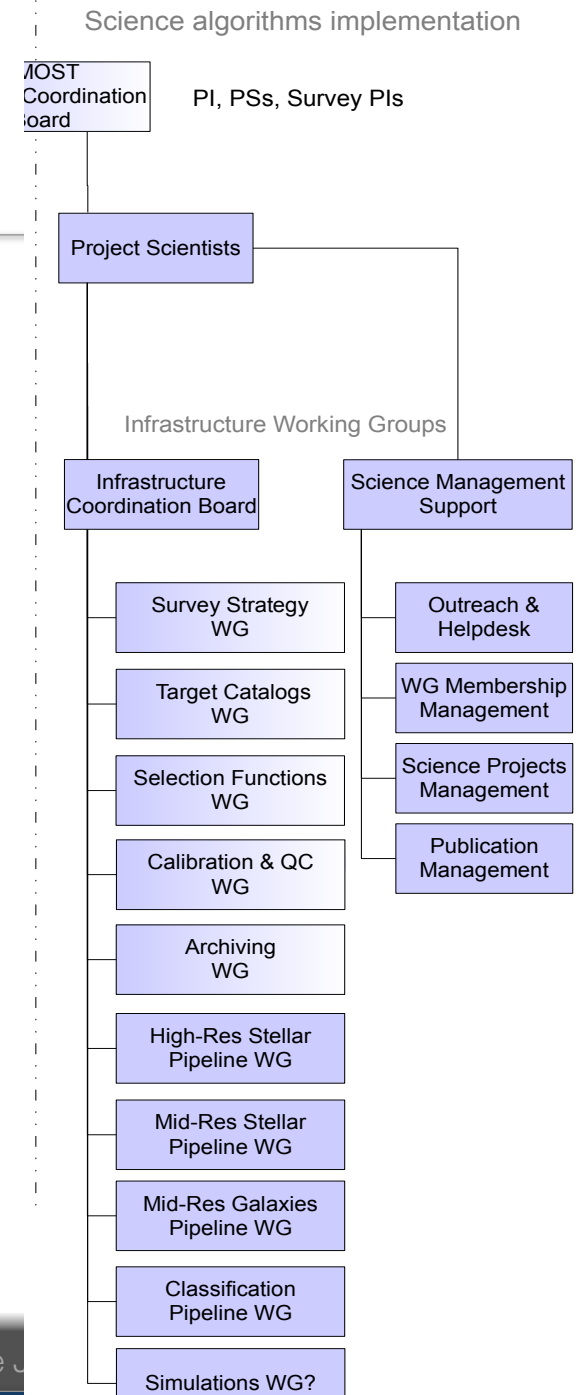
4MOST Surveys

- Responsible for Science Analysis, Science Requirements and Survey Preparation
- Developments will be implemented using a Survey Management Plan following a 4MOST wide schedule
- A number of tasks already foreseen for each survey for which responsible persons will have to be identified within the next year



Infrastructure Working Groups

- Infrastructure Working Groups ensure that deliverables that span across more than one survey get implemented in effective way



Infrastructure Working Groups

- These IWGs are relevant to all surveys
- Except for first, all have to have representation from all Surveys
- Mainly developing principles and algorithms, final implementation in general done by Science Operations WP

Infrastructure
Coordination Board

Survey Strategy
WG

Target Catalogs
WG

Selection Functions
WG

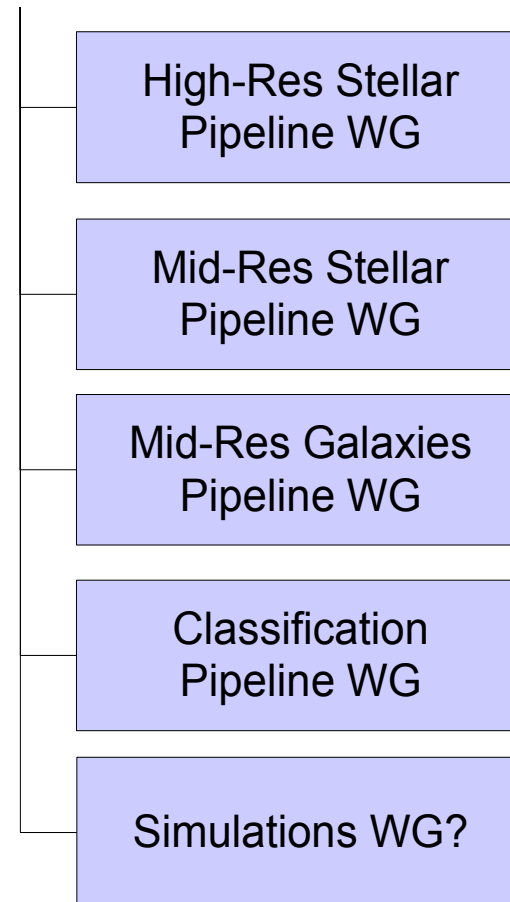
Calibration & QC
WG

Archiving
WG

Infrastructure Working Groups

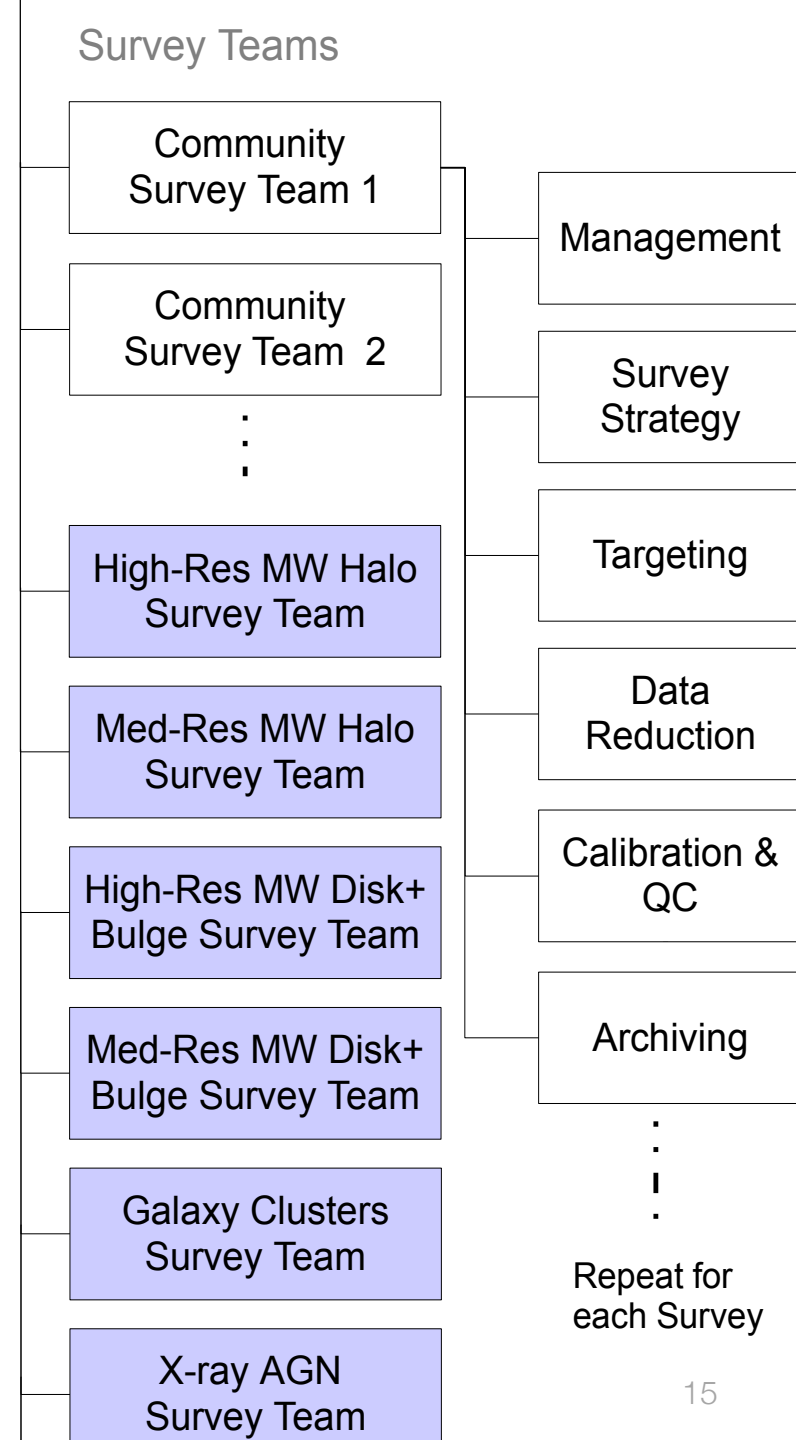


- These IWGs are relevant to a subset of all surveys
- Pipelines require real code development that will run on the 1D spectra coming from the DMS
- Survey PIs responsible for providing sufficient resources
- Do we need a separate pipeline for AGN?



Survey Teams & IWGs

- Management
- Survey strategy
- Targeting
- Selection functions
- Data reduction
- Calibration & QC
- Archiving



4MOST Consortium Science Kickoff



- Dates: 17 – 19 November (Mon-Wed)
- Location: AIP
- Agenda:
 - Science organization, Management & Policies
 - Schedule
 - Surveys
 - IWGs
 - Requirements
 - Operations
 - Publications