Technology Roadmap

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Our charge:

- Identify high priority technologies
- Capability and science areas enabled
- Recommendations to NOAO for technology development

Parameter space

- Ground based
- ~10 year time horizon
- Need visible as well as IR wavelengths

Technical topics

- Beam transport and delay for > 1 km baselines
- AO, co-phasing, fringe tracking for faint sources
- Beam combiner technologies
- Imaging fidelity
- High-dynamic-range imaging
- Detectors
- Telescope technology
- Site selection
- Metrology

Technical topics

- Beam transport and delay for > 1 km baselines
  - Dispersion compensation
  - Fibers, fiber couplers, switching schemes, throughput
  - Diffraction, pointing for free-space transport; beam size
  - How does LISA do it?
- AO
  - MCAO
  - Laser guide stars
- Co-phasing, fringe tracking for faint sources
  - Dual feed needed?
- Beam combiner technologies
  - Beam combination strategies for 12 or more telescopes
  - Local oscillators for IR interferometry
  - Intensity interferometry?

Technical topics

- High-dynamic-range imaging
  - Starlight suppression
  - Precision visibilities, phases
- Detectors
  - Zero read noise photon-counting infrared detectors (for co-phasing)
- Telescopes
  - Strategies for reducing cost (27 telescopes = 200 M€ ?)
- Site selection
  - Multi-site, multi-year information needed
- Metrology over long paths

How to make progress

- Identify commercial applications?
- How much money do we need?
- Do we need a coordinated effort or do we need the competition to prevail?

Milestone candidates

- Baseline bootstrapping with 4 telescopes
  - Quantify with, e.g., phase jitter on bootstrapping baselines?
- ‘OHANA fringes on 800 m baseline
- Dynamic range of 10^4
  - In an image, or on a single baseline?
- Fringes on an X^{th} magnitude star in ð band
  - Pick your number and your band.
- List of candidate sites
- Path length metrology over 500 meters
- Beam transport
- Laser guide star on an interferometer. Keck?
- “Low-cost” “large” telescope on an array

Recommendations to NOAO

- Establish a technology roadmap with well-defined technology milestones
- Maintain community engagement in roadmap
- Communicate progress (regular meetings?)
- Provide

Recommendations to NOAO

- Roadmap: Priorities for technology demonstration:
  1. High-quality imaging on existing arrays
  2. Increase sensitivity of existing arrays
  3. Combine AO with interferometer
  4. Demonstrate baseline bootstrapping
  5. Fiber links between existing telescopes

1. Roadmap: Priorities for technical development
   1. Metrology over 1 km lengths
   2. Guided optics for beam transport
   3. Site identification and testing
   4. Low-loss beam combiners for large number of telescopes