

Level	WBS Element	Title	Responsible Cost Estimator	Consultant 1	Consultant 2
1	NGAO	Next Generation AO Program			
2	1	Design			
3	1.1	Proposal	Richard Dekany		
3	1.2	System Design	Richard Dekany		
3	1.3	Preliminary Design	Peter Wizinowich		
3	1.4	Detailed Design	Peter Wizinowich		
2	2	Management			
3	2.1	Planning & Contracting	Peter Wizinowich		
3	2.2	Project Management & Meetings	Peter Wizinowich		
3	2.3	Tracking & Reporting	Peter Wizinowich		
3	2.4	Proposals & Fundraising	Peter Wizinowich		
3	2.5	Science Advisory Team	Claire Max		
2	3	Systems Engineering			
3	3.1	Requirements Maintenance	Chris Neyman		
3	3.2	System Architecture	Richard Dekany		
3	3.3	Modeling & Analysis	Richard Dekany		
3	3.4	Performance Budget Maintenance	Richard Dekany		
3	3.5	External Interface Control	Peter Wizinowich		
3	3.6	Internal Interface Control	Richard Dekany		
3	3.7	Configuration Management	Richard Dekany		
3	3.8	Documentation Control	Richard Dekany		
2	4	AO System Development			
3	4.1	AO Enclosure	Don Gavel	Jim Bell	
3	4.2	Optomechanical	Don Gavel		
4	4.2.1	Rotator	Don Gavel	Reni Kupke	
4	4.2.2	Optical Relays	Don Gavel	Reni Kupke	
4	4.2.3	Optical Switchyard	Don Gavel	Reni Kupke	
4	4.2.4	AO Support Structure	Don Gavel	Jim Bell	
4	4.2.5	LGS Wavefront Sensors	Viswa Velur		
4	4.2.6	NGS Wavefront Sensor	Viswa Velur		
4	4.2.7	Low Order Wavefront Sensors	Richard Dekany		
4	4.2.8	Truth Wavefront Sensors	Viswa Velur		
4	4.2.9	DM's and Tip/Tilt Stages	Don Gavel	Reni Kupke	
4	4.2.10	Tip/Tilt Vibration Mitigation	Peter Wizinowich		
4	4.2.11	Acquisition Cameras	Viswa Velur		
4	4.2.12	Atmospheric Dispersion Correctors	Don Gavel	Reni Kupke	
3	4.3	Alignment, Calibration, and Diagnostics			
4	4.3.1	Simulator	Chris Neyman		
4	4.3.2	System Alignment Tools	Chris Neyman	Reni Kupke	
4	4.3.3	Atmospheric Profiler	Richard Dekany		
4	4.3.4	PSF Monitoring Camera	Viswa Velur		
3	4.4	Non-real-time Control	Erik Johansson		
3	4.5	Real-time Control	Don Gavel		
3	4.6	AO System Lab I&T	Peter Wizinowich		
3	4.7	AO System Acceptance	Peter Wizinowich		
2	5	Laser System Development			
3	5.1	Laser Enclosure	Chris Neyman		
3	5.2	Laser	Sean Adkins		
3	5.3	Laser Launch Facility	Chris Neyman	Viswa Velur	
3	5.4	Laser Safety Systems	Chris Neyman		
3	5.5	Laser System Control	Chris Neyman	Erik Johansson	
3	5.6	Laser System Lab I&T	Chris Neyman		
3	5.7	Laser System Acceptance	Peter Wizinowich		
2	6	Science Operations Tools Development			
3	6.1	Observing Setup	David le Mignant		
3	6.2	User Interfaces	David le Mignant		
3	6.3	Astronomer Planning	David le Mignant		
3	6.4	System Control & Interfaces	David le Mignant	Erik Johansson	
3	6.5	Performance Monitoring	David le Mignant		
3	6.6	Automation and Optimization	David le Mignant		
3	6.7	User Documentation	David le Mignant		
2	7	Telescope & Summit Engineering			
3	7.1	Telescope Performance	Peter Wizinowich		
3	7.2	Infrastructure Mods for AO	Chris Neyman	Jim Bell	
3	7.3	Infrastructure Mods for Laser	Chris Neyman	Jim Bell	
3	7.4	OSIRIS Modifications	Sean Adkins		
3	7.5	Interferometer and OHANA Mods	Chris Neyman		
3	7.6	Old AO/Laser Removal	Peter Wizinowich	Jim Bell	
3	7.7	Laser Enclosure Integration	Chris Neyman	Jim Bell	
3	7.8	AO Enclosure Integration	Chris Neyman	Jim Bell	
2	8	Telescope Integration & Test			
3	8.1	AO System Install + I&T	Peter Wizinowich		
3	8.2	Laser System Install + I&T	Chris Neyman		
3	8.3	LGS AO System On-sky I&T	David le Mignant		
3	8.4	Performance Characterization	Richard Dekany		
3	8.5	Science Verification	David le Mignant		
2	9	Operations Transition			
3	9.1	Operations Personnel Training	David le Mignant		
3	9.2	Ops Maintenance Plan and Spare	Peter Wizinowich		