

Technical Manager's Report

Magellan Staffing Requirements

August 6, 2004

Summary

The staff required to support the existing telescopes and instrumentation at Magellan is low by five fte. Funding for one of these positions, an assistant telescope engineer, has been approved by the Magellan council and recruitment is in progress. This leaves us short about 4 fte: a computer and network administrator, an instrument scientist, and two instrument specialists. (The council has also recently approved a new telescope operator position that has already been filled, so this need is not listed in the five fte).

In the longer term (the F/5 era starting in 2006), one or two additional instrument scientists, an electronics technician, and a mechanical technician are needed to support incoming instrumentation and the F/5 focus. In addition, the Magellan community must be willing to retire some existing instrumentation and instrument builders must supply an on-site postdoc or scientist for the duration of instrument commissioning and testing, about one year to control on-site staff growth.

Introduction

The Magellan observatory is understaffed. Too few people are available for safe and efficient operation of the telescopes and instruments. Science productivity is high but this is achieved only through excess effort by Magellan engineers and scientists, volunteer help, and purchased support from the small telescope group. While human safety and major problems will always be quickly and effectively addressed, operational efficiency will decline as new instruments arrive and more telescope performance is demanded.

The consequences of under staffing are clear:

- Existing non-critical telescope problems or problems with workarounds are not being fixed.
- Preventive maintenance is not being performed.
- Staff dissatisfaction with the excess work is high.
- Staff absences from vacations or illness have high impact.
- Staff burnout and resignations are a worry.

The quality of the people at an observatory is the most important component in operations effectiveness and efficiency. The current Magellan technical staff, both at LCO and SBS, is extraordinary in this regard as they are not only highly competent but willing to do more when the situation demands.

Even exceptional people have real limitations, however, and we have a growing work backlog and are seeing significant delays in anticipated instrument and telescope capabilities such as intervention observing, telescope baffling, and non-sidereal tracking.

A combination of additional staff plus carefully considered reductions in observatory capabilities is needed to optimize observatory productivity and minimize costs.

Current status

The following chart lists telescopes, instruments, and subsystems at Magellan. Solid diamonds show existing items, open diamonds show existing items, open diamonds show planned.

ID	Work	2004				2005				2006				2007				2008				2009				2010	
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	
1	0 hrs			9/27	◆	Magellan telescope																					
2	0 hrs			9/27	◆	LDSS																					
3	0 hrs			9/27	◆	B&C spectrograph																					
4	0 hrs			9/27	◆	MagIC																					
5	0 hrs			9/27	◆	Guiders																					
6	0 hrs			9/27	◆	IMACS																					
7	0 hrs			9/27	◆	IMACS integral field unit																					
8	0 hrs			9/27	◆	MIKE																					
9	0 hrs			9/27	◆	PANIC																					
10	0 hrs			9/27	◆	MIKE fibers																					
11	0 hrs			10/28	◇	IMACS moe																					
12	0 hrs			11/29	◇	IMACS Maryland-Magellan tunable filter																					
13	0 hrs			1/31	◇	CorMASS visting IR spectrograph																					
14	0 hrs					11/30	◇	GLAO guider																			
15	0 hrs					11/30	◇	F/5 secondary mirror																			
16	0 hrs					11/30	◇	F/5 wavefront sensors (SAO)																			
17	0 hrs					11/30	◇	F/5 wide field corrector and ADC (SAO)																			
18	0 hrs					3/27	◇	Planet finding spectrograph																			
19	0 hrs					6/26	◇	Megacam																			
20	0 hrs					6/26	◇	MMIRS multiobject IR spectrograph																			
21	0 hrs					6/26	◇	Multi-wavelength optical/IR camera																			
22	0 hrs					6/26	◇	IMACS gismo IFU																			
23	0 hrs							1/8	◇	MagE optical echellette																	
24	0 hrs							6/25	◇	FourStar widefield IR imager																	
25	0 hrs							9/3	◇	IR echellette																	
26	0 hrs																								1/5	◇	F/11 AO secondary

We have two telescopes, seven facility instruments (LDSS, B&C, MagIC, IMACS, MIKE, PANIC, MIKE Fibers), and a few ancillary telescope systems such as the wide field corrector and ADC on Baade and tip-tilt controls on the secondary mirrors. Not shown are upgrades to existing subsystems such as guiders and instrument rotators.

To keep everything running, there is a staff of on-site engineers, technicians, and scientists. They are further supported by a smaller group in Pasadena.

Pasadena staff

At Santa Barbara Street, Magellan has access to people with mechanical and electronics design and fabrication skills. These include mechanical engineers and designers (Charlie Hull and Tyson Hare), an electronics designer and engineer (Alan Bagish), an electronics technician (Jorge Estrada), a high-level programmer (Christoph Birk), a machinist (Robert Storts), a technical manager (Alan Uomoto), and the science and technical staff at OCIW (e. g., Ian Thompson, Steve Shectman, Matt Johns, and Greg Burley). These people are deployed as necessary for major telescope upgrades (e. g., adding the ADC lenses) or to support new instrument installations. They are not generally available for day-to-day operational support, however, and are engaged in long-term work to upgrade or add function to the telescopes. For example, new guider upgrades will be designed and engineered using Pasadena technical staff. Magellan operations has budgeted 3.5 fte at SBS.

Las Campanas staff

The following table lists our current job titles and staffing level as well as the minimum staffing needed to support full-time observatory operations with current instrumentation and capabilities (solid diamonds in the above chart).

Staff allocation at LCO by job description

Showing under staffing amount for current instrument suite

<i>Title</i>	<i>Description</i>	<i>Available now (fte)</i>	<i>Needed now (fte)</i>	<i>Under by (fte)</i>
Site manager	On-site administration and technical management	0.25	0.25	0.00
Telescope engineer	Maintenance, repair, and upgrades of the telescopes	0.60	1.60	1.00
Instrument scientist	Maintains facility instrument performance, documentation, calibration; reports anomalies, assists and advises observers	1.00	2.50	1.50
Instrument specialist	Performs instrument setup, filter changes, grating settings, troubleshooting	2.00	4.00	2.00
Telescope operator	Nighttime operations	6.00	6.00	0.00
Electronics technician	Maintenance, repair, and new construction of electronics and controls hardware	3.00	3.00	0.00

<i>Title</i>	<i>Description</i>	<i>Available now (fte)</i>	<i>Needed now (fte)</i>	<i>Under by (fte)</i>
Programmer	Software maintenance and new software for incoming systems and instruments	2.90	3.00	0.10
Mechanical technician	Maintenance, repair, and new construction of mechanical systems	2.00	2.00	0.00
Mechanical assistant/janitorial	General hardware assistance (aluminizing work, for example) and telescope cleaning	2.00	2.00	0.00
Network and computer administrator, web programmer	Maintains and repairs the mountain network, observer and science staff computers	0.10	0.50	0.40

Site manager

The site manager provides LCO business administration, budget and physical plant reports, handles staff recruitment, and manages day-to-day technical operations following guidelines and priorities developed in collaboration with staff in Pasadena. Frank Perez handles these tasks ably, although inefficiencies are incurred when he is not available on-site to handle new problems. When he is traveling out of the La Serena area, there is no backup for management or technical decisions, a serious deficiency. A second telescope engineer would help solve this problem.

Telescope engineer

The telescope engineer is responsible for maintaining, repairing, and upgrading the telescopes and supporting instrumentation such as guiders and correctors. The tasks encompass a broad range of skills ranging through hydraulic controls, optical alignment, vacuum coatings, and servo-mechanical controls. Because the telescopes are large, experience in the safe rigging and motion of heavy, delicate equipment is important.

Frank Perez spends about 60% of his time on these tasks and is the only qualified person on-site. This level of effort is just sufficient to keep the telescopes operating in the short term and also to provide major routine maintenance such as mirror cleaning and aluminizing. It is not enough to perform preventive maintenance or enable significant performance enhancements on the telescopes. Perhaps more important, there is no backup for times when Frank is away from the observatory for extended periods. He is the only person on site with the analytical skills, hands-on experience, and management capability to execute major Magellan telescope work.

A second telescope engineer, acting as assistant to Frank Perez, has been approved by the Magellan Council is now being recruited. We expect that once this position is filled, we will satisfy our telescope engineer staffing requirement.

Instrument scientist

Instrument scientists are experienced observers intimately familiar with a few Magellan facility instruments. They monitor the instrument performance, assist in upgrades, and develop new observing techniques. They provided assistance to visiting observers. The instrument scientist can perform the tasks of an instrument specialist and probably develops the instrument

specialist's routine.

Instrument scientists should have primary responsibility for no more than three instruments and secondary responsibility for about two more. Of course some instruments are simpler than others and some are used infrequently so the particular number “3” might not be correct for every instrument scientist, but it's a good bet that our seven facility instruments would require slightly more than two instrument scientists.

We have one instrument scientist, David Osip, who contributes far more time than he should. We can operate seven instruments only through additional assistance from three experienced observers: Miguel Roth handles a lot of PANIC responsibilities (0.20 fte), Mark Phillips contributes to IMACS characterization, software, and testing (about 0.75 fte), and Nidia Morrell assists visiting observers with MIKE and IMACS (0.20 fte). None receives Magellan funding specifically for instrument scientist work although Magellan does pay mountain presence costs (but not enough to cover their level of effort). In addition, David Osip spends approximately 20 nights per month on the mountain, about twice that expected for an instrument scientist.

Instrument specialist

Instrument specialists perform the afternoon setup and checkouts, change instruments, and perform inspections and preventive maintenance. They also assist the telescope engineers in maintenance and alignment of the telescopes.

We currently have two instrument specialists (Mauricio Navarette and Gabriel Martin) which means there is only one specialist for both telescopes on most nights. This sometimes results in late starts or incomplete setups. To guarantee full-time coverage and to accommodate more instruments, four total are needed.

Telescope operator

Three people are required to guarantee full-time coverage at any position after accounting for vacations, weekends, and sick leave. Two telescopes thus require six operators just to guarantee someone is there every night to start up. Thanks to recent council approval to hire a new telescope operator, we have six (Hernan Nunez, Geraldo Valladares, Victor Merino, Hugo Rivera, Felipe Sanchez, and Sergio Vera).

Electronics technician

Magellan has three electronics technicians on staff (Emilio Cerda, Patricio Jones, and Marc Leroy). Magellan purchases the services of small telescope electronics technicians at about 0.25 to 0.50 fte to cover repair work arising. We have been using electronics technicians to cover some instrument specialist tasks so hiring two new instrument specialists (see above) will allow us to rely less on the small telescope staff, making three electronics technicians the correct number for the current instrument situation.

Programmers

We currently have three programmers on staff at Magellan, two hardware controls programmers (Jose Soto and Silvia Baeza) and one high-level programmer for observing software (Skip Schaller). This seems to be about the right amount and mix for now, since some programming work is throttled by limited access to the telescope and more programmers might not be able to do things faster.

Note that no Magellan programmers are allocated for observer support software such as IMACS mask alignment or mask cutting administration, web forms, etc.

Mechanical technician

Two are currently on staff (Miguel Mendez and Felix Quiroz) and are sufficient to handle routine work for the current instrument complement. We assume that major machining and similar work (rigging fixtures, etc.) will be done by instrument builders who will not require too much of the on-site mechanical staff.

Mechanical assistant/janitorial

Two are on staff now (Nelson Ibacache and Hector Torres).

Network and computer administrator

The current allocation of 0.1 fte for computer administration is silly, especially when it comes at the cost of observing software (Skip Schaller, one of our Magellan programmers, also handles computer systems administration).

New demands on the network and computing systems from high bandwidth, high capacity detector systems will require us to modify the existing network and computing architecture, increasing the need for on-site systems support. We would also like to have web programming support for on-site observer aids such as the guide camera seeing monitor. A half-time on-site systems administrator with remote support from OCIW and other Magellan partners would be adequate. We expect that LCO and GMT might cover the other half the cost of this person.

Priorities and schedule

Near term

The table above shows us understaffed by 5.0 fte. Funds have already been approved for the additional telescope engineer (1.0 fte). Beyond this, four additional people are needed to support current operations: 1.5 instrument scientists, 2.0 instrument specialists, and 0.5 of a computer administrator.

Except for the computer administrator, new hires could be traded for restricted telescope operations, but this is not likely worthwhile. Retiring high-maintenance instruments and deliberately scheduling telescope idle time doesn't make sense in the current configuration. In the future, however, some downsizing strategy will be needed.

Hiring a computer networking administrator immediately would have the multiple benefits of releasing some programmer time and improving the computer support. It would likely not be a full fte hire if LCO and GMT will split the cost.

The new assistant telescope engineer might take on some instrument specialist duties at first, which would make the additional instrument scientist and one instrument specialist the next choices in the list, allowing us to delay hiring the second instrument scientist.

Thus, immediate hires of one instrument scientist, one instrument specialist, and one computer network administrator (the latter shared with LCO) with an additional instrument specialist next year would bring us to a stable and reasonable situation at Magellan, although with somewhat less instrument scientist support than we'd like.

F/5 era

In early 2006 the F/5 secondary mirror and some associated instrumentation (wide-field corrector, F/5 wavefront sensors, and Megacam) will be available for installation and testing. While sufficient help will be available from off-site Magellan and SAO staff to install and commission the subsystems, additional on-site staff will be needed for maintenance and

operations.

In particular, two additional instrument scientists would be needed to cover the new arriving instruments. In addition to Megacam, MMIRS and IMACS gismo will be arriving in 2006 and the following year brings an optical echellette spectrograph, the FourStar IR imager, and an infrared echellette spectrograph. This brings the facility instrument count up to 11, not including the F/5 system (wide field corrector, secondary mirror, wavefront sensors), and GLAO guiders, which have similar support requirements. We might anticipate that a few instruments will be retired at this point so no more than two new instrument scientists will be needed (more on this later).

An additional electronics technician will certainly be needed and an additional mechanical technician would be desirable to handle the heavier instrument change load incurred by F/5. The additional mechanical technician might be avoided if we are willing to reduce our aluminizing schedule and/or allow scheduling inefficiencies to avoid simultaneous work on both telescopes.

The above staffing requirement assumes that instrument builders provide full support for installation and commissioning, something that has not occurred to date. Using site staff for instrument installation and commissioning is inefficient because it delays scheduled work and because site staff are not usually familiar with incoming instruments. Based on current experience, a good suggestion is to have a skilled postdoc or scientist who is familiar with the instrument reside at Las Campanas for the duration of the commissioning and checkout period, typically one year.

We have assumed the earliest reasonable schedules for instrument and subsystem arrivals; in practice, some delay is likely.

Long term

In the long term, a decision is needed on whether to offer the full range of potential instrumentation at all times or to limit the number of active facility instruments. Three instruments per telescope at F/11 plus the F/5 instrument suite is a good starting point. Instruments might be decommissioned or converted to “user” instruments if someone at a Magellan institution can assume support responsibilities.

Schedule

The following table shows the hiring profile described above. It is different from a similar table presented by Dressler at the last SAC meeting in that we recognize the immediate need for four positions (the 2004 jobs). The previous schedule also assumed that F/5 deployment would not occur until MMIRS was available (2007) but in reality it may be possible to do it in 2006.

The positions shown in 2004-2005 are essential for current operations if we do not want to give up instrumentation or incur scheduling inefficiencies (and it isn't clear that any palatable plan can actually reduce the staffing requirement). In 2006 and beyond, we anticipate three or four more ftes will be needed to support more incoming instruments and the F/5 focus, provided concurrent cutbacks are made on older instrumentation.

<i>Cal Year</i>	<i>Job description</i>	<i>Notes</i>
2004	Computer administrator (0.5)	Shared with LCO (0.5 fte for Magellan, up from 0.1 fte)
	Telescope engineer/scientist (1.0)	Applicants being reviewed now; gives us two telescope engineers
	Instrument scientist (1.0)	Currently we have one; each handles three instruments (we currently have seven)
	Instrument specialist (1.0)	One more brings us to three total, giving full coverage if each does two telescopes occasionally
2005	Instrument specialist (1.0)	Brings us to four total, so most of the time there is one per telescope every night
2006	Instrument scientist (1.0-2.0)	Third instrument scientist handles F/5 instrument support; maybe a fourth is needed unless we retire some instruments
	Electronics technician (1.0)	Additional instrumentation requires more electronics support; this makes 4 on staff
	Mechanical technician (1.0)	This is the third; needed for additional workload of F/5 changes; can be traded for reduced scheduling efficiency