



More Bang for the Buck: **Lessons from A Decade of** **Keck Mainland Observing Operations**

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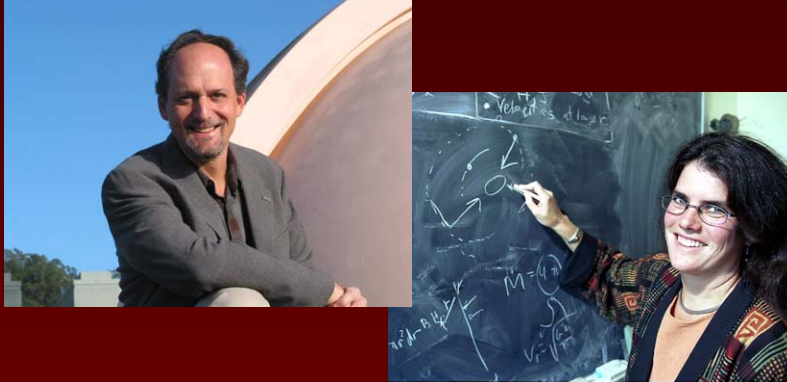
W. M. Keck Observatory

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UCO/Lick Observatory



Observers and Staff have different concerns about Remote Operations



➔ **Bang**



➔ **Buck**

Operating a quality remote-observing system requires multiple components

Handling observer requests

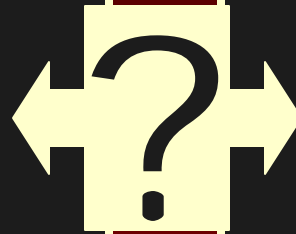
Managing VNC servers

Launching VNC viewers

Monitoring remote computers

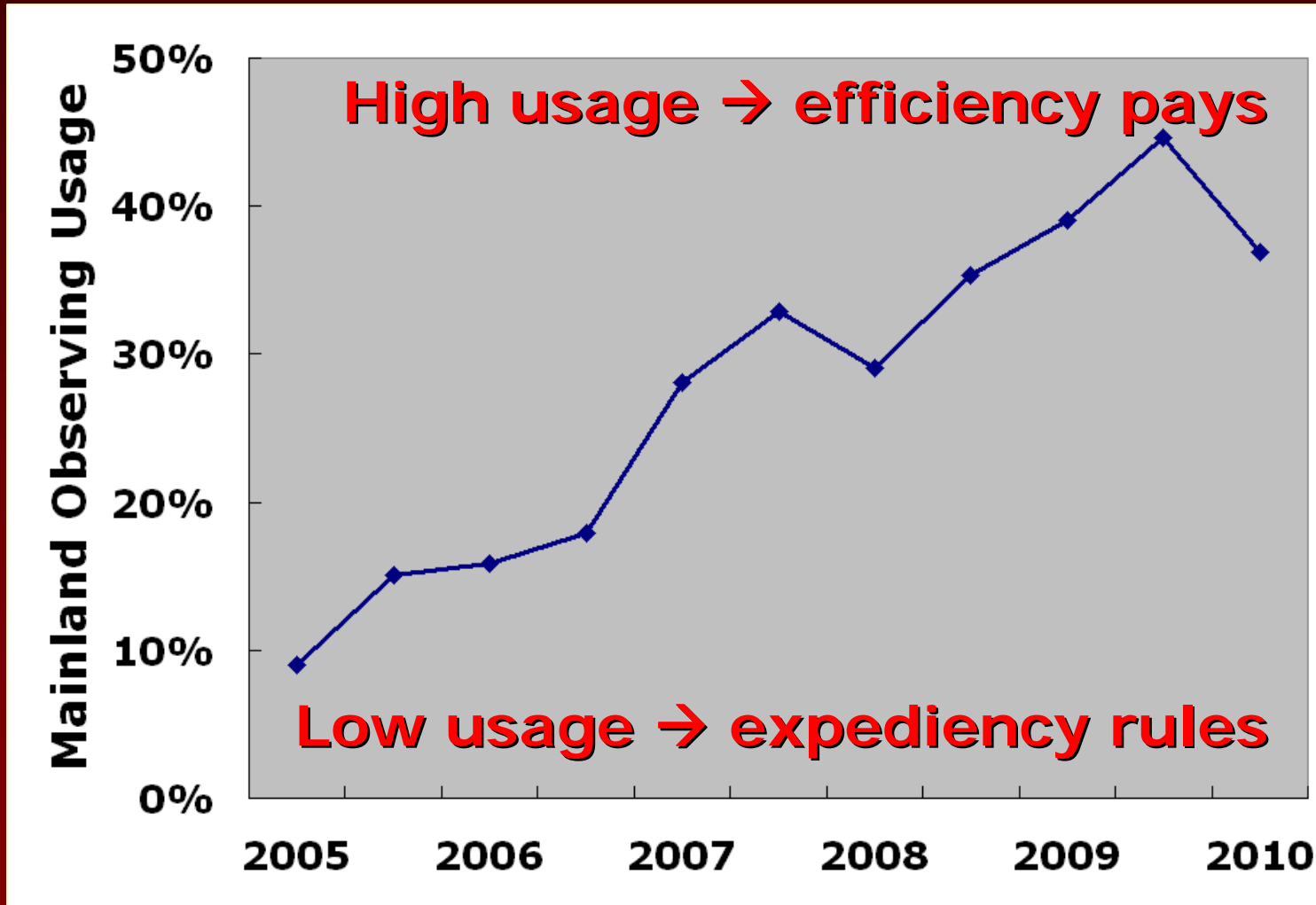
How do you maximize system performance per dollar?

*Low
Demand:*
Expedience



*High
Demand:*
Efficiency

Demand for Keck mainland observing began low, got high



**What lessons did we learn
about operating Keck's
remote observing system
as demand increased?**

Lesson 1: Encourage uniformity among the remote (and local) sites to make operations easier



Local site (Waimea)

Remote site (Santa Cruz)



Lesson 2: Automate the tedious tasks as demand justifies it

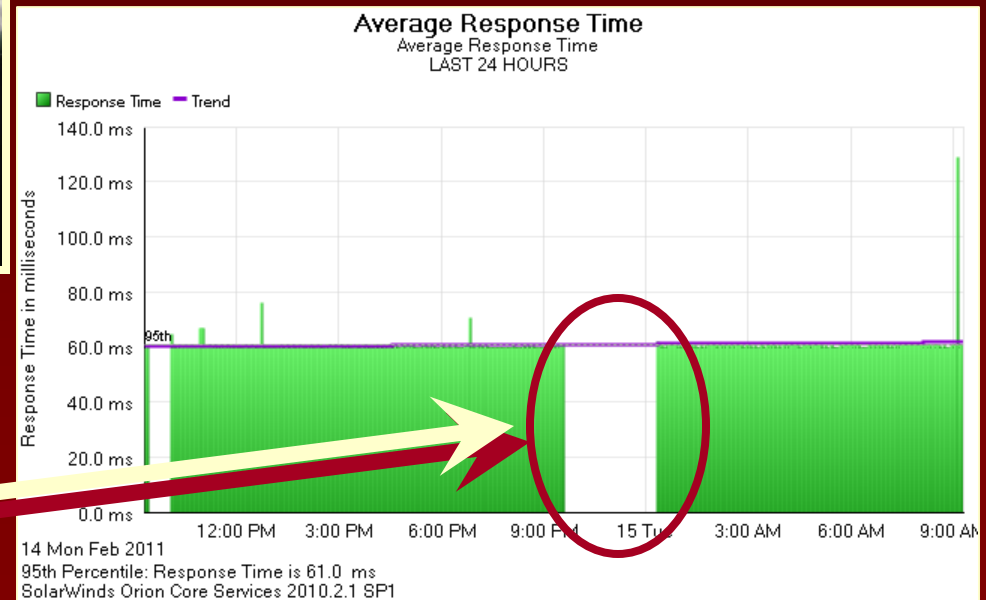
<i>Task</i>	<i>Old Solution</i>	<i>New Solution</i>
Handling usage requests	Email	Web form + database
Managing VNC servers	Manual	Schedule-driven cron
Launching VNC viewers	Command-line	GUI

Lesson 3: Regularly check health of remote computers & networks

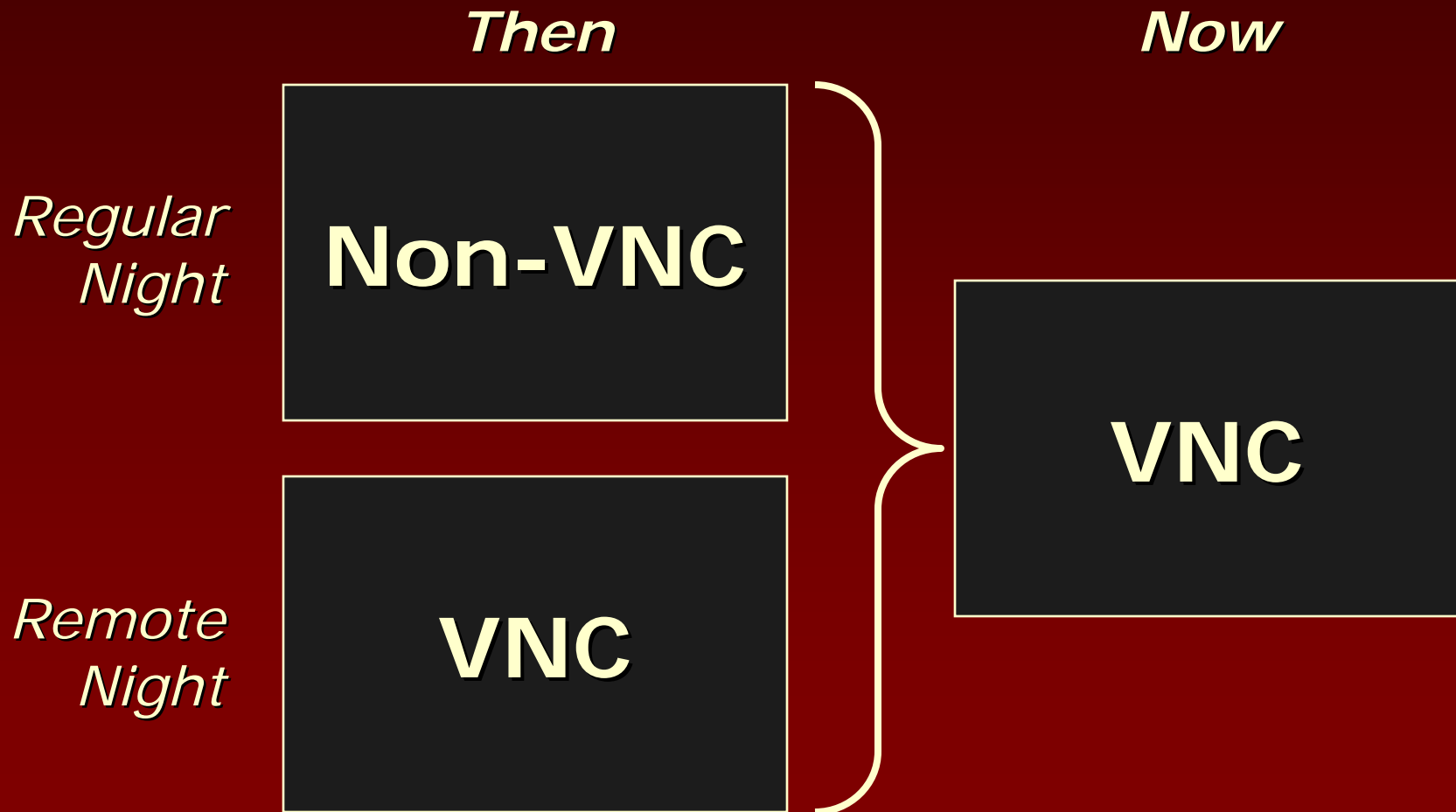


Remote pre-run checkout

Watchdog detected Internet outage



Lesson 4: Treat all observing as potential remote observing



Lesson 5: You'll find unanticipated ways to use your remote observing system



Telescope operators



Home troubleshooters

Remote instrument teams



Lesson 6: You will need to decide how remote is "too remote"



Conclusion:

**A well-built
remote observing system can
deliver significant benefits
with minimal burden
to observatory operations**