

ODI Software Schedule and Budget

20 Nov 2008



ODI Project Approach

- **Continuous Integration as subsystems become available**
- **Results in multiple integration and tests of subsystems**
- **Find mistakes early**
- **Make Improvements as you go**



ODI Software Development Approach

- **Based on Agile Model**
 - Frequent short-term releases that provide needed functionality
 - Close interaction with stakeholders
 - Test-oriented development (JUnit, CruiseControl)
 - Adaptation to changing requirements
- **Based on Service Oriented Architecture (SOA)**
 - Service functionality tied to Project Milestones
 - Services get refined progressively and are revisited multiple times

Reuse Existing Software

- Minimize development
- Take advantage of wide-spread testing and support of existing interface standards
- Don't reinvent the wheel
- Examples
 - Java libraries (thread pools, concurrent queues)
 - Jboss remoting
 - RemoteTea (generates GWC router XDR Java message classes)
 - JMX
 - TerraCotta (sync shared data)

Services needed to produce ODI functionality

- Execution/Scripting Service *
- Focal Plane Camera Controls *
- Engineering UI *
- Operator UI
- Observer UI
- Quick Look UI *
- Pipeline (Tier 1) *
- Database *
- Shutter and Time Service
- Image Cataloging & Retrieval
- Telescope & Instrument Control *
- Telemetry Management and Reporting
- Focus System
- Observation Preparation Tool
- NOAO Archive Service

* Current prototypes exist



Schedule Approach

- **Based on project milestones**
 - **StarGrasp Controller Delivery and Acceptance**
 - **Instrument Support Package Integration & Testing**
 - **Dewar Integration & Testing**
 - **ODI Production System Hardware**
 - **Focal Plane Integration (with Dewar)**
 - **Engineering Test Support & Installation on KP**
 - **Commissioning Phase 1**
 - **Commissioning Phase 2**



Example of Execution/Scripting Service Used at Multiple Milestones

- **Execution/Scripting Service**
 - StarGrasp Controller Delivery and Acceptance
 - Instrument Support Package Integration & Testing
 - Dewar Integration & Testing
 - Commissioning Phase 2

Labor Estimates

- Based on estimate of effort needed to produce the required services and functionality for each milestone
- Prototypes created for some services
- Services (tasks) and duration entered into Microsoft Project
- Costs based on fully-loaded labor

Purchased Material Costs

■ Production Hardware for KP

- Cluster \$30K
- Network Equipment \$30K
- Data Storage \$20K
- Quick Look - \$15K

Brief History of ODI Software

- **Andrey Yeatts hired in Jul 06 as Software System Engineer**
- **Initial Plan included another 1.5 software FTEs for a total of 11,730 hrs**
- **Initially based on MONSOON Controller**
- **Switch to StarGrasp Controller approved by WIYN Board – Mar 08**



History Continued

- **StarGrasp Controller contract signed June 08**
- **Software replan and estimate to complete in Jul 08**
 - 8713 hrs to complete \$896K + 90.4K= \$986.4K
 - assumed hiring new senior software engineer in June 08
 - Extended software project until Jan 2011 with 1 FTE from Jun 2010 until Jan 2011
- **StarGrasp Kickoff Meeting – Aug 08**
- **Prototype Stargrasp Controller delivered – Oct 08**



History continued

- **Software replan and estimate to complete again in Nov 08**
 - Assumes new senior software engineer will be hired in Jan 09
- **To meet ODI Project milestones software project extended to Jan 2011 with 2.5 FTEs – 11,914 hrs**

Software Costs to Complete by Milestone

| | | | | | | | | |
|--|---------------|--------------------|---------------|--------------------|-------------------|-----------------------|-----------------|-----------------------|
| 1.1 Concept Demo | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$75,945.24 | 700 h | \$75,945.24 |
| 1.2 CDR | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$37,200.67 | 352 h | \$37,200.67 |
| 1.3 StarGrasp controllers | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$154,545.84 | 1,440 h | \$154,545.84 |
| 1.4 Instrumentation Support Package | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$86,877.96 | 800 h | \$86,877.96 |
| 1.5 Dewar Integration & Test | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$47,708.16 | 440 h | \$47,708.16 |
| 1.6 ODI Production System Hardware | \$0.00 | \$97,000.00 | \$0.00 | \$95,000.00 | \$2,000.00 | \$84,118.96 | 822 h | \$181,118.96 |
| 1.7 Focal Plane Integration | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$110,998.67 | 1,040 h | \$110,998.67 |
| 1.8 Installation | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$71,103.99 | 680 h | \$71,103.99 |
| 1.9 Commissioning Phase 1 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$212,615.26 | 1,920 h | \$212,615.26 |
| 1.10 Commissioning Phase 2 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$172,544.16 | 1,580 h | \$172,544.16 |
| 1.11 Built, Integration and Test Support | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$99,737.13 | 2,140 h | \$99,737.13 |
| Software III | \$0.00 | \$97,000.00 | \$0.00 | \$95,000.00 | \$2,000.00 | \$1,153,396.03 | 11,914 h | \$1,250,396.03 |

1.1 Concept Demo completed in FY08 includes \$75,945
 Software Costs include \$98,040 that was previously included in other WBS items
 Comparable ETC to Jul 08 ETC is \$1,250,396 – (\$75,945 + \$90,040) = \$1,084,411



ODI Software Costs through FY08

| Fiscal Year | Cost |
|-------------|-----------|
| FY06 | \$35,934 |
| FY07 | \$142,507 |
| FY08 | \$297,707 |
| TOTAL | \$476,148 |

Projected Cost to Complete From Oct 1, 2008

| Fiscal Year | Cost |
|-------------|-------------|
| FY09 | \$501,421 |
| FY10 | \$488,690 |
| FY11 | \$180,443 |
| TOTAL | \$1,170,554 |



Projected Total Software Cost at Completion

| Time Period | Cost |
|-----------------------|-------------|
| Project to Date | \$476,148 |
| Estimate to Complete | \$1,170,554 |
| Estimate @ Completion | \$1,646,702 |

Staffing

- **Andrey Yeatts**
- **Senior Software Engineer (to be hired)**
 - Assumed start date 15 Jan 09
- **Gene McDougall – 50% Build, Integration, and Test Support**
- **Shelby Gott – Costs included in Instrument Controller WBS**

Conclusions

- **Delays and restarts have caused cost increases**
- **Delays in Hiring additional software engineer have extended the software project**
- **The basic scope of the Software Project has not changed dramatically in 3 years**