

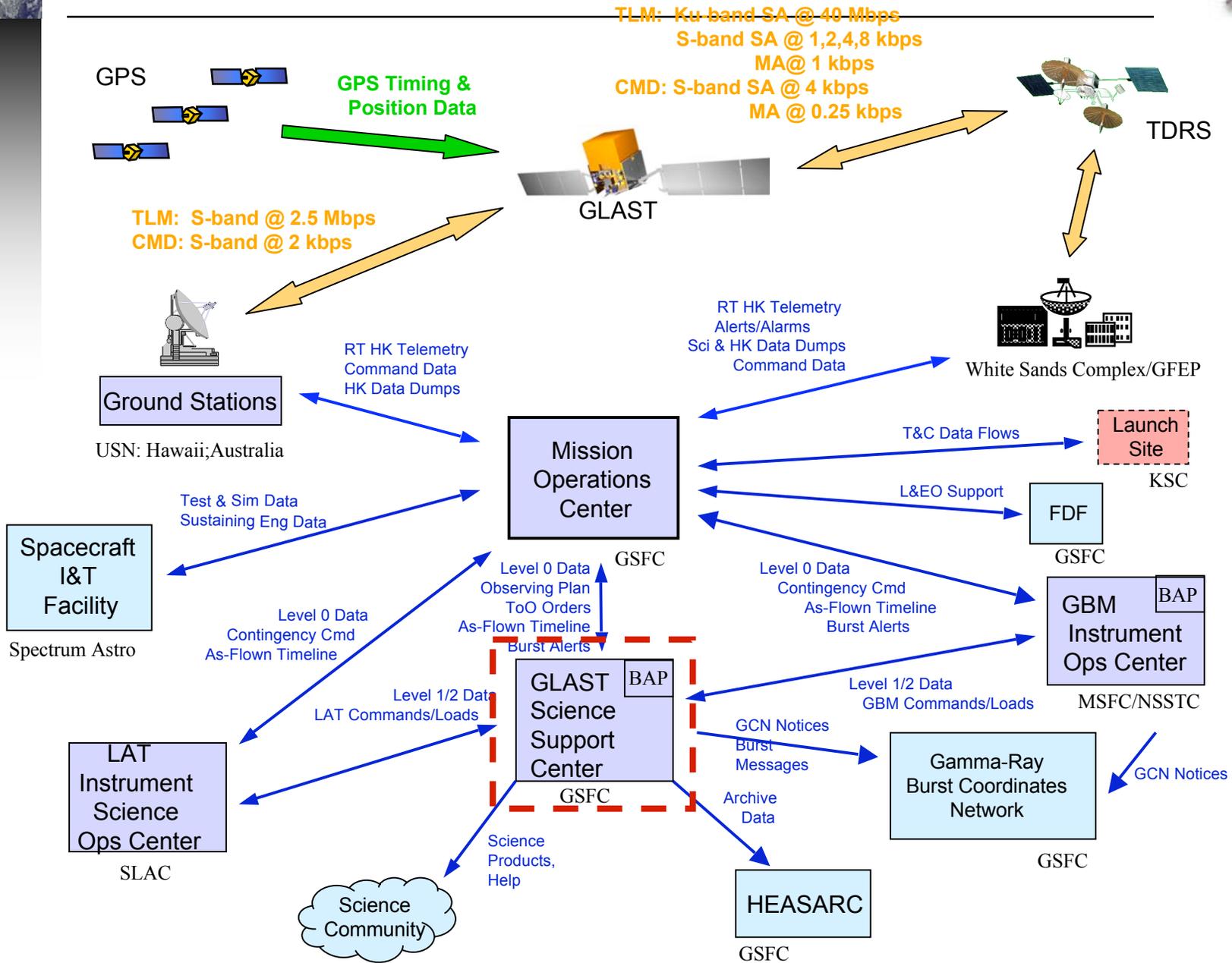


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**GLAST Science Support Center Status**  
**GLAST User's Group**  
**May 8-9, 2006**

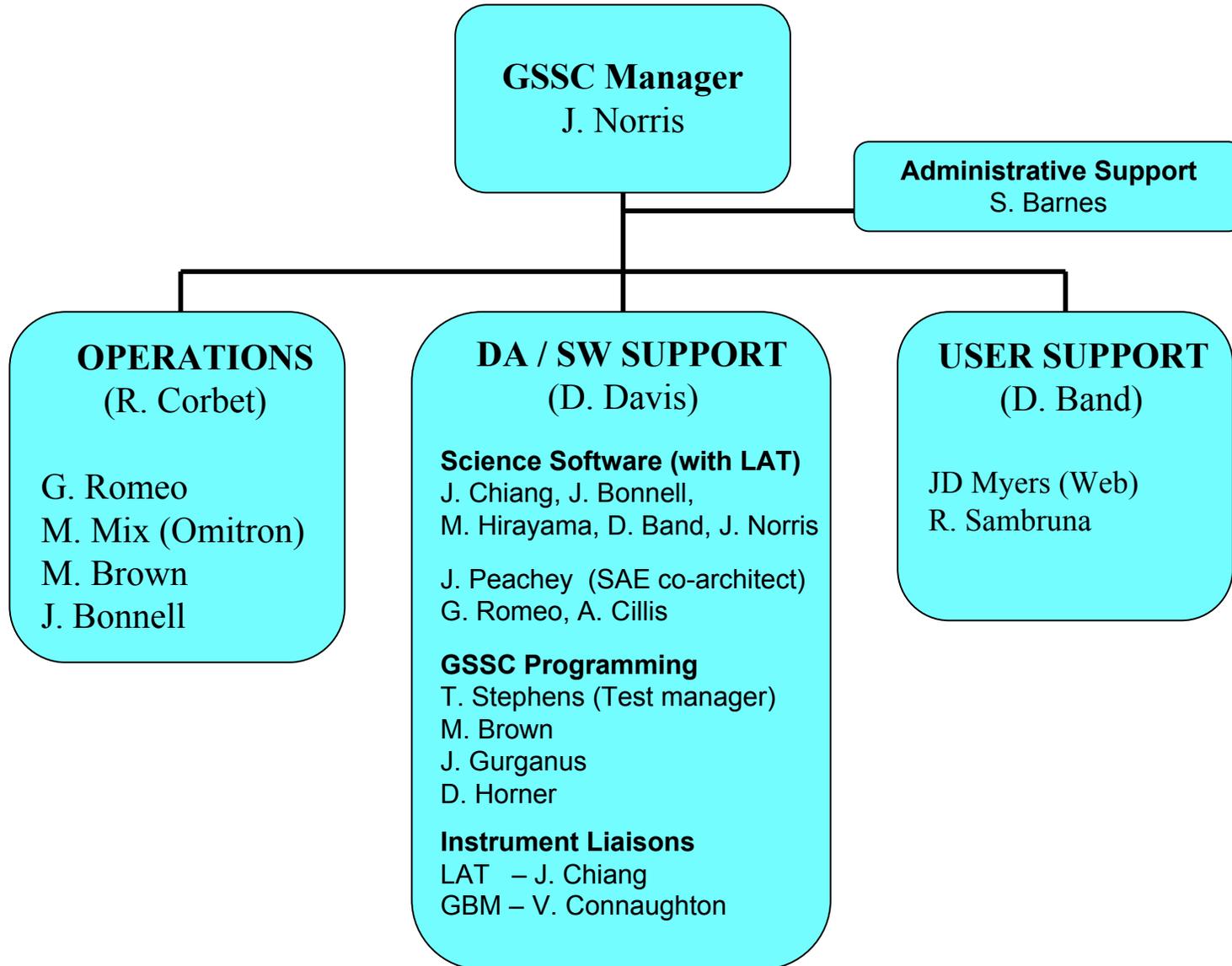


# GLAST Architecture Diagram



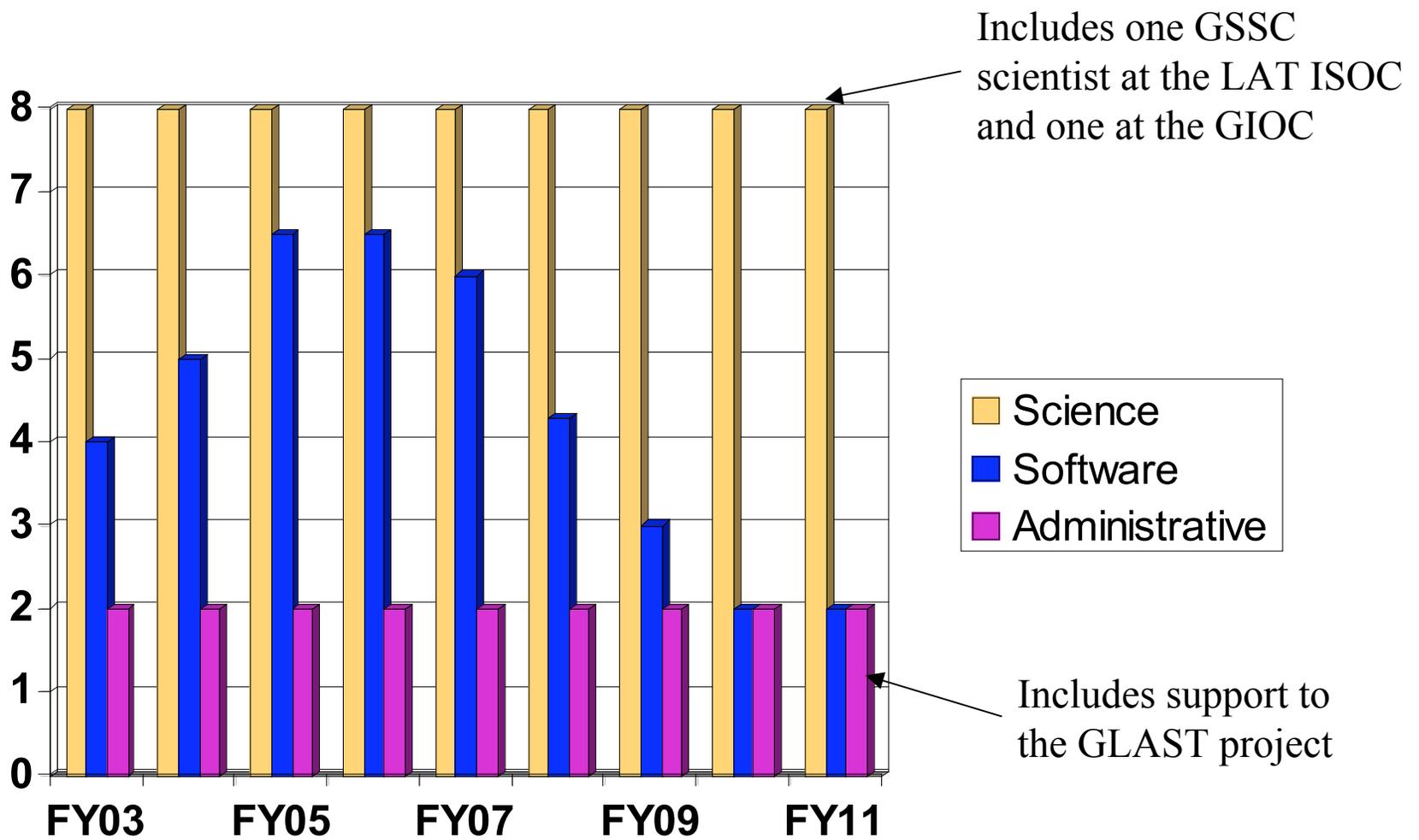


# GSSC Organization





# GSSC Staffing Profile





# Documents – 1/2



<b><i>ID</i></b>	<b><i>Document</i></b>	<b><i>Status</i></b>
<b><i>433-RQMT-0002</i></b>	<b><i>GSSC Functional Requirements Document</i></b>	<b><i>Baselined by Project CCB</i></b>
<b><i>GSSC-0001</i></b>	<b><i>GSSC Development Plan</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0002</i></b>	<b><i>GSSC Verification Matrix</i></b>	<b><i>Revised version baselined by GSSC CCB</i></b>
<b><i>GSSC-0003</i></b>	<b><i>GSSC Design Document</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0004</i></b>	<b><i>GSSC Software Management Plan</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0005</i></b>	<b><i>GSSC Test Plan</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0006</i></b>	<b><i>LAT Event Summary Database Requirements</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0007</i></b>	<b><i>Standard Analysis Environment Database Requirements</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0008</i></b>	<b><i>GLAST-HEASARC MOU</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0009</i></b>	<b><i>Ingest System Detailed Design Document</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0010</i></b>	<b><i>Operations System Detailed Design Document</i></b>	<b><i>Baselined by GSSC CCB</i></b>



# Documents – 2/2



<b><i>ID</i></b>	<b><i>Document</i></b>	<b><i>Status</i></b>
<b><i>GSSC-0011</i></b>	<b><i>GSSC Testing Standards</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0012</i></b>	<b><i>LAT SAE Database System Detailed Design Document</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0013</i></b>	<b><i>TAKO User's Guide</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0014</i></b>	<b><i>TAKO Detailed Design Specification</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0015</i></b>	<b><i>GSSC Documentation Standards</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0016</i></b>	<b><i>GSSC User Support Tools Design Document</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0017</i></b>	<b><i>Data Transmission System Design</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0018</i></b>	<b><i>GSSC Paging Requirements</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>GSSC-0019</i></b>	<b><i>Operations Level IV Requirements</i></b>	<b><i>Baselined by GSSC CCB</i></b>
<b><i>433-PLAN-009</i></b>	<b><i>Project Data Management Plan</i></b>	<b><i>Mature draft revised often; to be baselined by Project CCB</i></b>
	<b><i>Science Data Products ICD</i></b>	<b><i>Mature draft; to be baselined by Ground System CCB</i></b>



# GSSC Status — Completed SW



## DASS SW: 13/29 Elements Complete

*Data Ingest Pipeline Prototype*

*Inbound File Transfer System*

*LAT Data Server Prototypes*

*LAT Data Server DC2 version*

*Database QueueManager*

*GSSC Bug Tracking System*

*GSSC Nightly Build System Prototype*

*GSSC Perl Infrastructure*

*GSSC Standard Operating Environment*

*GSSC Process Manager*

*GSSC Testing Infrastructure*

*Orbit Simulator*

*GSSC Build Manager*

## User Support: 3/19 Elements Complete

*S-61 - Help Desk Question Submission*

*S-62 - Help Desk Response Administration*

*S-63 - FAQ Access*

## Ops SW: 20/32 Elements Complete

*Op10 - As-Flown Timeline Ingest*

*Op12 - As-flown Timeline comparator*

*Op15 - Timeline Merger*

*Op20 - Integrated Obs. Timeline Ingest*

*Op35 - TOO Notices & Acknow. Ingest*

*Op40 - GLAST Ephemeris Ingest*

*Op42 - Eclipse Report Ingest*

*Op45 - TDRSS Ephemeris Ingest*

*Op50 - TDRSS Contact Schedule Ingest*

*Op52 - SAA Definition Ingest*

*Op54 - SAA Report Receiver*

*Op60 - Obs. T&C Database Ingest*

*Op70 - Command Ingest*

*Op72 - Command Log Ingest*

*Op80 - Command Submit*

*Op110 - Science Timeline Submit*

*Op120 - ToO Orderer*

*Op140 - Paging Tool*

*Op170 - ST2FT2*

*Op210 - Retransmission Tool*



# GSSC Status — In-work SW 1/3



<u>DASS SW:</u>	<u>% Done</u>	<u>Finish Date</u>	<u>Assignee</u>
<i>LAT Photon Data Server (final version)</i>	80%	May 24, 2006	Tom Stephens
<i>Outbound Data Transfer System</i>	40%	May 24, 2006	Tom Stephens
<i>Sky Map Generator</i>	90%	May 24, 2006	Dave Davis
<i>DB backup System (revisit)</i>	50%	May 24, 2006	Dave Davis
<i>BROWSE Databases</i>	20%	May 24, 2006	Dave/Don
<i>LAT Pipeline</i>	0%	Aug 16, 2006	Dave, Tom
<i>GBM Pipeline</i>	18%	Aug 16, 2006	Dave Davis
<i>MySQL Databases</i>	6%	Aug 16, 2006	Dave, Tom
<i>Burst product packaging</i>	0%	Aug 16, 2006	David, Tom
<i>Level 0 DB</i>	0%	Aug 16, 2006	Dave Davis
<i>Proposal Database Ingest</i>	0%	Aug 30, 2006	Dave, David, Don
<i>Event Data Reformatting software</i>	0%	Jan 24, 2007	Tom Stephens
<i>Metadata Extraction Modules</i>	75%	Jan 24, 2007	Don Horner
<i>Validation Modules</i>	50%	Jan 24, 2007	Don, Michael
<i>Pointed Observation Packaging</i>	0%	Jan 24, 2007	David, Tom
<i>Popular source packaging</i>	0%	Jan 24, 2007	Dave, Tom



# GSSC Status — In-work SW 2/3



<u>Ops SW:</u>	<u>% Done</u>	<u>Finish Date</u>	<u>Assignee</u>
<i>Op 140 Paging Tool</i>	90%	May 24, 2006	Giuseppe Romeo
<i>Op 100 Scheduling Tool (TAKO Rel 3)</i>	90%	May 24, 2006	Giuseppe, Marilyn
<i>Op 90 Planning Tool (wrapper script)</i> <i>(absorbs Op 85 - Fake Prop. Gen.)</i>	60%	Jun 15, 2006	Giuseppe Romeo
<i>Op 95 Exposure Evaluator</i>	0%	Jun 15, 2006	Giuseppe Romeo
<i>Op 30 Anomaly Reports Ingest</i>	0%	Aug 16, 2006	Don Horner
<i>Op 150 ToO Evaluator</i>	20%	Aug 16, 2006	Giuseppe Romeo
<i>Op 115 ToO Approver</i>	50%	Aug 16, 2006	Jerry Bonnell
<i>Op 75 Command Viewer</i>	0%	Aug 16, 2006	Giuseppe, Michael
<i>Op 165 ToO Proposal Ingestor</i>	0%	Aug 16, 2006	Jerry Bonnell
<i>Op 160 Proposal Ingestor</i>	0%	Aug 30, 2006	Marilyn
<i>Op 180 Duty Scientist Asst. Web Page</i>	0%	Jan 24, 2007	Giuseppe Romeo
<i>Op 102 Timeline Sanctioner</i>	10%	Jan 24, 2007	Jerry Bonnell



# GSSC Status — In-work SW 3/3



<u>UserSupp SW:</u>	<u>% Done</u>	<u>Finish Date</u>	<u>Assignee</u>
<i>S-33 ToO Proposer Notification</i>	<i>0%</i>	<i>Aug 16, 2006</i>	<i>David, JD</i>
<i>S-31 TOO Proposal Submit</i>	<i>90%</i>	<i>Aug 16, 2006</i>	<i>Robin, David</i>
<i>S-32 TOO Display</i>	<i>2%</i>	<i>Aug 16, 2006</i>	<i>JD Meyers</i>
<i>S-57 GCN Circular Post (GCN work)</i>	<i>90%</i>	<i>Aug 16, 2006</i>	<i>JD Meyers</i>
<i>S-56 GCN Notice Post (GCN work)</i>	<i>90%</i>	<i>Aug 16, 2006</i>	<i>JD Meyers</i>
<i>S-01 Source Sensitivity Calculator</i>	<i>23%</i>	<i>Aug 30, 2006</i>	<i>David, JD</i>
<i>S-05 GLAST 1D Spectral Simulator</i>	<i>14%</i>	<i>Aug 30, 2006</i>	<i>David Band</i>
<i>S-21 GI Proposal Submit</i>	<i>90%</i>	<i>Aug 30, 2006</i>	<i>David, Dave</i>
<i>S-06 LAT 3D Spectral Simulator</i>	<i>0%</i>	<i>Aug 30, 2006</i>	<i>David Band</i>
<i>S-04 Observation Simulator</i>	<i>0%</i>	<i>Apr 16, 2007</i>	<i>David Band</i>
<i>S-59 Exposure Time History Display</i>	<i>0%</i>	<i>Apr 16, 2007</i>	<i>David, JD</i>
<i>S-11 Timeline Post</i>	<i>90%</i>	<i>Apr 16, 2007</i>	<i>JD Myers</i>
<i>S-12 Timeline Reconciliation</i>	<i>80%</i>	<i>Apr 16, 2007</i>	<i>JD Myers</i>
<i>S-53 Diffuse Emission</i>	<i>0%</i>	<i>Apr 16, 2007</i>	<i>JD Myers</i>
<i>S-41 LAT Observation Request Interface</i>	<i>23%</i>	<i>Apr 16, 2007</i>	<i>Robin, David</i>
<i>S-55 GRB Lightcurve</i>	<i>0%</i>	<i>Apr 16, 2007</i>	<i>Jerry Bonnell</i>
<i>S-51 Exposure and Count Map Display</i>	<i>0%</i>	<i>Apr 16, 2007</i>	<i>Dave, JD</i>



# Recent Work: Science Tools

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**(1) Commenced work on “ABC User’s Guide” for Science Tools**

**Documentation — This will be the guide for the novice, with first draft assembled from LAT/GSSC efforts to date on SAE documentation.**

**Sequence: D. Band makes first full draft. Internal edits by GSSC staff. HEASARC and LAT members review for third draft, latter ensuring that substance is retained. GUC members then inherit the Guide for highest level of critique. GSSC implements GUC suggestions for improvement.**

**(2) Decision — anticipating suggestions from DC2, and considering prior suggestions about Science Tools — to plan, schedule for**

**(a) *integrated tool package*: standardization of user-input parameters and interfaces between tools (common hidden parameters);**

**(b) *augmentations and fixes to tools*: functionality, conveniences;**

**(c) *additional analysis methods/tools* requested.**



# Recent Work: Obs. Planning

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*Made integrated plan for **evaluating LAT exposure uniformity** for combined (fake) pointings and survey mode. Utilizes Ops 85, 90, 95, and 100 tools, completion dates moved earlier, to June 15:*

- (1) Generate fake set of pointings, e.g., from some EGRET proposals. Implement Ops 85 tool (Fake Proposal Generator) for this step. Run 2-3 different sets of pointings, realizing extremes in sky coverage.*
- (2) Run TAKO to generate timelines for these sets of pointings — TAKO adjusts survey coverage to recover optimal uniformity.*
- (3) Use TAKO-generated timeline in Orbit Simulator to produce FT2 file.*
- (4) FT2 file is used in GT-livetime-cube, then in GT-exposure-map to produce exposure maps.*
- (5) Implement Ops 95 tool (Exposure Evaluator) to evaluate "nonuniformity"; some metrics for nonuniformity captured in design statement for Ops 95 ... iterate to step (2).*
- (6) Report results to LAT representatives.*



# Data Ingest Completion Milestones

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- ▶ ***OPUS is already installed and running.***
- ▶ ***Initial Ingest branch designed and prototype has been implemented.***
- ▶ ***Data specific module completion tied to GSSC Software Releases.***
  - ✓ ***Release 1 (11/24/04) – Data Transfer System, OPUS, Initial Ingest branch, and Level 0 specific Pipeline***
  - ✓ ***Release 2 (03/28/05) – Operations Data I***
  - ✓ ***Release 3 (10/13/05) – Operations Data II***
  - ✓ ***Release 4 (11/09/05) – and Operations Data III***
  - ***Release 5 (06/21/06) – GBM Science Data, LAT Science Data***
  - ***Release 6 (08/30/06) – Anomaly Reports, ToO products***
  - ***Release 7 (11/20/06) – All remaining data***
  - ***Release 9 (05/15/07) – Bug fixes, updates (Launch Release)***
  - ***Release 10 (12/10/07) – Bug fixes, updates (1<sup>st</sup> Post-Launch Release)***



# Science Timeline Generation Details

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- ▶ ***Scheduling Tool*** is TAKO, which has local heritage:
  - *Initially written for Astro-E.*
  - *Modified for use with Swift.*
  - *Being used for Suzaku (Astro-E2).*
  - *Use initiated for RXTE in parallel with older Spike software for long-term scheduling.*
  
- ▶ ***All planned changes needed to use TAKO with GLAST have now been made.***
  
- ▶ ***Modifications included Sky Survey Mode and the use of MySQL databases.***
  
- ▶ ***Development work is now in debug stage and will shortly move to extensive testing.***



# GSSC Role in Scheduling, Planning

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- ▶ ***GSSC creates long term schedule (LTS) covering 1 year, assigning targets to a specific week, based on:***
  - *Sky survey requirements;*
  - *Accepted observations proposed by science community.*
- ▶ ***GSSC creates detailed Science Timelines covering 1-week periods, considering any observational constraints.***
  - *Preliminary science timelines delivered weekly to MOC with ~ 3 weeks lead time to allow TDRSS scheduling.*
  - *Final science timelines delivered 1 week prior to upload; changes possible provided TDRSS contacts are not disrupted.*
- ▶ ***Planned GLAST Science Timeline can be disturbed by:***
  - *Auto-repoints caused by GRBs*
  - *Target of Opportunity observations*
  - *Instrument or spacecraft anomalies*



# Targets of Opportunity

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- ▶ ***GSSC TOO system is fully designed.***
- ▶ ***Draft TOO Operations agreement between GSSC, MOC, ISOC and GIOC has been written and distributed.***
- ▶ ***Science Community will request TOOs via standard RPS (Remote Proposal Submission) web interface.***
- ▶ ***GSSC staff will be alerted by paging system (based on existing RXTE system).***
- ▶ ***GSSC evaluates TOO request, and aids Project Scientist in making decision.***
- ▶ ***Requester is informed of Project Scientist's decision***
- ▶ ***If approved, a TOO order is sent to MOC, and information on TOO progress is posted on public web site.***



# GSSC Participation in L&EO

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- ▶ ***The GSSC role in LEO will be covered by the Mission Operations Agreement.***
- ▶ ***The GSSC will participate in LEO planning meetings.***
- ▶ ***During the commissioning phase the GSSC will***
  - ***Produce science timelines containing spacecraft pointings as required for calibration and other purposes ...***
  - ***on possibly shorter timescales than during post-LEO operations; and the GSSC will be available to revise science timelines on short notice.***
  - ***The GSSC will be available to generate test TOO Orders as required.***
- ▶ ***During commissioning, commanding from the instrument teams will be incorporated into the science timeline in the normal way.***

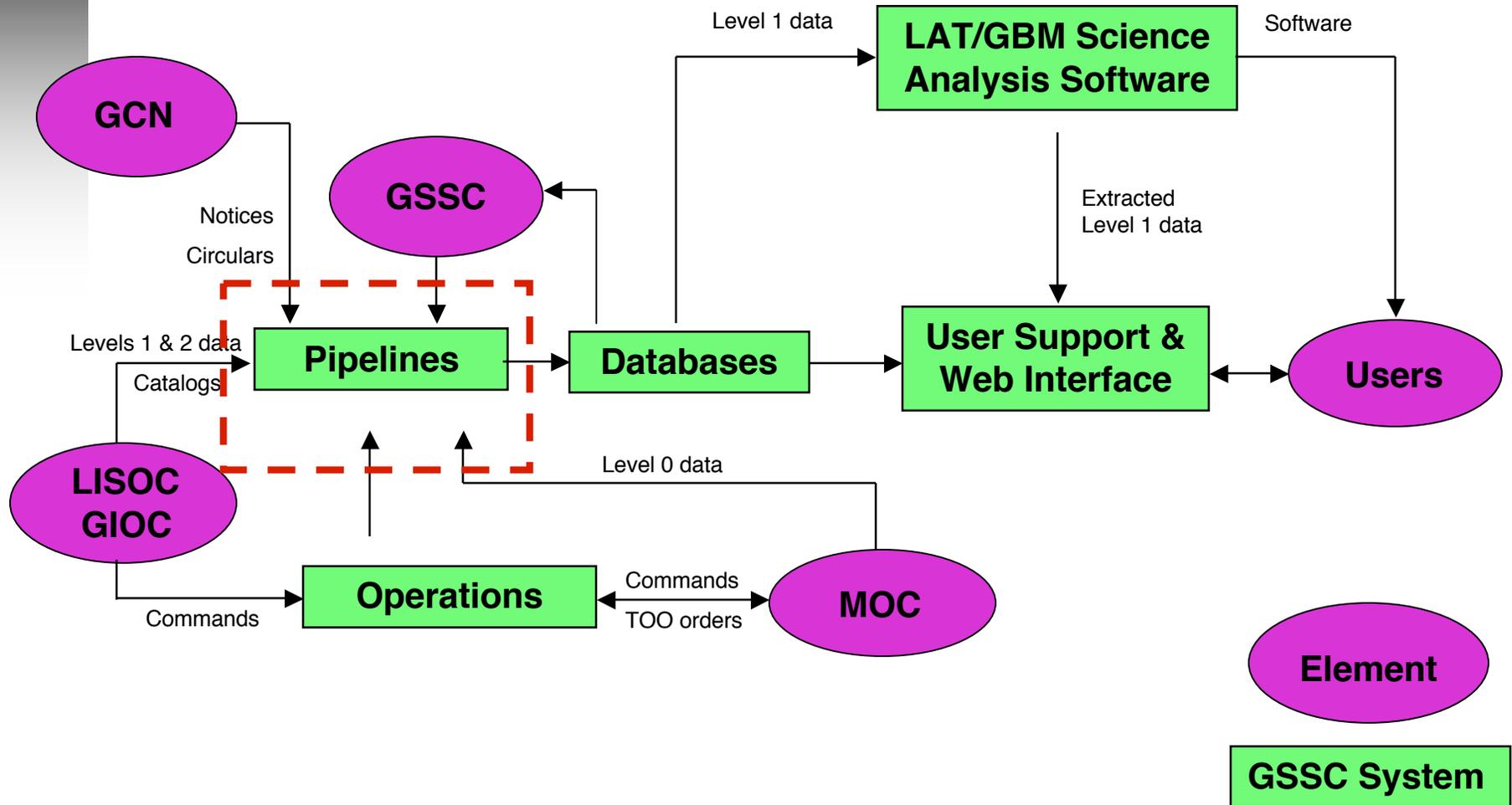


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# Backups



# GSSC Data Pipeline Flowchart





# GSSC Computer Architecture

