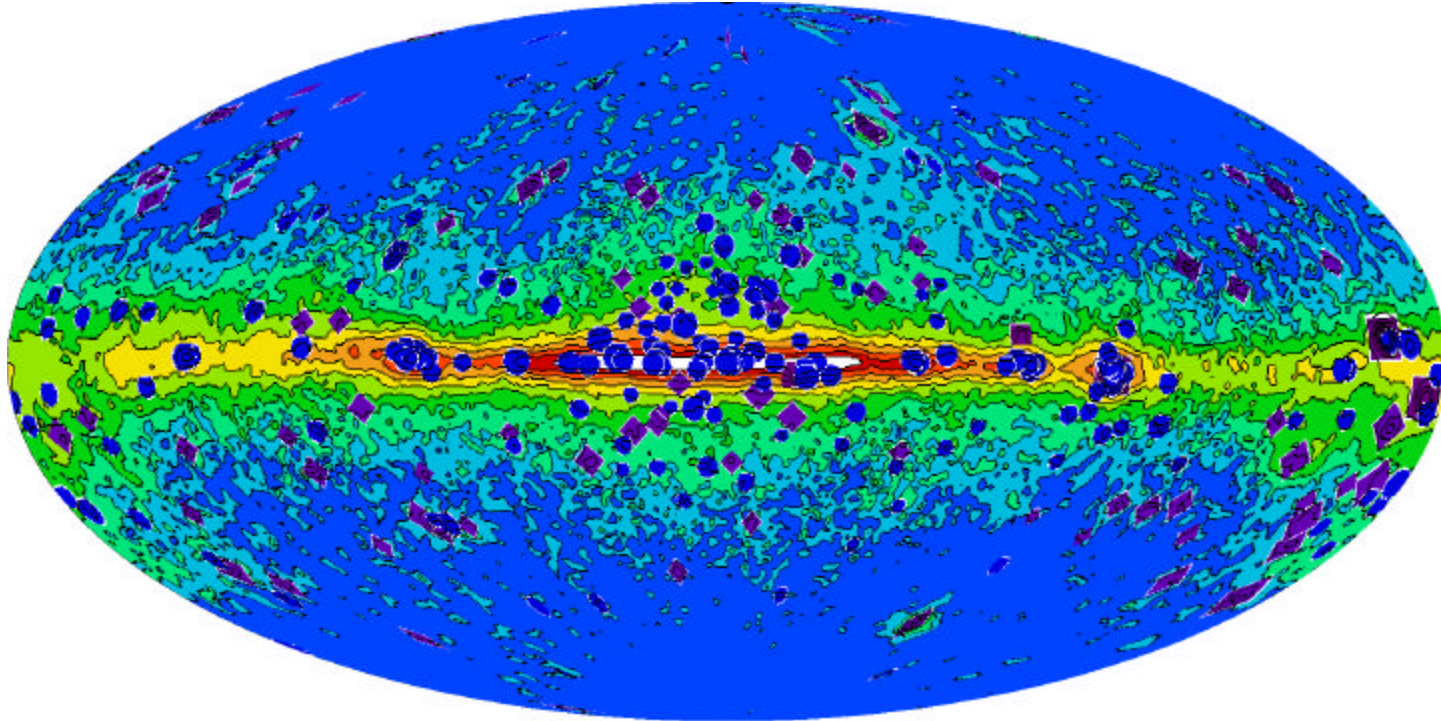# Science Tools - Status

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Outline

- **[What's a science tool?]**
- **Who we are**
    - **Organization & working groups**
- **Where we need to be**
    - **Interfaces & obligations**
    - **Schedule - remember the WBS**
- **Where we are**
    - **Status**
    - **What's working**
    - **What's not working**
- **Topics for the working sessions**

What's a science tool?

- **Jargon for the analysis software and databases that we'll need for deriving scientific results from the LAT data**

- **Implicit in the term is that the analysis is high-level, like studying cosmic sources of gamma rays**

- **Also implicit in the term is that the analysis relies on an abstract characterization of the LAT – via its response functions – and to a lesser extent some faith that background rejection will meet the SRD requirements**

  - **This may be a prejudice of mine, that science with the LAT does not require making Monte Carlo simulations of the sky**

- **The Standard Analysis Environment is the group of science tools that we have agreed to develop jointly with the SSC for us and for guest investigators to use**

  - **Remember the big complicated diagram**

- **Within the LAT team we've got additional tools to develop**

  - **e.g., interstellar emission model, transient source searches, point source catalog generation, in-flight (high-level) calibration monitoring**

Who we are

- **LAT collab. scientists and software developers & assoc. scientists with free time on our hands + SSC**

- **Self-reported: 49 people, 18+ FTEs (the majority of whom are available now)**

- **Cautionary notes: 13 institutions, ~<0.4 FTE/person**

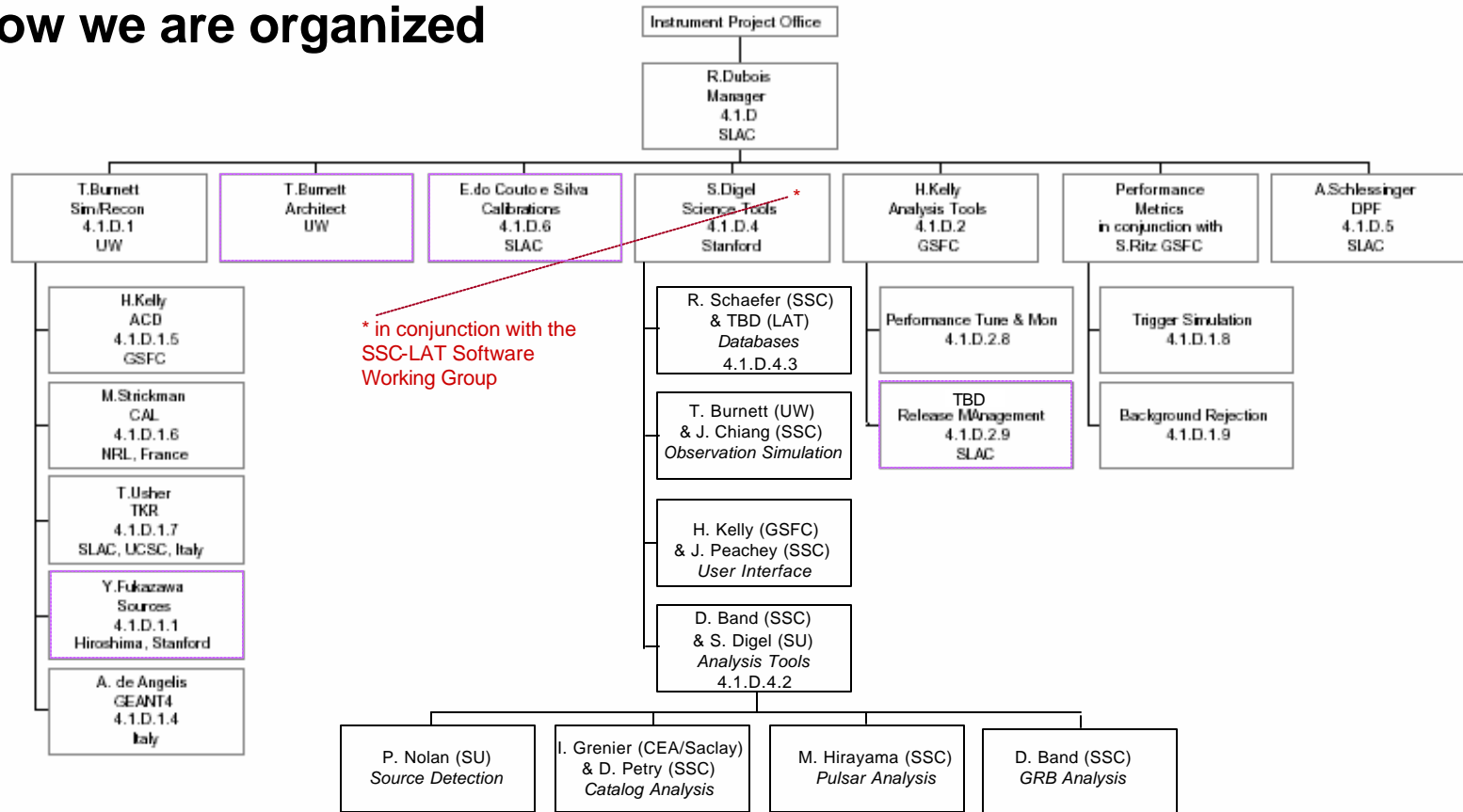| |
|---|
| **SU/HEPL** |
| **SU/SLAC** |
| **GSFC/SSC** |
| **GSFC/UMBC** |
| **CEA/Saclay** |
| **IN2P3/LLR** |
| **IN2P3/Bordeau** |
| **INFN/Perugia** |
| **INFN/Trieste** |
| **INFN/Udine** |
| **INFN/Pisa** |
| **INFN/Bari** |
| **Univ. Washington** |

Who we are (2)

- **How we are organized**

Who (3)

- **Working groups that are known to have meetings at least sometimes**
  - **SSC-LAT – Policy-establishing group, officially receives the science tools in the SAE, also reviews requirements for the L1 pipeline**
  - **Science Tools – Has been for definition, design issues; should be for developers**
  - **Science Tools Core – Analog of the classic core group and will merge**
  - **User Interface**
  - **Databases & Related Utilitites**
  - **Gamma-Ray Bursts**
  - **LAT FITS Formats**

Where we need to be

- **The data challenge-driven development schedule imposes milestones on the functionality of the standard analysis environment**

Data Challenge 1	141 days	Mon 9/1/03	Mon 3/15/04
Planning (science tools aspects, before event generation)	22 days	Mon 9/1/03	Tue 9/30/03
Testing prerelease DC1 versions of tools	20 days	Mon 11/17/03	Fri 12/12/03
DC release of tools	0 days	Mon 12/15/03	Mon 12/15/03
DC user support	55 days	Mon 12/15/03	Fri 2/27/04
DC closeout	11 days	Mon 3/1/04	Mon 3/15/04
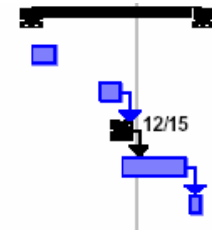
- **Playing well with others**

  - **Sorting out what's in the IOC**

  - **There's a whole ground system out there**

- **Ground system management also imposes a schedule (for functionality and esp. for reviews), and we are on the hook to have a follow-up face-to-face review with the committee that we faced last September**

GLAST Ground System

GLAST Ground System / Mission Operations Schedule (as of 7/22/03)

Mike Rackley
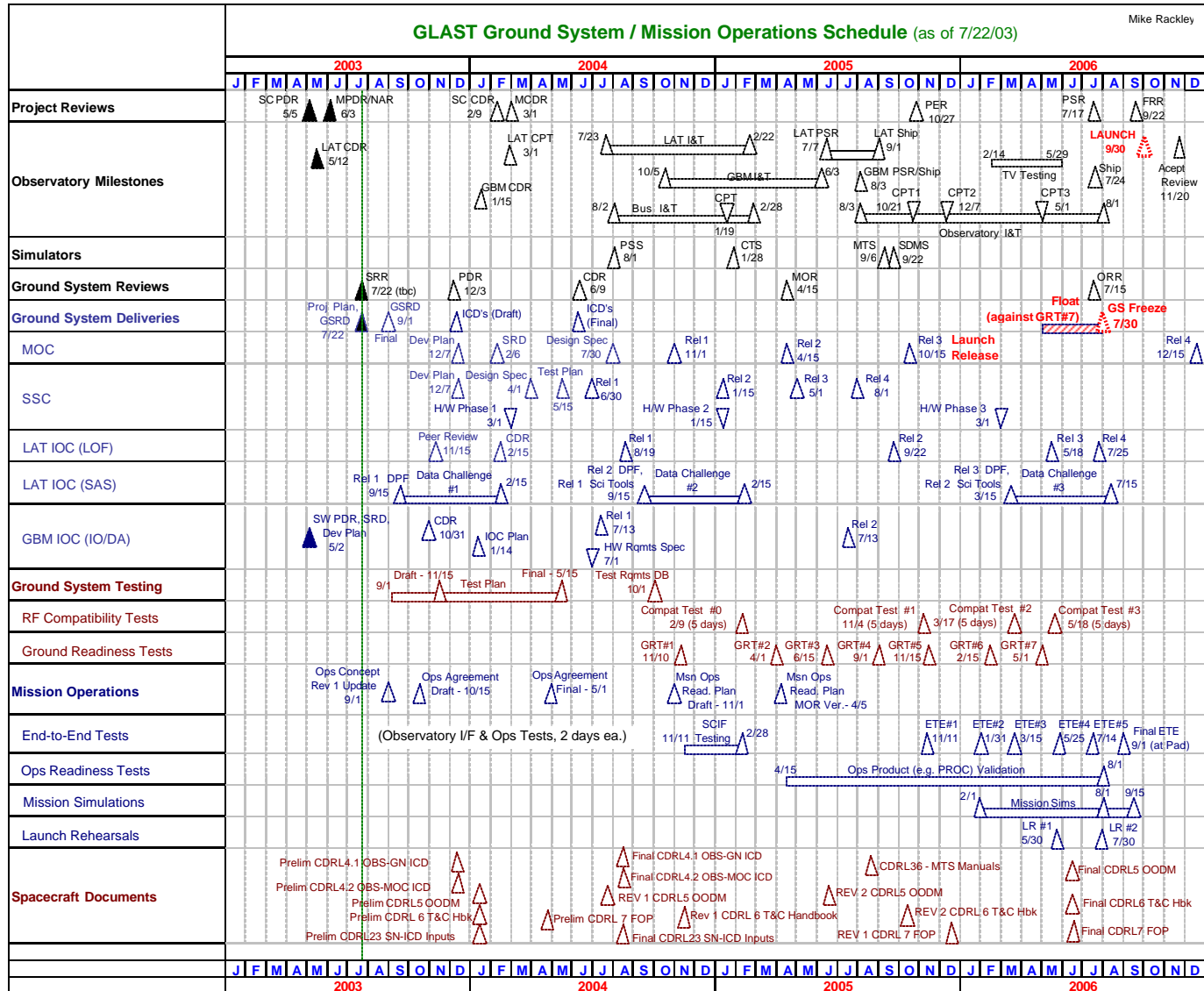
Where we are: Status

- **Core**
  - *Development environment, release manager*
  - **HOOPS (OO PIL)**
  - **GOODI – data representation, i/o**
  - **Plplot/AIDA**
- **D1 database and supporting utilities**
- **D2 pointing/livetime/mode history**
- **D3 response functions, form and interface**
- **O1 orbit and attitude simulation**
- **O2 & interim simulated data set**
- **A1 & supporting tools**
  - *Functional prototype likelihood analysis*
  - **Source model definition**
  - **Exposure calculation?**
  - **Response function visualization**
- **Map generation – counts, exposure, intensity, model**

Ready
Signs of progress
Signs of life
Moribund

5 months before DC1 release of science tools

Where we are (2): What's working

- **Jim Chiang has produced a workable prototype version of A1 and aced the first science tools code review**

- **Core is coming along**

- **O2 is getting the attention it deserves – 2 prototypes actively under development (see Jim Chiang's talk) although useful cooperation**

- **LAT FITS definition (Bansal, Bonnell, Dubus, Hirayama)**

- **SSC has a GRB event binning tool**

- **Healthy interest in alternative source detection algorithms**

Where we are (3): What isn't

- **Finishing up definitions of requirements**
    - **Within reason – we have to know when we're done**
- **Distribution of assignments/responsibilities**
    - **Taking advantage of the prospective 18 FTEs**
- **VRVS attendence across 9 time zones – staying coordinated and not distracted**
- **Decision making**

My concerns

- **Design**
  - **Bottoms up vs. spiral (out of control) development?**

- **Non-SAE tools**
  - **SSC is major source of real labor**
  - **LAT people are doing things like building the LAT**

- **L1 database**
  - **Behind the curve on the LAT side**

- **Likelihood analysis**
  - **Will we be killed by response functions, numerical accuracy, multidimensional optimization, computational requirements?**
  - **Making sensible, informed tradeoffs**

- **Interstellar emission model**
  - **(For the future, not DC1) How good can it be and how good is good enough?**

Topics for the working sessions

- **Some nominations for science tools-related sessions**
  - **Observation simulation**
  - **Graphics – AIDA & Plplot issues**
  - **HOOPS – how-to**
  - **Data layer – core developer-level discussion: what it can do for you**
  - **D1 & D2 details – like how to communicate with them**
  - **Source detection**
  - **Interstellar emission model**
- **Priority order; other nominations?**
- **We'll try to optimize scheduling, or at least help with finding rooms**
- **Report back on progress**