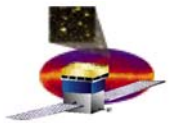
SAS Overview

- The Big Picture
  - Reminder of the SAS mission, data flow, etc
- Simulation/Reconstruction Directions
- New in 2001
- Who's Doing What?
- Calibrations Planning
- Early Science Tools directions
- Short- and long-term schedules
- Management Stuff
- Worries



Our Mission

- shall perform prompt processing of Level 0 data through to Level 1
- shall provide near real time monitoring information to the IOC.
- shall facilitate monitoring and updating instrument calibrations.
- shall maintain state and performance tracking.

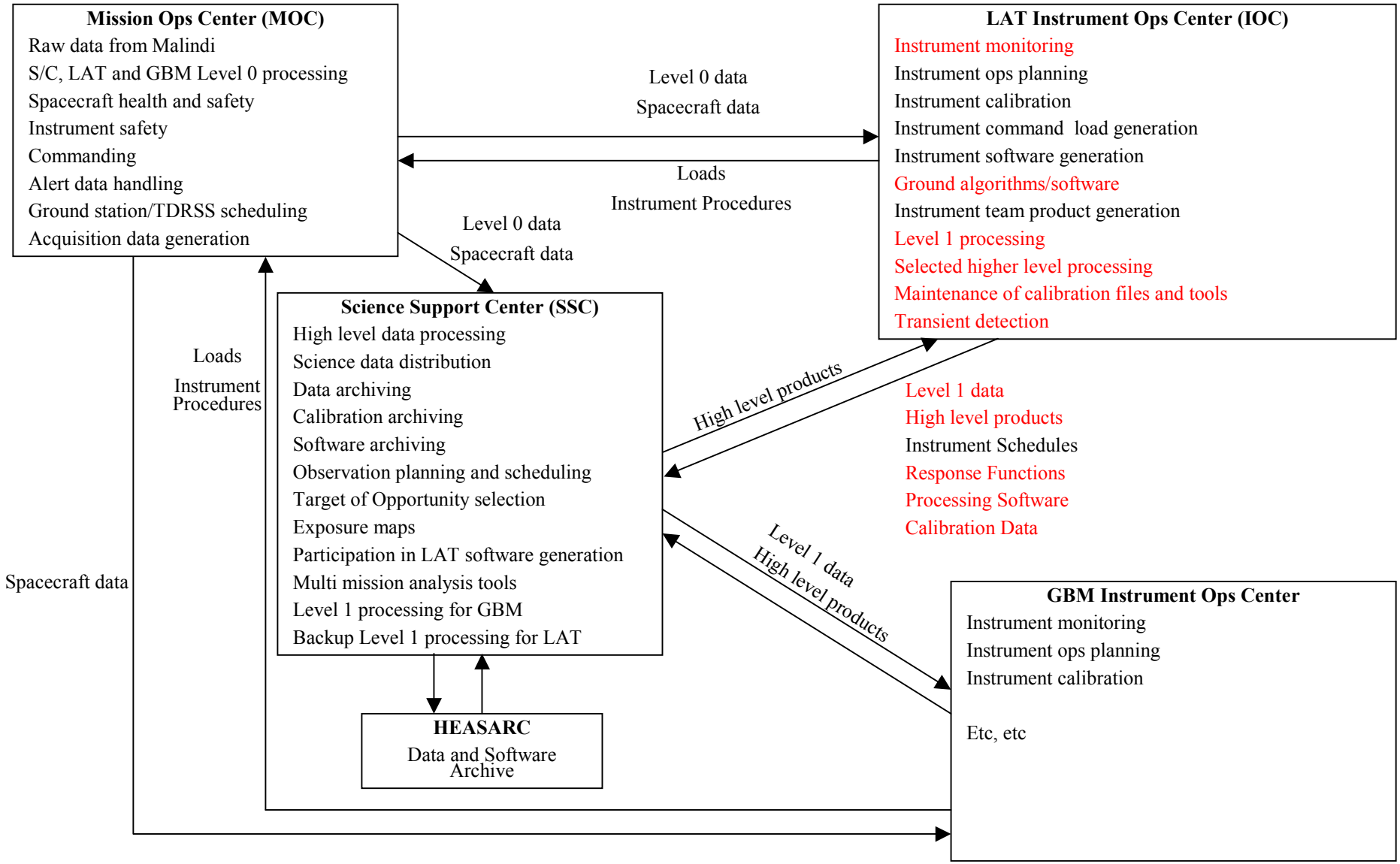
- shall create high level science products from Level 1 for the PI team.
- shall perform reprocessing of instrument data.
- shall provide access to event and photon data for higher level analysis.
- shall perform bulk production of Monte Carlo simulations.

- shall interface with mirror PI team site(s) (sharing data and algorithms).
- shall interface with the SSC (sharing data and algorithms).
- shall support design of LAT instrument with simulations.

- Production event processing is performed in the Data Processing Facility.

Proposed Big Picture

Draft 11/02/01



Data Flow

MOC

IOC

Data recon + MC on disk. Abstract full-recon output into L1 DB for analysis

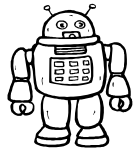
DPF

MC

Recon

Calibs

Italian mirror
French mirror



ORACLE

L1 DB

L2 DB

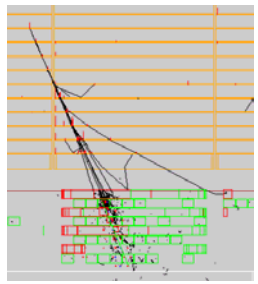
SSC

Fully automated server, with RDB for data catalogue + processing state. Uses SLAC batch CPU and disk farms.

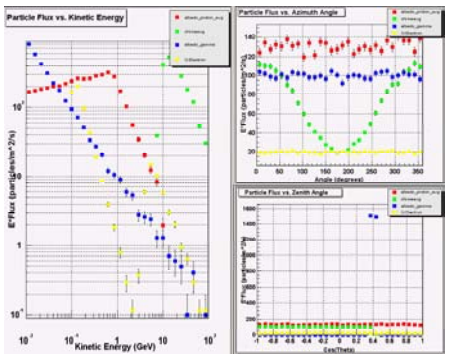
Parts of L2 processing also automated

Instrument Simulations and Reconstruction

3 GeV gamma interaction



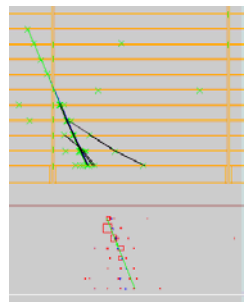
Source Fluxes



Particle Transport

"Raw" Data

Instrument data

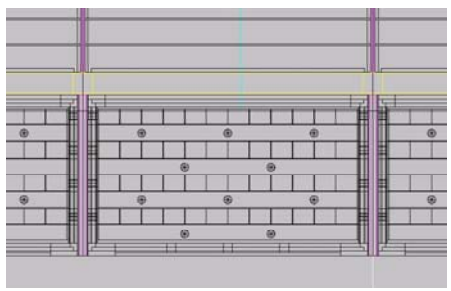


3 GeV gamma recon

Recon

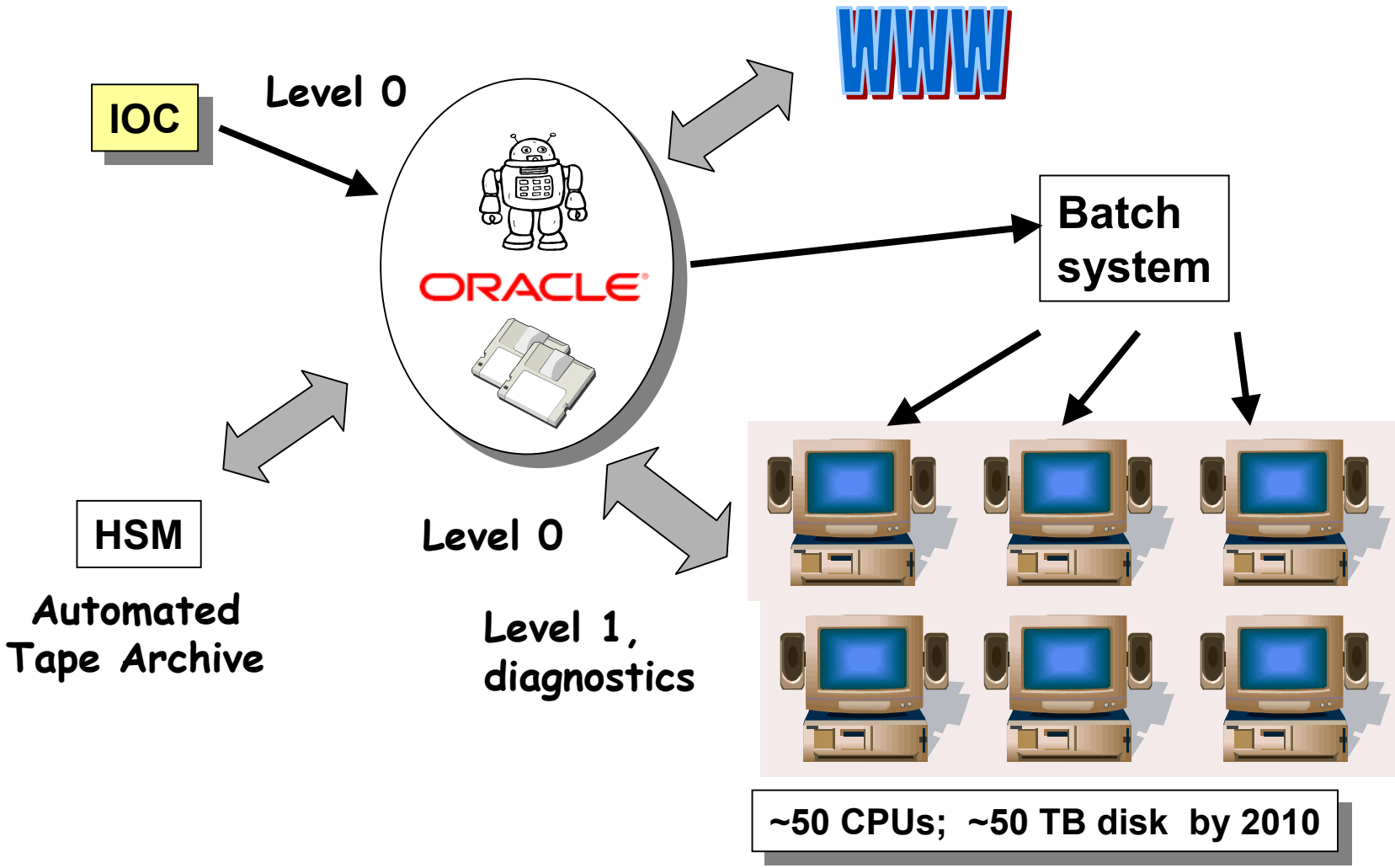
Geometry

Background Rejection - Particle ID



CAL Detail

Processing Pipeline



Sim/Recon Toolset

applications

Root, IDL – analysis

TkrRecon, CalRecon, AcdRecon – test beam era versions; Rewrites being planned & executed

gismo – simulation package
GEANT4 – on its way

xml – geometry, parameters

Root – object I/O

Gaudi – code framework

VC++ – Windows IDE
gnu tools - Linux

vcmt – Windows gui

CMT – package version management

ssh – secure cvs access

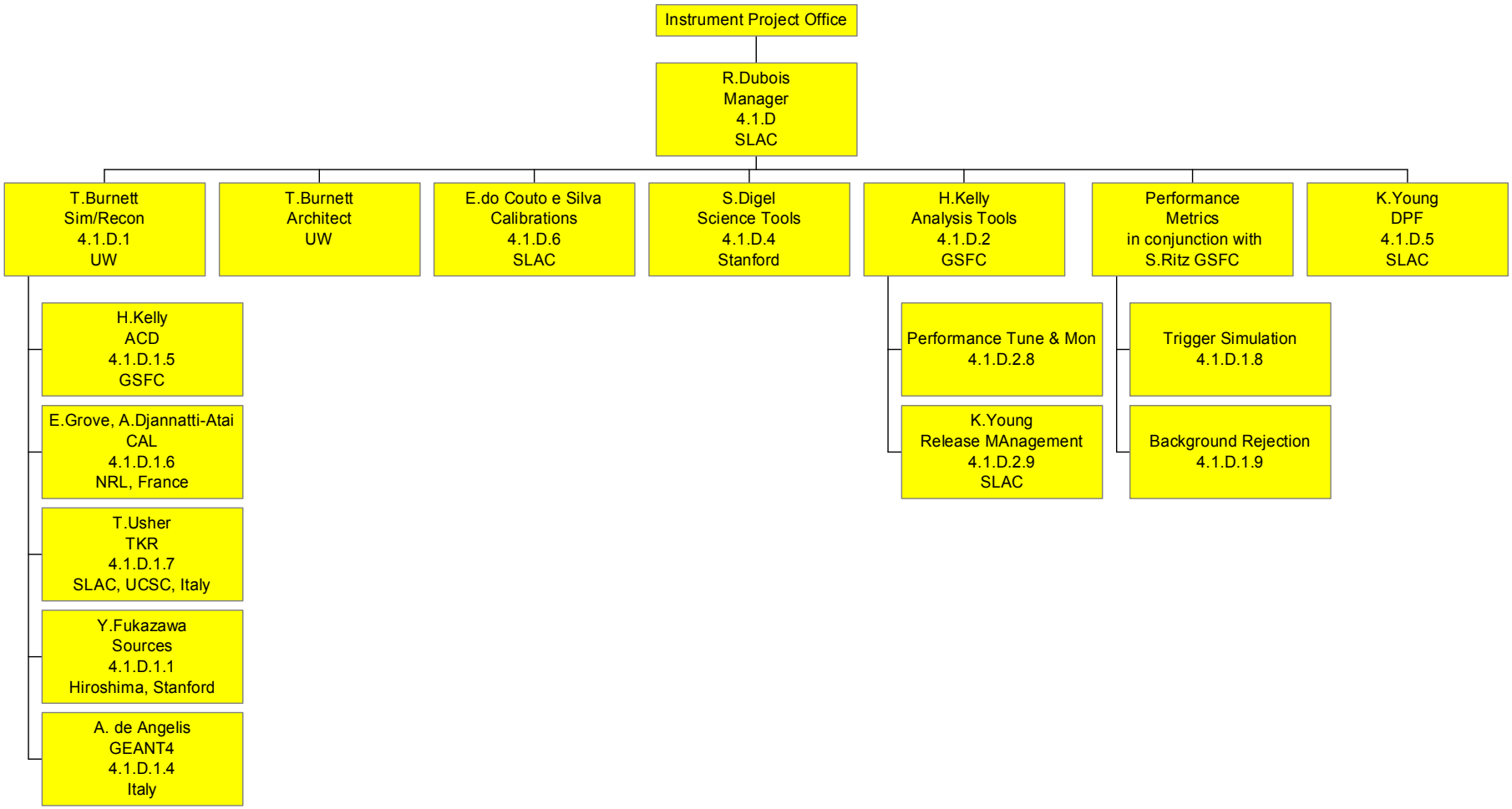
cvs – file version management

utilities

2001 in a Nutshell

- New code framework – Gaudi
  - Bulk of the software has been moved in
  - Some useful features not moved yet
    - eg Sawyer's "time history" code
- tb_recon versions of TkrRecon and CalRecon ported and tweaked
- Geometries updated to match new baseline
- Sources updated
- All PDR studies run in this new environment
- GEANT4 just brought online – first version
  - EM physics validation performed
- And, of course, PDR report, budgets, schedules, PMCS etc
- Using Root for object I/O system
  - More descriptive and efficient format, suited to event data
  - proto Recon tree & ntuples so far
- Code systems operational again on 2 OS – Windows + Linux
  - Windows & Linux standard installs at UW & SLAC
- Data Manager prototype running
  - Scripts produced simulation runs for PDR
  - exercised SLAC batch farm
  - Relational database is ready to use for tracking processing. Undergoing some tweaks
- Release Manager prototype could be turned on
  - Automated code builds & limited testing
  - Nightly runs – notify package owners of problems

SAS Organization



Institutional Responsibilities

- Management – SLAC
- Code Architect – U Washington
- Subsystems
  - ACD – GSFC
  - CAL – NRL, France
  - TKR – SLAC, UCSC, Italy
- Infrastructure – GSFC, SLAC, UW
- GEANT4 – Italy
- Event Display – Italy, UW
- Sources – SLAC, UW, Japan
- DPF – SLAC, Stanford

- Science Tools – Stanford lead + collaboration + SSC

Who's Doing What?

- Core
  - Everything – Toby
  - xml & geometry – Joanne
  - detModel – Riccardo
  - Sources - Sean
  - Root stuff – Heather
  - Data Manager, Release Manager – Karl
  - CMT, librarian – soon to be Alex
  - Calibrations – will be Joanne
  - Event Display – led by Riccardo
- TKR
  - Tracy, Leon, Bill Atwood
  - Alignment - Hiro
  - Digis – folks at Bari
  - Vertexing – folks at Pisa
- CAL
  - Sasha, Eric, Malcolm, Regis, Arache
  - Calibrations – Sasha, Eric
- ACD
  - Heather
- GEANT4
  - Validation – Alessandro, Francesco, Riccardo, Claudia, Tune
  - To Gaudi – core + Monica
  - Geometry - Riccardo
  - Hits – Riccardo, Francesco
- BFEM
  - Heather
  - Event Display – Nick, Gloria
- PDR Instrument Studies
  - Steve, Bill, Tracy + core
- User Support
  - Documentation Task Force – Heather
  - "binaries" distributions – Alex
  - Bug tracking - Karl

Doc & User Support

- Documentation Task Force
  - Commissioned in Dec ’01
  - Group of 7. Heather Kelly (GSFC) chair.
  - Charged with riding herd on all forms of doc
    - Web, inline, Users and Developers manuals
    - Defining procedures for maintenance

    http://www-glast.slac.stanford.edu/Software/core/documentation/
- “Binary” Code Distributions
  - rpms and tarballs now available on Linux
  - Winzip files on Windows
  - Greatly reduce difficulty of install for non-experts
- Bug Tracking
  - Currently just instituted simple majordomo mailing list
  - Investigating use of Remedy for ‘real’ tracker. Will be a learning experience.

Data Structures Task Force (1)

1. Data Structures

- Commissioned in Dec '01. Time is right, since TKR & CAL are rethinking their recons. Match to May/Oct '02 major code releases.
  - May require iteration
- About 10 members provide broad representation of subsystems, core and science. Leon Rochester (SLAC) chair.
- Charged with revisiting all transient/persistent store structures in sim + recon
  - Content
  - standards

http://www-glast.slac.stanford.edu/Software/DataStructuresTF/

Data Structures Task Force (2)

- Content
  - Add missing information
  - Remove unneeded or duplicate information
  - New classes
    - Volume ID's
    - Event info (time, position, instrument status, etc.)
- Uniformity
  - Coding rules
  - File templates
  - Member function names
  - Private data names
- Monitor implementation
- Document design and implementation

Calibrations Planning

- Instrumental Calibrations
  - ACD pedestals & gains
  - CAL pedestals, gains, light tapers
  - TKR hot/dead channel lists, alignments
- Schedule Drivers
  - EM1 unit Aug '02
  - Qualification Unit Nov '03
- High Level Calibrations
  - Instrument Response Functions – resolution and efficiency parametrizations
  - Used for astronomy
- Work in conjunction with Integration & Test group
  - SAS writes algs, I&T runs them
  - Test plans in prep for creating calibs for engineering units
  - Test plans in prep for verification of MC against cosmics and beam tests.
- Current PSF, A_{eff} shown in Steve Ritz's Day 1 talk
  - Will repeat and refine this work annually

Calibrations: SVAC Data

(being reviewed by subsystems)

Science verification

- Number of reconstructed photons (Effective Area)
- Absolute Energy
- Energy Resolution
- Single Photon Angular Resolution
- Background Rejection (CAL+TKR)
- Monte Carlo tuning (hit distributions, energy deposition, …)

High Level Calibration

ACD
- Detection Efficiency
- High Threshold detection

TKR
- Single Hit Efficiency
- SSD Alignment
- Ladder Alignment
- Tray Alignment
- Tower Alignment
- Inter Tower Alignment
- LAT & Observatory Alignment

CAL
- Light Attenuation
- Light Asymmetry

Low Level Calibration

ACD
- Pedestals

TKR
- Noisy Strips
- Dead Strips
- Time-Over-Threshold

CAL
- Pedestals
- Scintillation efficiency
- Energy range: Electronic Gain
- Energy range: Integral non linearity
- Energy range: Differential non linearity

From I&T – E. do Couto e Silva

SVAC = Science Verification and Calibration

Science Tools Progress

- At Feb review
  - Already had list of tools and rough estimate of needed manpower
    - ~40 MY effort estimated – to be drawn from the collaboration and SSC
    - Seen by IPO as "Level of Effort" – after critical items are in hand.
  - SSC did not exist
    - Was awarded to Goddard during summer; starting to staff up
- Since then
  - Negotiations with Goddard on LAT interface to SSC and deliverables
  - Draft Project Data Management Plan
  - Working on formalizing collaboration and internal science effort
  - Working with SSC on requirements for Event Database used for astronomy
  - Planning on a Science Tools workshop in Feb/March

Budget = Manpower Profile

USA

- **On project**
  - **1.25 FTE NRL**
  - **1 FTE GSFC, increasing to 2 in FY03**
  - **1 FTE Stanford, increasing to 2 in FY03**
- **Off Project**
  - **7 FTE SLAC**
  - **1 FTE UW**
  - **1/2 FTE UCSC**

France

- **2 ½ FTE**

Italy

- **2 ½ FTE (and probably more, see TKR)**

Japan

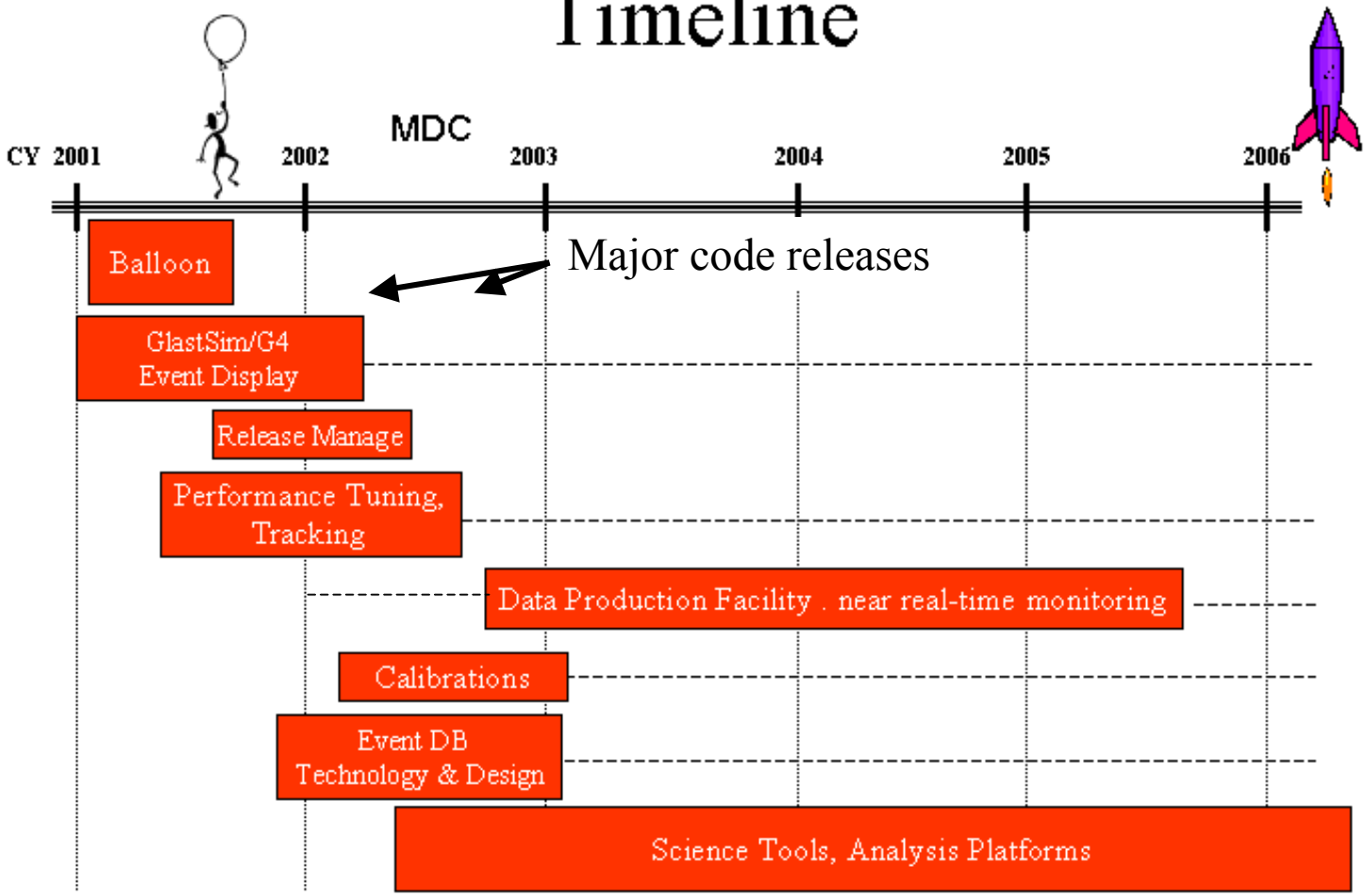
- **½ FTE**

Profile shows dropoff in out years:
- no Science Tools work yet
- some lack of imagination about tasks that far out!

2002 Schedule

- **Milestones submitted to IPO**
  - Prototype Code Release Manager - 3/02
  - ACD Calibration algorithm ready 4/02
  - Major Post-PDR Code Release (G4, flexible geometry) - 4/02
  - CAL Calibration algorithm ready 6/02
  - TKR Low level calibration alg ready 6/02
- **Calibration milestones are in response to I&T needs – EM1 module in 10/02**
- **Major Code Release 5/02**
  - First G4 ready by 1/02
  - Significant fraction of new TKR, CAL recons
  - Next iteration on infrastructure
  - Partially updated output structures
- **Major Code Release 10/02**
  - G4 stable
  - New TKR, CAL recons done
  - Fully updated output structures
- **CDR in 8/02!**

Timeline

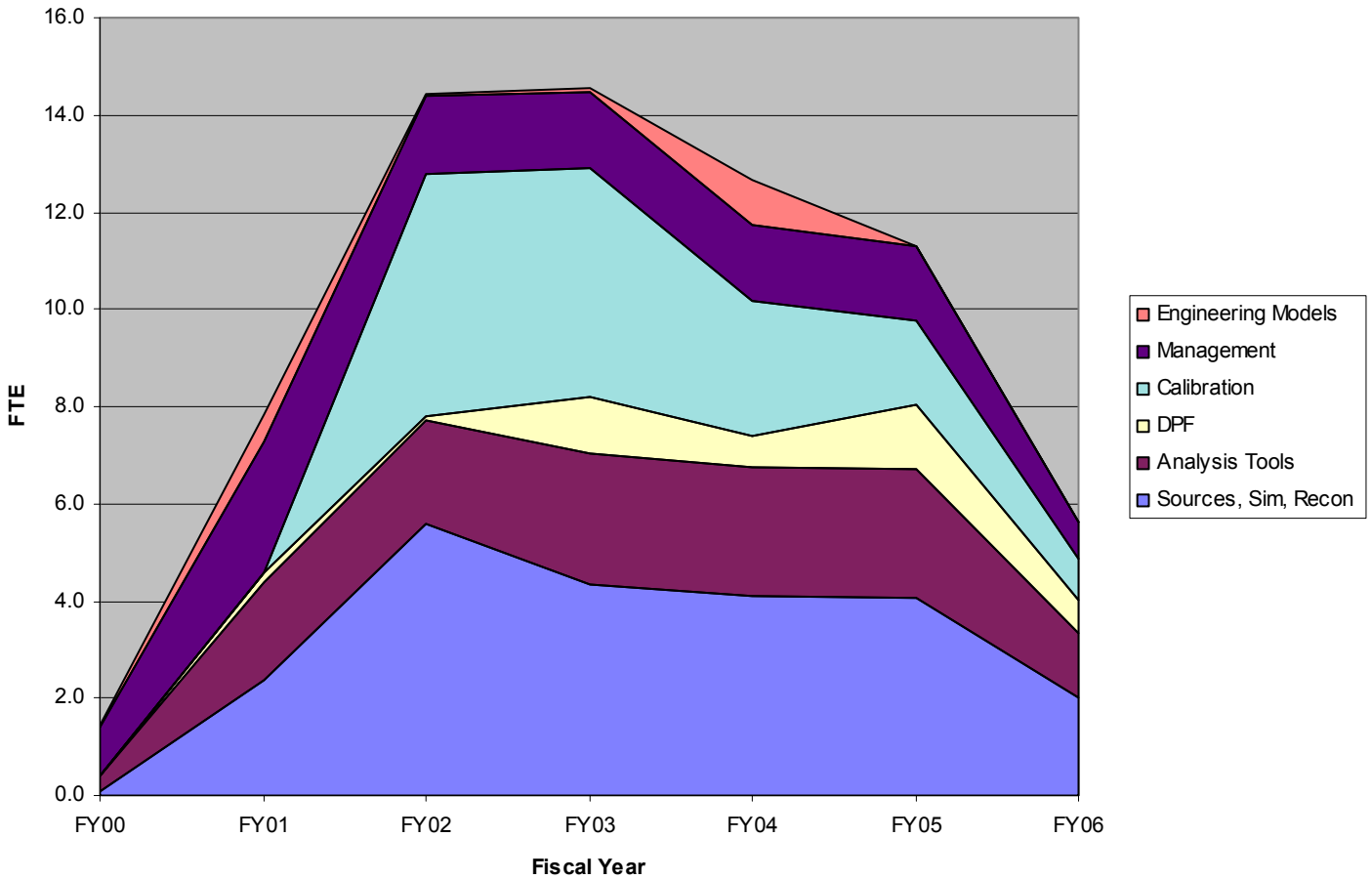

MDC
CY 2001
2002
2003
2004
2005
2006
Balloon
Major code releases
GlastSim/G4
Event Display
Release Manage
Performance Tuning,
Tracking
Data Production Facility . near real-time monitoring
Calibrations
Event DB
Technology & Design
Science Tools, Analysis Platforms

Management Stuff

- Scope
  - Full WBS exists
  - Critical areas (ie all but Science Tools) defined in Level 3 & 4 requirements.
  - Calibrations defined in concert with I&T group
    - SAS writes algs, I&T runs them
- Resource Loaded schedule
  - '02 and beyond loaded bottoms up. On- & off-project effort accounted for. ('01 loading is very approximate)
  - Much use of "ongoing support" to indicate tweaking of "finished" projects
  - Science Tools resources & schedule in as place holders from initial estimate
- Responsibilities
  - All areas have clear line of responsibility
  - Work packages defined to scope out details in combination with tasks
    - Will be signed off by institutions, including non-US
    - On-project folks report time per work package (started October)
    - Off-project still to be worked out. IPO only requires reporting to top level WBS.

Manpower Projection

Note: ’06 is only ½ year



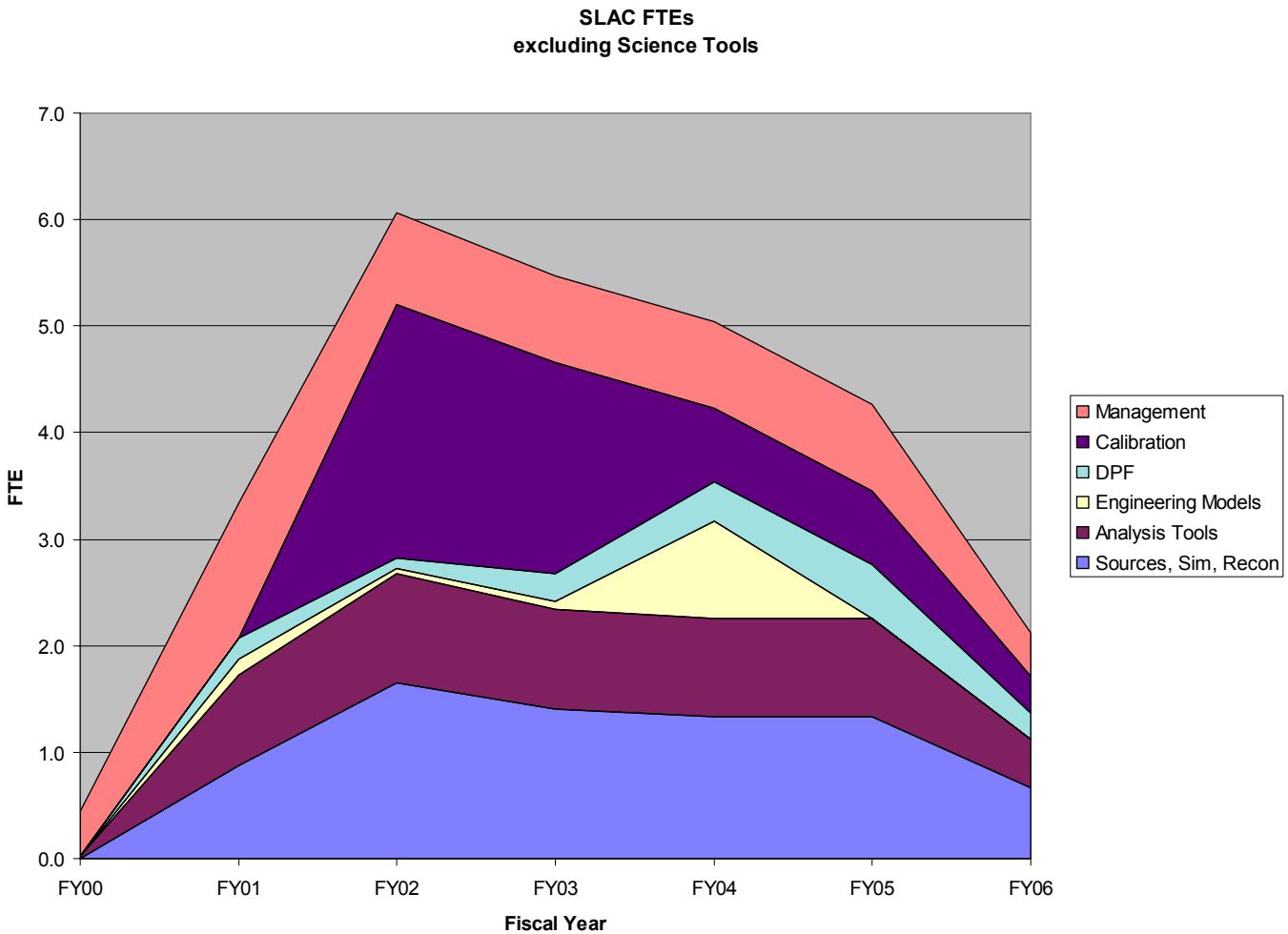
• excludes Science Tools effort buildup

Worries

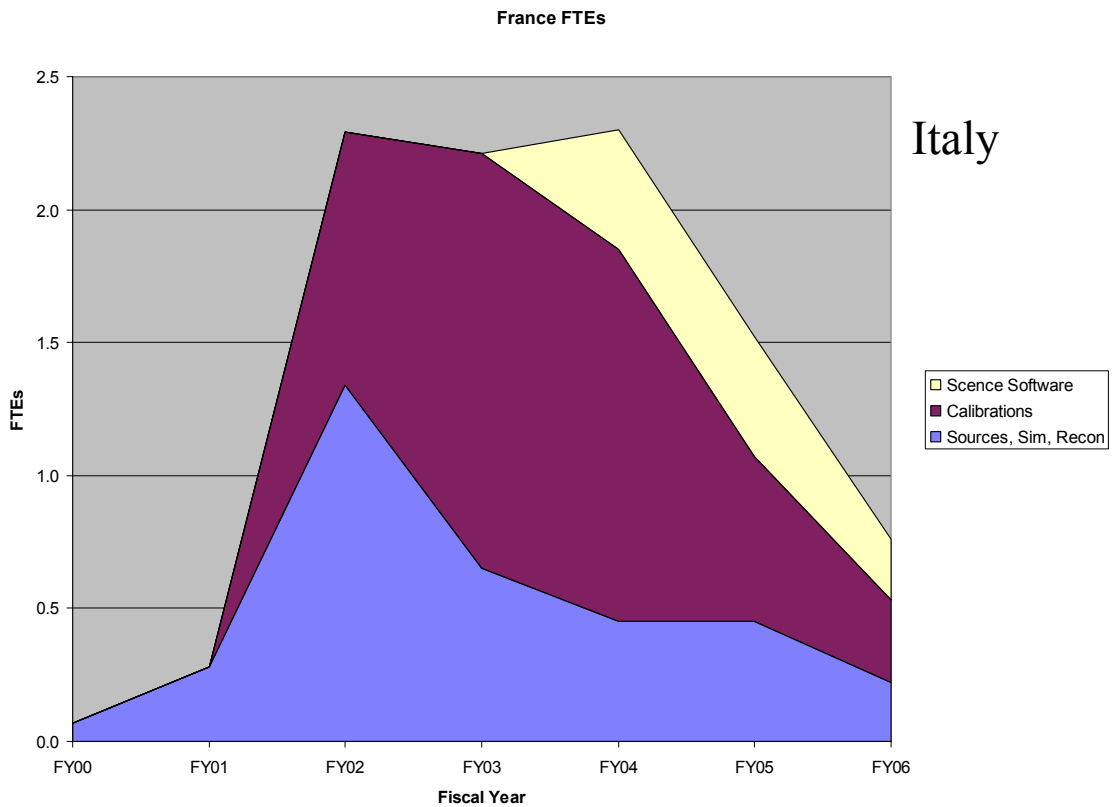
- **Manpower**
  - **Budget cuts in FY02 cost in User Support and DPF**
    - **Stretching existing manpower (eg Documentation TF, and using students to help with DataManager)**
  - **Situation in France is in flux**
    - **Unknown effect on CAL and ripple on NRL**
  - **Single code architect is a risk**
    - **Toby Burnett is overloaded. Too much support work on top of design.**
    - **We need another 'architect class' person on board to assist Toby**
- **Science Tools**
  - **Collaboration not yet organized for this effort**
  - **Negotiating roles with Science Center now**
    - **Not ready to devote much manpower to it yet, but SSC raring to go!**

Backup Slides

Manpower Estimates



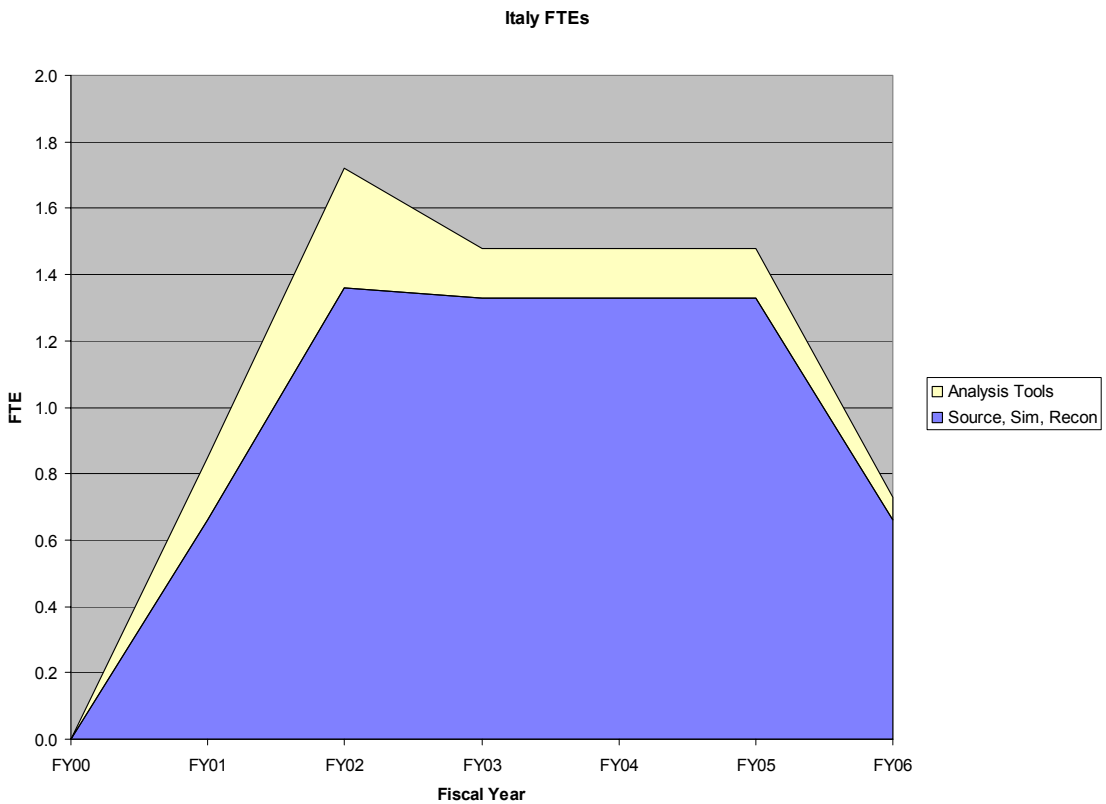
Manpower – France



Italy

- expect greater contribution to Science Tools later

Manpower - Italy



- excludes potential Science Tools effort
- continuing contribution to TKR not yet defined