



Software Project Status

Torre Wenaus

BNL

U.S. ATLAS Physics and Computing Advisory Panel Review
Brookhaven National Laboratory
May 21, 2001



Outline

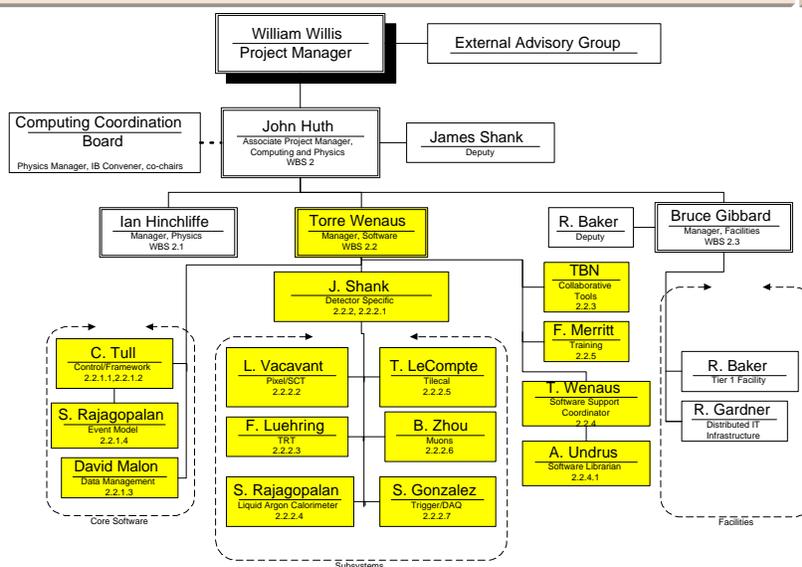
- * Brief software project overview
 - Objectives, scope, organization
- * Project planning status
 - WBS, schedule, relation to International ATLAS
- * Technical progress; current and near-term activities
 - Core software (Framework/Architecture, Databases, Event Model)
 - Software support and QA/QC
 - Training & collaborative tools
 - Grid software
- * Status relative to Nov PCAP comments, recommendations
- * Budget/Personnel: Priorities, status

U.S. ATLAS Software Project Overview



- * Major roles in key core software domains which leverage U.S. capability and are central to U.S. physics analysis
 - Control framework and architecture
 - Chief Architect, Athena framework development, event model
 - Databases and data management
 - Database co-Leader, major development roles
- * Software support: for developers, users and physics analysis
 - Software librarian, quality control, software development tools, training...
- * Subsystem software roles complementing hardware responsibilities
 - Closely coupled to core development: tight feedback loop
- * Leadership roles commensurate with our activities
- * Scope commensurate with U.S. in ATLAS: ~20% of overall effort

U.S. ATLAS Software Organization



Project Planning Status



- * U.S. ATLAS WBS based on XProject essentially complete
- * XProject extensions to support International ATLAS complete; integration in ATLAS by Helge Meinhard in progress
 - More detailed U.S. WBS being integrated into ATLAS PBS
 - U.S. and ATLAS versions will mostly coincide (wherever possible)
 - ATLAS and U.S. ATLAS schedules fully integrated
- * U.S. and ATLAS project management cooperating and in synch: working from same work breakdown and schedule sources
 - Common sources (data and code) in ATLAS CVS
- * New 'WBS projections' capability of XProject also used for grid planning: 'US Grid Computing WBS' projection developed

Schedule



- * Integrated (U.S. software + U.S. grid + ATLAS), comprehensive schedule developed
 - Linked to U.S. ATLAS, ATLAS, U.S. Grid WBS's throughout
 - Supports, but does not yet show most linkages between tasks/milestones
- * Reasonable detail for next 1-2yrs; sketchier beyond that
- * WBS and schedule are input to the U.S. ATLAS project management accounting and tracking system
- * Microsoft Project version (e.g. for Gantt charts) autogenerated (but not used to date)

XProject Project Planning Tool

- * **WBS, schedule, personnel info implemented as simple text files**
 - Maintained in the ATLAS CVS repository
 - WBS and schedule ATLAS-wide; personnel is U.S.-only
- * **Text sources processed by home-grown software 'XProject'**
 - Text source converted to XML conforming to an XProject DTD by perl script
 - XML is parsed and processed by a Java program
 - Builds object collections for WBS, sched, personnel
 - These are used to generate needed outputs
 - Static and dynamic (Java servlet) web pages showing project info, filtering on dates, tags, WBS nos., etc.
 - Input (CSV) files for U.S. ATLAS Project Office:
 - ▲ Access databases for manpower, WBS
 - ▲ Microsoft Project

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U.S. ATLAS - ATLAS Coordination

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graph TD
    Willis[William Willis  
U.S. ATLAS Project Manager] -.- Jenni[Peter Jenni  
ATLAS Spokesperson]
    Huth[John Huth  
Associate PM] -.- McCubbin[Norman McCubbin  
Software Coordinator]
    Hinchliffe[J. Hinchliffe  
Physics SM] -.- Gianotti[F. Gianotti  
Physics Coordinator]
    Wenaus[T. Wenaus  
Software SM] -.- Meinhard[H. Meinhard  
Software Planning]
    Tull[C. Tull  
Framework] -.- Quarrie[D. Quarrie  
Chief Architect]
    Malon[D. Malon  
Database] -.- MalonSchaffer[Malon/Schaffer  
Database]
    Subsystem[Subsystem Software] -.- Subsystem[Subsystem Software]
    Gibbard[B. Gibbard  
Facilities SM] -.- Putzer[A. Putzer  
NCB]
    Gardner[R. Gardner  
Distributed Computing] -.- Perini[L. Perini  
ATLAS GRID]
  
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ATLAS Detector/Task Matrix				
	Offline Coordinator	Reconstruction	Simulation	Database
Chair	N. McCubbin	D. Rousseau	K. Amako	D. Malon/ R.D. Schaffer
Inner Detector	D. Barberis	D. Rousseau	F. Luehring	S. Bentvelsen
Liquid Argon	J. Collot	S. Rajagopalan	M. Leltchouk	S. Simion/ R. Sobie
Tile Calorimeter	A. Solodkov	F. Merritt	A. Solodkov	T. LeCompte
Muon	G. Poulard	J.F. Laporte	A. Rimoldi	S. Goldfarb
LVL 2 Trigger/ Trigger DAQ	S. George	S. Tapprogge	T. Hansl- Kosenecki	H. P. Beck
Event Filter	V. Vercesi	F. Touchard		

New since last time: Pavel Nevski (BNL), Geant3 simulation coordinator

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Technical Progress Since November	
<ul style="list-style-type: none"> * Control Framework and Architecture * Databases and Data Management * Software Support and QA/QC * Training and collaborative tools * Grid Software * Subsystem software -- no time to cover this 	

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Control Framework and Architecture



- * Major Athena release in Jan ('December' release)
 - StoreGate data model deployed
 - Interactive scripting based on Python deployed
- * Athena Users Guide written
- * Common Gaudi core code base established with LHCb
- * Event filtering into multiple output streams
- * Data dictionary prototype developed
- * Architecture Review Committee final meeting 5 Mar
 - Final report awaited. Bottom line: Athena will be endorsed.
- * Near term focus: Physics analysis release supporting physics workshop in Sep; expected in June.
 - Generator and simulation support; Objy and ROOT I/O support

Databases and Data Management



- * ANL staffing ramp completed in Jan: 3.5 FTEs (.5 supported by ANL) plus 0.5 at Chicago
- * Database support for Athena released in Jan
 - Objy baseline, and ROOT I/O (based on ROOT 'blobs')
 - Supporting Atfast fast simu, and user-written I/O
- * MySQL deployed in LAr for conditions data; also used for bookkeeping, file & metadata management
 - Being integrated into overall DB effort
- * DB technology evaluation plan in development
 - Technology choice probably delayed to mid '01, allowing time for adequate evaluations of Objy, ROOT I/O, (object) relational DBs
- * Integration with early distributed file management tools soon
 - [Output collection registration](#)

Software Support, QA/QC



- * U.S. based support of releases, other software
 - Provided in AFS for use throughout the U.S.
- * Nightly build facility developed and deployed
 - Full software build based on most recent tags; email to developers
 - Ease integration of ATLAS software into timely releases
- * ATLAS Coding Standards document edited and released
- * HyperNews web-based discussion tool deployed
- * U.S. based CVS repository (+browsers, etc.) established
 - Preliminary and U.S.-local projects; personal CVS areas

Training, Collaborative Tools



- * New cycle of training courses initiated
 - Solicitation to gather interest: C++, Java, G4, code management tools,...
- * 1-week Geant4 course in Michigan in Feb
 - With careful arrangements to record it using the Syncomat web-based lecture tool
 - Video, audio, synchronized slides
 - High-quality result should be released in a few weeks
- * LAr reconstruction training in Dec
 - Athena based software in action; use of StoreGate event model
- * New Athena user manual very valuable

Grid Software



- * Much attention since last PCAP (part political, part technical)
 - Objective is to integrate grid software activities tightly into ongoing core software program, for maximal relevance and return
- * Grid WBS developed, clarifying relative roles of Software and Facilities
- * Software workplan developed (expressed in XProject schedule/WBS)
- * Grid tool (Globus) deployment and testing getting underway
- * In-house distributed data and processing infrastructure and prototype planning/development underway; utilizing Globus, Condor, ...
- * Integration of early distributed data, 'virtual data' tools into Athena to start soon
 - Output dataset registration in distributed catalog
 - 'Generate on demand' virtual data trial in Atlfast fast simu planned

Subsystem Software



- * Activity continuing...
 - Silicon Tracker
 - Transition Radiation Tracker (TRT)
 - Liquid Argon Calorimeter
 - Tile Calorimeter
 - Muon Spectrometer

Subsystem Software Activities

- * Performance/design studies – All
- * G3 based simulation – All
 - G3 simulation coordination for ATLAS
- * Test beam – Si, LAr, Tile
- * Athena integration – Si, LAr, Tile, Muon
- * Reconstruction development in C++ - Si, LAr, Tile, Muon
- * G4 based simulation development – Si, TRT, LAr, Muon
- * G4 physics validation – Si, LAr
- * XML based detector description – TRT, Muon
- * Database – LAr, Tile, Muon

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Summary Milestone Schedule

US Atlas Computing Summary Milestone Schedule										
Description	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1 Tbyte database prototype	Jan 1									
Release of Athena pre-alpha version		May 9								
Tier 1 Processor Farm Prototype		Sep 29								
Athena alpha release		Sep 29								
Geant3 digi data available			Oct 30							
Athena Beta Release	Done!		Dec 29							
First definition of regional centers	Done!		Jan 1							
Tier 1 Storage Prototype			Oct 1							
Decide on database product	Probably mid 2002		Jun 29							
MDC 0 Completed			Dec 12							
Full validation of G4 physics	Probably delayed		Dec 31							
MDC 1 Completed			Jul 30							
Computing TDR Finished			Nov 29							
Tier 1 Upgrade (for MDC2)			Dec 31							
Tier 1 Large Scale Test (MDC2)			Sep 30							
Physics readiness report completed			Jun 30							
Test full software chain in real environment			Jul 30							
Full DB infrastructure available			Dec 31							
20% Processing Farm Prototype			Jun 30							
Tier 1 Full scale									Oct 2	

Software in blue

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Budget (= Personnel) Priorities



* Status of pre-FY01 priorities:

- Control/Framework: LBNL build-up supporting A-Team achieved
- Databases: ANL build-up supporting DB role finally achieved
- Support: Software librarian at BNL in place
- Subsystem support: software professionals at core/subsystem interface unfunded -- out of project scope set by agencies

* FY01(+) priorities:

- Sustain LBNL and ANL efforts
- Begin the delayed BNL ramp: Add first sw pro developer
 - New hire in progress now. Increment by 1 person/yr through FY04
 - Info on BNL program follows
- Establish sustained presence at CERN
 - Unfunded; 1 person @ CERN via existing funds (LBNL relocation)

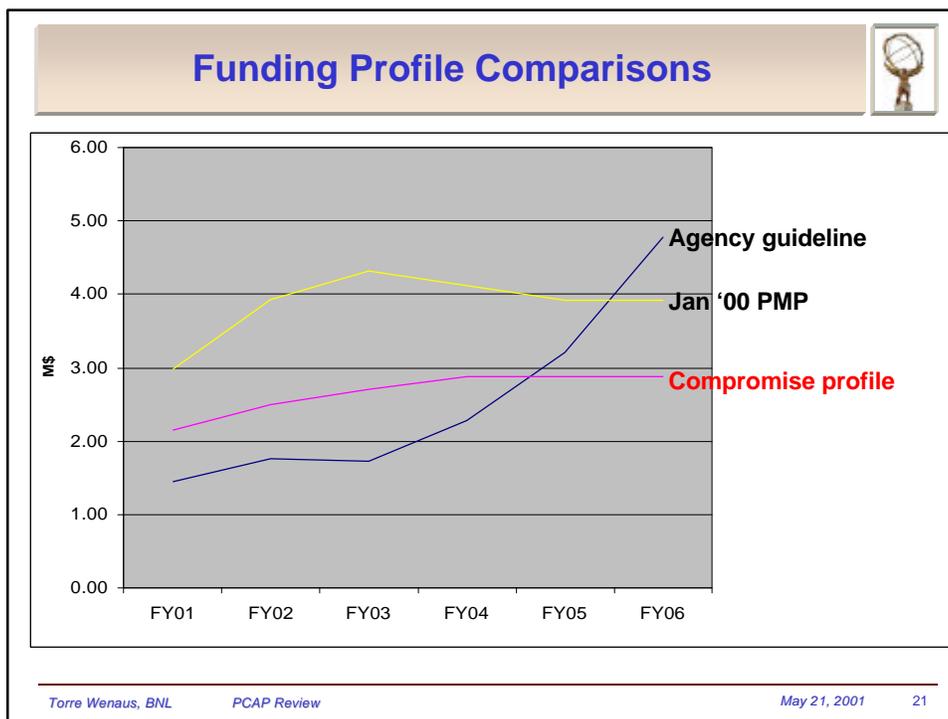
FY01 Budget Guidelines



* Original agency profile of monies in software FY01-06 was an *impossible* one for software (not too strong a word)

- Extremely sharp and late peak looks like the profile of a failed project:
- Program fitting the profile makes critical mass at any US site impossible
- Dismissals of valuable HEP experts would have been necessary

* We developed a 'compromise profile' well below our Jan 2000 proposal which provides the needed flatter profile



Planned & Required Effort Levels

FTEs by FY	FY01	FY02	FY03	FY04	FY05	
Arch/Frame	7.0	6.3	6.2	6.1	6.4	Needed
	6.0	5.9	6.4	6.4	6.4	U.S. provided (LBNL + BNL)
DB/Data mgmt	14.6	15.8	18.3	16.5	18.5	Needed
	5.5	6.9	7.4	8.3	8.3	U.S. provided (ANL + BNL)

Needs based on bottom-up estimate of Int'l ATLAS needs from WBS level 5. Developed by U.S. software managers based on experience (developed by one of us, reviewed by other two; revisions were small). Broadly consistent with International ATLAS estimates.

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BNL Software Program



- * Program complements BNL roles: Tier 1; physics analysis center; subsystem software development
- * Principal core activity areas:
 - Databases and data management
 - Event model
 - Physics analysis infrastructure
 - Closely coupled to both of these: grid software development
 - Software support and QA/QC
 - Project management
 - All areas leverage local expertise and experience (STAR/RHIC, D0)
- * Subsystem software development activities closely couple to hardware expertise (LAr, muons) and core activity

Current & Near Term BNL Software Activity



- * Software support and quality control
- * Databases and data management
 - Relational (MySQL) database development for LAr conditions data and distributed data management
 - ROOT based I/O, applying STAR experience: Currently LAr applications, leading to role in ATLAS event store evaluation
- * Event model development: StoreGate
- * Grid software
 - Distributed data services prototype in development
- * Software project management
 - Also 'user liaison' with Facilities
- * LAr, muon simu/reco; G3 coordination for ATLAS

ATLAS Software Organization at BNL



- * Physics Applications Software (PAS) Group established 10/2000
 - "To provide a physics software development capability and expertise base, particularly to the BNL HEP program and the ATLAS experiment."
 - Fully focused on ATLAS software
 - Physicists and professionals migrating from STAR, and new professional hires. Currently:
 - Yuri Fisyak, Pavel Nevski, Torre Wenaus, Valery Fine, Alex Undrus
 - Close collaboration with ATLAS physicists in Omega group
 - Currently H.Ma, S.Rajagopalan (LAr group) in particular
 - Ramp: one project-supported developer today; 4 in FY04

<http://www.usatlas.bnl.gov/AFSWEB/bnl/pas>

Nov PCAP - Comments Arising



- * Hire 2 DB persons *done*. Increase CERN presence. *Unfunded. One person from LBNL resident at CERN on existing funds. Fulfilling U.S. staffing has priority if funds are short.*
- * Collaborative data mgmt reassessment encouraged. *In the works, in collaboration with CMS in the U.S. and LHC experiments/CERN internationally. U.S. ATLAS role in Objy, ROOT I/O, relational DBs expected.*
- * Formal decision on Athena needed. *Will be soon and positive.*
- * QC should be strengthened with Athena the priority application. *BNL provided increased manpower. SW test/validation improved with new nightly build scheme, with Athena/D.Quarrie a principal client, motivator and source of design and functionality input.*

Nov PCAP comments (2)



- * Negotiate with DOE and NSF the required funding profile for software development. *Boy, how we try!*
- * Complete and debug the WBS. *Done, modulo ongoing refinements and Int'l ATLAS-driven changes.* Unify U.S. WBS with ATLAS PBS. *Complete from the U.S. side, and in progress on the ATLAS side.* Some areas need to be developed in more detail. *Areas without U.S. activity are probably still weak and await International ATLAS input.*

Summary



- * Core teams in place at LBNL, ANL; focus now on sustaining these and building up at BNL according to plan.
- * Framework/Architecture progress and acceptance good. Architecture review should (finally) be coming out with an endorsement of Athena and many useful and substantive recommendations
- * Database progress increased but still short on resources both in U.S. and internationally. Technology choice delayed to mid-2002 (?) to allow time for realistic evaluations. U.S. should play a major role -- in Objy, ROOT, RDBMS (options and evaluation plan not settled) -- at ANL and BNL
- * Useful progress and clarification in grid software planning
- * Geant3 coordination for ATLAS a welcome addition which strengthens our role in near term Data Challenges and 'applied' distributed processing
- * Funding situation is perilous: both project and base program, and we still await substantive return on large time investments in grid and other proposals.