

U.S. ATLAS Work Breakdown Structure

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- 2.0 Physics Support and Computing
 - 2.2 Software
 - 2.2.1 Coordination
 - 2.2.1.1 Software Program Coordination
 - 2.2.1.2 Data Management Coordination
 - 2.2.2 Core Services
 - 2.2.2.1 Framework
 - 2.2.2.2 EDM Infrastructure
 - 2.2.2.3 Detector Description
 - 2.2.2.5 Analysis Tools
 - 2.2.2.6 Grid Integration
 - 2.2.2.7 Performance Optimization
 - 2.2.3 Data Management
 - 2.2.3.1 Database Services and Servers
 - 2.2.3.2 Common Data Mgmt Software
 - 2.2.3.3 Event Store
 - 2.2.3.4 Non-Event Data Management
 - 2.2.3.5 Collections, Catalogs, Metadata
 - 2.2.3.6 Distributed Data Management
 - 2.2.4 Distributed Software
 - 2.2.4.1 Distributed Analysis
 - 2.2.4.2 Production System
 - 2.2.5 Application Software
 - 2.2.5.2 Tracking Infrastructure
 - 2.2.5.3 Calorimeter Infrastructure
 - 2.2.5.4 Muon Infrastructure
 - 2.2.5.5 Monitoring Infrastructure
 - 2.2.6 Infrastructure Support
 - 2.2.6.1 SW Validation
 - 2.2.6.2 Librarian
 - 2.2.6.3 SW Infrastructure & QA
 - 2.2.8 Implementing Multi-Core Processes
 - 2.3 Facilities and Distributed Computing
 - 2.3.1 Tier 1 Facilities
 - 2.3.1.1 Management/Administration
 - 2.3.1.2 Tier 1 Fabric Infrastructure
 - 2.3.1.3 Tier 1 Linux Systems
 - 2.3.1.4 Tier 1 Storage Systems
 - 2.3.1.5 Tier 1 Wide Area Services
 - 2.3.1.6 Tier 1 Operations
 - 2.3.2 Tier 2 Facilities
 - 2.3.2.1 University of Chicago/Indiana
 - 2.3.2.2 Boston University/Harvard
 - 2.3.2.3 Southwest Tier 2 - UTA
 - 2.3.2.4 Tier 2 Facility - University of Michigan
 - 2.3.2.5 Tier 2 Facility - SLAC
 - 2.3.3 Wide Area Network
 - 2.3.4 Grid Tools and Services
 - 2.3.4.1 Grid Infrastructure
 - 2.3.4.2 Workflow Services

- 2.3.4.3 Data Services
 - 2.3.4.4 Monitoring Services
 - 2.3.4.5 Production Frameworks
 - 2.3.4.6 Analysis Frameworks
 - 2.3.5 Grid Production
 - 2.3.6 Facility Integration
 - 2.3.6.1 Management
 - 2.3.6.2 Distributed storage, grid and ATLAS services
 - 2.3.6.3 Facility performance and accounting
- 2.4 Analysis Support
 - 2.4.1 Physics/Performance Forums
 - 2.4.2 Analysis Tools
 - 2.4.3 Analysis Support Centers
 - 2.4.4 Documentation
 - 2.4.5 Tier 3 Coordination
- 3.0 Maintenance and Operations
 - 3.1 Silicon
 - 3.1.1 Pixels
 - 3.1.1.1 Pre-Operations
 - 3.1.1.2 Operations
 - 3.1.1.3 Maintenance
 - 3.1.2 SCT
 - 3.1.2.1 Pre-Operations
 - 3.1.2.2 Operations
 - 3.1.2.3 Maintenance
 - 3.1.3 RODs
 - 3.1.3.1 Pre-Operations
 - 3.1.3.2 Operations
 - 3.1.3.3 Maintenance
 - 3.2 TRT
 - 3.2.1 TRT-Subsystem
 - 3.2.1.1 TRT Pre-Operations
 - 3.2.1.1.1 Module Check
 - 3.2.1.1.4 TRT-6 mod-check
 - 3.2.1.1.5 TRT-SCT in SR
 - 3.2.1.2 TRT Operations
 - 3.2.1.3 TRT Maintenance
 - 3.2.2 Common TRT/ID
 - 3.2.2.1 Pre-Operations
 - 3.2.2.2 Maintenance and Operations (IU)
 - 3.2.2.3 Maintenance and Operations (Nevis)
 - 3.3 Liquid Argon
 - 3.3.1 Mechanical Liquid Argon M&O
 - 3.3.1.1 Pre-Operations and Commissioning
 - 3.3.1.1.1 Cryostat
 - 3.3.1.1.2 Feedthrough
 - 3.3.1.1.3 Cryogenics
 - 3.3.1.1.4 Forward Calorimeter
 - 3.3.1.2 Operations
 - 3.3.1.2.1 Cryostat
 - 3.3.1.2.2 Feedthrough
 - 3.3.1.2.3 Cryogenics
 - 3.3.1.2.4 FCAL
 - 3.3.1.3 Maintenance
 - 3.3.1.3.1 Cryostat-Maintenance of Interface
 - 3.3.1.3.2 Feedthrough

- 3.3.1.3.3 Cryogenics
 - 3.3.1.3.4 FCAL
 - 3.3.2 Electronic Liquid Argon M&O
 - 3.3.2.1 Pre-Operations and Commissioning
 - 3.3.2.1.3 System Crate Integration
 - 3.3.2.1.4 Front End Board
 - 3.3.2.1.5 Level 1 Trigger
 - 3.3.2.1.6 ROD System
 - 3.3.2.2 Operations
 - 3.3.2.2.2 Preamp/Calibration
 - 3.3.2.2.3 System Crate
 - 3.3.2.2.4 Front End Board
 - 3.3.2.2.5 Level 1 Trigger
 - 3.3.2.2.6 ROD System
 - 3.3.2.3 Maintenance
 - 3.3.2.3.3 System Crate
 - 3.3.2.3.5 Level 1 Trigger
 - 3.3.3 Beam Tests and Cosmic Ray Runs
 - 3.3.3.1 FCal Hadronic Tail Measurement
 - 3.3.3.2 Test Beam-Optical Links
 - 3.3.3.3 F/E Readout Commissioning
 - 3.3.3.4 Beam Test Equipment Modification
- 3.4 TileCal
 - 3.4.1 TileCal - Specific Costs
 - 3.4.1.1 Pre-Operations
 - 3.4.1.2 Operations (Beam-On)
 - 3.4.1.3 Maintenance (Beam-off)
 - 3.4.1.4 Power Supplies Development
 - 3.4.2 Calibration and Monitoring
 - 3.4.2.1 Pre-Operations
 - 3.4.2.2 Operations (Beam-on)
 - 3.4.2.3 Maintenance (Beam-off)
- 3.5 Muon
 - 3.5.1 MDT Pre-Operations, Operations and Maintenance
 - 3.5.1.1 MDT Pre-Operations
 - 3.5.1.1.1 Set-up of MDT Test and Test Station
 - 3.5.1.1.2 Pre-Operations of MDT Chambers -Phase 1
 - 3.5.1.1.3 Pre-Operations of MDT Chambers -Phase 2
 - 3.5.1.1.4 Pre-Operations of MDT Chambers - Phase 3
 - 3.5.1.2 MDT Operations (Beam On)
 - 3.5.1.2.1 MDT Mechanical Operations (Beam On)
 - 3.5.1.2.2 MDT Electronics Operations (Beam On)
 - 3.5.1.3 MDT Maintenance (Beam Off)
 - 3.5.1.3.1 MDT Mechanical Maintenance (Beam Off)
 - 3.5.1.3.2 MDT Electronics Maintenance (Beam Off)
 - 3.5.1.4 MDT Spares - Mechanical and Electrical
 - 3.5.2 CSC Pre-Operations, Operations and Maintenance
 - 3.5.2.1 CSC Pre-Operations
 - 3.5.2.1.1 Setup of CSC Staging and Test
 - 3.5.2.1.2 Pre-Operations of CSC Chambers - Phase 1
 - 3.5.2.1.3 Pre-Operations of CSC Chambers - Phase 2
 - 3.5.2.1.4 Pre-Operations of CSC Chambers - Phase 3
 - 3.5.2.2 CSC Operations (Beam On)
 - 3.5.2.2.1 CSC Mechanical Operations (Beam On)
 - 3.5.2.2.2 CSC Electronics Operations (Beam On)
 - 3.5.2.3 CSC Maintenance (Beam Off)

- 3.5.2.3.1 CSC Mechanical Maintenance (Beam Off)
 - 3.5.2.3.2 CSC Electronics Maintenance (Beam Off)
 - 3.5.2.4 CSC Spares - Mechanical and Electronics
 - 3.5.2.4.1 CSC Mechanical Spares
 - 3.5.2.4.2 CSC Electronics Spares
 - 3.5.3 Alignment System Pre-Ops, Operations & Maintenance
 - 3.5.3.1 Alignment System Pre-Operations
 - 3.5.3.1.1 Pre-Ops Stage Area for Alignment Parts
 - 3.5.3.1.2 Pre-Ops of Alignment Parts - Phase 1
 - 3.5.3.1.3 Pre-Ops of Alignment Parts - Phase 2
 - 3.5.3.1.4 Pre-Ops of Alignment Parts - Phase 3
 - 3.5.3.2 Alignment System Operations (Beam On)
 - 3.5.3.3 Alignment System Maintenance (Beam Off)
 - 3.5.4 Muon Endcap Common Costs
 - 3.5.4.1 Engineering Coordination of Endcap Muon System
 - 3.5.4.2 Muon Endcap Common Costs Operations
 - 3.5.5 Monitoring and Calibration
 - 3.5.5.1 Monitoring and Calibration (Beam On and Beam Off)
 - 3.5.5.1.1 MDT M&C System
 - 3.5.5.1.2 CSC M&C System
 - 3.5.5.1.3 Alignment M&C System
 - 3.5.5.1.4 Environmental Sensors M&C System
 - 3.5.5.2 Muon Test Beams
- 3.6 Trigger/DAQ
 - 3.6.1 Pre-Operations
 - 3.6.1.1 Supervisor RoI Builder
 - 3.6.1.2 Communications and Travel
 - 3.6.1.3 Programming Support
 - 3.6.1.4 Equipment
 - 3.6.2 Operations
 - 3.6.2.1 Supervisor RoI Builder
 - 3.6.2.2 Communications and Travel
 - 3.6.2.3 Programming Support
 - 3.6.2.4 Test Facilities
- 3.7 Common Projects
 - 3.7.1 BNL Common Funds
 - 3.7.2 Columbia Common Funds
 - 3.7.3 Accounting Services for ATLAS
 - 3.7.4 CERN HLT Farms computing UCI
- 3.8 Education/Outreach
 - 3.8.1 BNL Outreach
 - 3.8.2 Nevis Outreach
- 3.9 Program Management
 - 3.9.1 BNL Program Management
 - 3.9.2 COL Program Management
 - 3.9.3 Michigan Program Management Work - Collaboratory Tools
 - 3.9.4 U Mass PM
 - 3.9.5 Boston U PM (Travel)
 - 3.9.6 Cal Tech (EVO)
 - 3.9.7 MDI Lawsuit
- 3.10 Technical Coordination Support
 - 3.10.1 ATLAS Access
 - 3.10.2 Maintenance of Movement System
 - 3.10.3 Configuration Control Envelope
 - 3.10.4 Installation and Maintenance Database
 - 3.10.5 TC Project Office

- 3.10.6 TC Pass-thru
- 3.10.7 IBL Support Tube
- 4.0 Upgrade R&D
 - 4.1 Silicon
 - 4.1.1 Detectors
 - 4.1.1.1 Innermost Pixel Layer
 - 4.1.1.1.6 IBL Services
 - 4.1.1.2 Investigation of Strip Technology
 - 4.1.1.3 Short Strips
 - 4.1.2 Front-End Electronics
 - 4.1.2.1 Deep Sub Micron for Pixels
 - 4.1.2.2 SiGe for Strips
 - 4.1.2.3 Controller Chip Development
 - 4.1.3 Optical Readout
 - 4.1.3.1 Diode Receivers
 - 4.1.3.2 Fiber Drivers
 - 4.1.3.3 Fibers
 - 4.1.3.4 Multiplexers and Interconnect Circuits
 - 4.1.3.4.2 Multiplexers and Interconnects
 - 4.1.4 Modules
 - 4.1.4.1 Stave Structures
 - 4.1.4.2 Hybrids
 - 4.1.4.3 Cooling Channels
 - 4.1.4.4 Powering Schemes
 - 4.1.4.5 Readout of the channels (HSIO)
 - 4.1.5 Silicon R&D Pass-thru
 - 4.3 Liquid Argon
 - 4.3.1 Layer Buildup due to Radiation
 - 4.3.2 Readout Electronics
 - 4.3.2.1 Study of System Architecture
 - 4.3.2.2 Development of Analog Front-End
 - 4.3.2.3 Digital Readout System
 - 4.3.2.4 Optical Data Link
 - 4.3.3 Trigger
 - 4.3.3.1 L1 Trigger Interface
 - 4.3.3.2 Analog Optical Link for L1 Trigger
 - 4.3.4 Next Generation ROD
 - 4.3.4.1 Next Generation ROD (BNL)
 - 4.3.4.2 Next Generation ROD (Arizona)
 - 4.3.5 Radiation Hard Low Voltage Power Supplies
 - 4.3.5.1 Radiation Hard Low Voltage Power Supplies (BNL)
 - 4.3.5.2 Radiation Hard LVPS (Yale)
 - 4.4 TileCal Upgrade R&D
 - 4.4.1 ANL Tile Upgrade R&D
 - 4.4.2 Chicago Upgrade R&D
 - 4.5 Muon
 - 4.5.1 Arizona Muon Upgrade R&D
 - 4.5.2 BNL Muon Upgrade R&D
 - 4.5.3 SB Muon Upgrade R&D
 - 4.5.4 U Michigan Upgrade R&D
 - 4.6 Trigger/DAQ Upgrade R&D
 - 4.6.1 LVL1 Trigger
 - 4.6.1.1 Calorimeter
 - 4.6.1.4 Hardware Track Trigger
 - 4.6.2 FTK
 - 4.6.2.1 Engineering design/Prototyping