

WBS Dictionary as of Mon 10/21/02  
CDF Run 2B Data Acquisition and Trigger Upgrade

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
<b>1.3</b>	<b>Run 2b DAQ and Trigger Project</b>	<b>\$4,048,791.00</b>	<b>\$3,951,743.00</b>	<b>\$97,048.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Project includes TDC upgrade, XFT upgrade, L2 upgrade, SVT upgrade, EVB upgrade and L3 PC replacements.						
<b>1.3.1</b>	<b>Run 2b TDC Project</b>	<b>\$1,183,030.00</b>	<b>\$1,085,982.00</b>	<b>\$97,048.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary element covers the development and construction of new time to digital converters (TDC) used in the readout of the CDF central outer tracker (COT).						
1.3.1.1	Start Run 2b TDC Subproject	\$0.00	\$0.00	\$0.00	0	0	3
	<u>Notes</u>						
	WBS Description:						
	Milestone - denoting the start of the Run 2b TDC level 3 subproject						
<b>1.3.1.2</b>	<b>Specification &amp; Development</b>	<b>\$50,840.00</b>	<b>\$44,240.00</b>	<b>\$6,600.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary task covers the new TDC's specification and development on hit time digitization, buffer management, front-end ASDQ and trigger interfaces and data compression						
<b>1.3.1.3</b>	<b>Detailed Design (FNAL)</b>	<b>\$126,060.00</b>	<b>\$98,560.00</b>	<b>\$27,500.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary tasks covers the detailed design for the specifications developed previously.						
<b>1.3.1.4</b>	<b>Detailed Design (Chicago)</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary tasks covers the detailed design for the specifications developed previously.						

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
1.3.1.5	TDC Design Review	\$0.00	\$0.00	\$0.00	0	0	3
	<u>Notes</u>						
	WBS Description:						
	milestone on TDC Design Review . The TDC's have been sucessfully designed and prototype board fabrication can begin.						
1.3.1.6	<b>Prototype - V1.0 (FNAL)</b>	<b>\$143,265.00</b>	<b>\$143,265.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary task covers the first round of TDC prototypes including building the boards, debugging and evaluating their performance.						
1.3.1.7	<b>Prototype - V1.0 (Chicago)</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary task covers the first round of TDC prototypes including building the boards, debugging and evaluating their performance.						
1.3.1.8	Design Review Milestone	\$0.00	\$0.00	\$0.00	0	0	3
	<u>Notes</u>						
	WBS Description:						
	Milestone - completion of TDC design review after prototyping as a requirment for the commencement of preproduction and production						
1.3.1.9	<b>Preproduction (FNAL)</b>	<b>\$151,441.00</b>	<b>\$151,441.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary task covers preproduction TDC board fabrication and performance testing with single and multiple boards.						
1.3.1.10	<b>Preproduction (U of Chicago)</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary task covers preproduction TDC board fabrication and performance testing with single and multiple boards.						

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont.	Level																																																
1.3.1.12	Beginning of TDC Production	\$0.00	\$0.00	\$0.00	0	0	2																																																
	<u>Notes</u>																																																						
	WBS Description:																																																						
	Milestone - marking the beginning of TDC production after a successful production readiness review.																																																						
1.3.1.13	Production	\$480,898.00	\$471,850.00	\$9,048.00	0	0	0																																																
	<u>Notes</u>																																																						
	WBS Description:																																																						
	This summary task covers the mass production of the TDC boards including quality assurance tests																																																						
1.3.1.14	Data Concentrator	\$230,526.00	\$176,626.00	\$53,900.00	0	0	0																																																
	<u>Notes</u>																																																						
	WBS Description:																																																						
	Summary task covers design, prototyping and production of the Data Concentrator boards.																																																						
1.3.1.16	Run 2b TDC Ready for Installation	\$0.00	\$0.00	\$0.00	0	0	2																																																
	<u>Notes</u>																																																						
	WBS Description:																																																						
	Milestone - denoting that the Run 2b TDC project is ready for installation at B0 (end of level 3 subproject).																																																						
1.3.2	Run 2b Level 2 Project	\$307,819.00	\$307,819.00	\$0.00	0	0	0																																																
	<u>Notes</u>																																																						
	WBS Description: This summary task covers the development and production of the Level 2 Trigger system																																																						
1.3.2.1	Start of Run 2b Level 2 Project	\$0.00	\$0.00	\$0.00	0	0	3																																																
	<u>Notes</u>																																																						
	WBS Description: Milestone denoting the start of the Level 2 Trigger Project																																																						
1.3.2.2	Testing and Software work existing L2 Pulsar test stand	\$0.00	\$0.00	\$0.00	0	0.5	0																																																
	<table border="1"> <thead> <tr> <th>ID</th> <th>Resource Name</th> <th>Units</th> <th>Work</th> <th>Delay</th> <th>Start</th> <th>Finish</th> <th>Cost</th> <th>Baseline Cost</th> <th>Act. Cost</th> <th>Rem. Cost</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>PhysicistF</td> <td>150%</td> <td>960 hrs</td> <td>0 days</td> <td>Wed 9/4/02</td> <td>Mon 12/30/02</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> </tr> <tr> <td>2</td> <td>PostDocF</td> <td>50%</td> <td>320 hrs</td> <td>0 days</td> <td>Wed 9/4/02</td> <td>Mon 12/30/02</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> </tr> <tr> <td>7</td> <td>PostDocU</td> <td>200%</td> <td>1,280 hrs</td> <td>0 days</td> <td>Wed 9/4/02</td> <td>Mon 12/30/02</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> <td>\$0.00</td> </tr> </tbody> </table>											ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost	1	PhysicistF	150%	960 hrs	0 days	Wed 9/4/02	Mon 12/30/02	\$0.00	\$0.00	\$0.00	\$0.00	2	PostDocF	50%	320 hrs	0 days	Wed 9/4/02	Mon 12/30/02	\$0.00	\$0.00	\$0.00	\$0.00	7	PostDocU	200%	1,280 hrs	0 days	Wed 9/4/02	Mon 12/30/02	\$0.00	\$0.00	\$0.00	\$0.00
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost																																													
1	PhysicistF	150%	960 hrs	0 days	Wed 9/4/02	Mon 12/30/02	\$0.00	\$0.00	\$0.00	\$0.00																																													
2	PostDocF	50%	320 hrs	0 days	Wed 9/4/02	Mon 12/30/02	\$0.00	\$0.00	\$0.00	\$0.00																																													
7	PostDocU	200%	1,280 hrs	0 days	Wed 9/4/02	Mon 12/30/02	\$0.00	\$0.00	\$0.00	\$0.00																																													
	<u>Notes</u>																																																						
	WBS Description: The prototype Pulsar board will be commissioned as part of a test stand for the Run 2A system. Specific																																																						

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont.	Level
-----	------	------	-----	-------	-----------	-------------	-------

"Testing and Software work existing L2 Pulsar test stand" continued

Notes

tasks are: finish all mezzanine/Aux cards, Pulsar prototype testing, Rev B if needed; SLINK to PCI software work, test stand software, additional firmware work for testing ALL basic functionalities of prototypes

M&S BOE: N/A

Labor BOE: Based on Run 2A experience

1.3.2.3	Commission L2 Pulsar for each data path - proof of principle te:	\$0.00	\$0.00	\$0.00	0	0.5	0
---------	--	--------	--------	--------	---	-----	---

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	PhysicistF	150%	1,680 hrs	0 days	Thu 1/2/03	Mon 7/21/03	\$0.00	\$0.00	\$0.00	\$0.00
2	PostDocF	50%	560 hrs	0 days	Thu 1/2/03	Mon 7/21/03	\$0.00	\$0.00	\$0.00	\$0.00
7	PostDocU	200%	2,240 hrs	0 days	Thu 1/2/03	Mon 7/21/03	\$0.00	\$0.00	\$0.00	\$0.00

Notes

WBS Description: The Pulsar board will be commissioned for each data path coming in to and out of the Level 2 decision system.

M&S BOE: N/A

Labor BOE: Based on Run 2A experience.

1.3.2.4	<b>Preproduction run of Pulsar L2 system</b>	<b>\$145,515.00</b>	<b>\$145,515.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
---------	--	---------------------	---------------------	---------------	----------	----------	----------

Notes

WBS Description: This task covers the preproduction run of the Level 2 system, which consists of three Pulsar boards, associated mezzanine cards, S-link boards and interface hardware, and L2 decision processor, and will be configured for a vertical slice test.

1.3.2.5	Vertical Slice Test	\$0.00	\$0.00	\$0.00	0	0.5	0
---------	---------------------	--------	--------	--------	---	-----	---

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	PhysicistF	150%	1,200 hrs	0 days	Mon 2/9/04	Mon 6/28/04	\$0.00	\$0.00	\$0.00	\$0.00
2	PostDocF	50%	400 hrs	0 days	Mon 2/9/04	Mon 6/28/04	\$0.00	\$0.00	\$0.00	\$0.00
7	PostDocU	200%	1,600 hrs	0 days	Mon 2/9/04	Mon 6/28/04	\$0.00	\$0.00	\$0.00	\$0.00

Notes

WBS Description: This item covers assembly of a vertical slice of the Level 2 system. Specific tasks include: use test stand to fine tune receiver firmware for each data path; system integration at crate level with test stand; L2 code testing for new system.

M&S BOE: N/A

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont.	Level			
"Vertical Slice Test" continued										
<u>Notes</u>										
Labor BOE: Based on Run 2A experience										
<b>1.3.2.6</b>	<b>Production run of Pulsar L2 system</b>	<b>\$162,304.00</b>	<b>\$162,304.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>			
<u>Notes</u>										
WBS Description: Summary task for Production Run of Pulsar Level 2 system: fabrication and purchase of boards, link hardware, L2 decision processors.										
1.3.2.7	System Integration standalone w/ test stand	\$0.00	\$0.00	\$0.00	0	0.5	0			
<i>ID</i>	<i>Resource Name</i>	<i>Units</i>	<i>Work</i>	<i>Delay</i>	<i>Start</i>	<i>Finish</i>	<i>Cost</i>	<i>Baseline Cost</i>	<i>Act. Cost</i>	<i>Rem. Cost</i>
1	PhysicistF	150%	720 hrs	0 days	Wed 3/16/05	Wed 6/8/05	\$0.00	\$0.00	\$0.00	\$0.00
2	PostDocF	50%	240 hrs	0 days	Wed 3/16/05	Wed 6/8/05	\$0.00	\$0.00	\$0.00	\$0.00
7	PostDocU	200%	960 hrs	0 days	Wed 3/16/05	Wed 6/8/05	\$0.00	\$0.00	\$0.00	\$0.00
<u>Notes</u>										
WBS Description: This item covers integration of the system, first using the Pulsar teststand to drive the Pulsar L2 system, and after studying/optimizing the performance, testing the L2 decision system using test runs with beam data.										
M&S BOE: N/A										
Labor BOE: Based on Run 2A experience.										
1.3.2.9	Pulsar Level 2 subproject ready for installation	\$0.00	\$0.00	\$0.00	0	0	2			
<u>Notes</u>										
WBS Description:										
Level 2 subproject ready for installation.										
<b>1.3.3</b>	<b>Run 2b XFTII Project</b>	<b>\$1,529,842.00</b>	<b>\$1,529,842.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>			
<u>Notes</u>										
WBS Description:										
Project to Upgrade the CDF Level 1 tracking trigger system.										
1.3.3.1	Start of XFTII Project	\$0.00	\$0.00	\$0.00	0	0	3			
<u>Notes</u>										
WBS Description:										
Milestone - marking the start of the XFTII upgrade project.										
<b>1.3.3.2</b>	<b>Finder Boards</b>	<b>\$638,480.00</b>	<b>\$638,480.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>			
<u>Notes</u>										
WBS Description:										

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont.	Level
-----	------	------	-----	-------	-----------	-------------	-------

**"Finder Boards" continued**

Notes

Development of axial and stereo segment Finder boards. These boards take hit information from the COT and find track segments in the COT superlayers.

1.3.3.3	Test equipment	\$25,000.00	\$25,000.00	\$0.00	0.3	0	0
---------	----------------	-------------	-------------	--------	-----	---	---

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	MANDS	25,000	25,000	0 days	Thu 11/14/02	Fri 11/29/02	\$25,000.00	\$0.00	\$0.00	\$25,000.00

Notes

WBS Description:

purchase test equipment for production testing of boards

M&S BOE:

DVM's , oscilloscope, probes.

Labor BOE:

1.3.3.4	TDC Transition Module	\$31,400.00	\$31,400.00	\$0.00	0	0	0
---------	-----------------------	-------------	-------------	--------	---	---	---

Notes

WBS Description:

TDC Transition Module: The design for these boards already exists and is being used in the Run 2A design. Additional boards are required for the Stereo Segment Finding. We need 54 boards + 6 spares.

1.3.3.5	Finder Transition Module	\$21,600.00	\$21,600.00	\$0.00	0	0	0
---------	--------------------------	-------------	-------------	--------	---	---	---

Notes

WBS Description:

Finder Transition Module: The design for this board already exists and is being used. Additional boards are required for the Stereo segment finders. We need 18 boards + 12 spares

1.3.3.6	Finder3D Tester Board	\$13,600.00	\$13,600.00	\$0.00	0	0	0
---------	-----------------------	-------------	-------------	--------	---	---	---

Notes

WBS Description:

Finder 3D Tester Board used to test Stereo Finder boards  
need 1 board

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
1.3.3.7	<b>Cables</b>	<b>\$8,000.00</b>	<b>\$8,000.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u> WBS Description:						
1.3.3.8	<b>Linker Modules</b>	<b>\$259,544.00</b>	<b>\$259,544.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u> WBS Description:						
	Linker Modules provide the segment linking between axial layers of the COT. It uses input from the Finders and outputs a track list with Pt and Phi information to the rest of the trigger system. We require 12 boards + 4 spares.						
1.3.3.9	<b>Linker Output Module II</b>	<b>\$36,800.00</b>	<b>\$36,800.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u> WBS Description:						
	Linker Output Module II captures the track list from Linker Modules and drives the data to the XTRP and the Stereo Association Module. We need 24 boards + 6 spares						
1.3.3.10	<b>Stereo Association Modules</b>	<b>\$296,326.00</b>	<b>\$296,326.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u> WBS Description:						
	The stereo association system associates axial XFT tracks with COT SL7 segments to produce 3D tracks in the trigger.						
1.3.3.11	<b>Stereo Association Module Custom Backplane (FNAL)</b>	<b>\$11,540.00</b>	<b>\$11,540.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u> WBS Description:						
	Summary task for SAM custom backplane.						
1.3.3.12	<b>Stereo Association Module Custom Backplane (ILL)</b>	<b>\$3,720.00</b>	<b>\$3,720.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u> WBS Description:						
	Summary task for SAM custom backplane.						
1.3.3.13	<b>Stereo Association Module Tester Board (FNAL)</b>	<b>\$28,888.00</b>	<b>\$28,888.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u> WBS Description:						

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont.	Level
<b>"Stereo Association Module Tester Board (FNAL)" continued</b>							
	<u>Notes</u>						
	Summary task for SAM tester board. Tester board serves as both data source and sync, allowing SAM testing at full clock speed for a large number of events.						
<b>1.3.3.14</b>	<b>Stereo Association Module Tester Board (ILL)</b>	<b>\$41,664.00</b>	<b>\$41,664.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for SAM tester board. Tester board serves as both data source and sync, allowing SAM testing at full clock speed for a large number of events.						
<b>1.3.3.15</b>	<b>Stereo Association Module Transition Module (FNAL)</b>	<b>\$16,054.00</b>	<b>\$16,054.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for SAM transition module.						
<b>1.3.3.16</b>	<b>Stereo Association Module Transition Module (ILL)</b>	<b>\$3,162.00</b>	<b>\$3,162.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for SAM transition module.						
<b>1.3.3.17</b>	<b>Stereo Association Module Clock and Control Board (FNAL)</b>	<b>\$13,348.00</b>	<b>\$13,348.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for SAM Clock and Control board.						
<b>1.3.3.18</b>	<b>Stereo Association Module Clock and Control Board (ILL)</b>	<b>\$10,044.00</b>	<b>\$10,044.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for SAM Clock and Control board.						

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
1.3.3.19	<b>SAM Clock and Control Transition Module (FNAL)</b>	<b>\$13,348.00</b>	<b>\$13,348.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for SAM clock and control transition module.						
1.3.3.20	<b>SAM Clock and Control Transition Module (ILL)</b>	<b>\$10,044.00</b>	<b>\$10,044.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for SAM clock and control transition module.						
1.3.3.21	<b>Level 2 Interface Board</b>	<b>\$47,280.00</b>	<b>\$47,280.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for XFT-> Level 2 interface board.						
1.3.3.23	XFT Ready for Installation at CDF	\$0.00	\$0.00	\$0.00	0	0	2
	<u>Notes</u>						
	WBS Description:						
	Milestone indicating XFT project complete.						
1.3.4	<b>Event-Builder Upgrade</b>	<b>\$414,000.00</b>	<b>\$414,000.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary element covers the Event-Builder upgrade. It includes the complete software development, the construction of a prototype and the construction of the full system.						
	M&S BOE -						
	The details of the purchase and all parts are assumed to be equal to the purchase of the present Event Builder hardware. According to somewhat outdated quotes the hardware costs about 500k.						
	Contingency is included in the sense that these are old quotes and the hardware will only become cheaper, although not by much.						
	Further Details on the Hardware from a quote from December 2001						
	Raw cost						
	32 port ASX 4000 (Marconi) \$215k						
	16 OC12 PCI cards (ForeRunnerHE 622) \$30k						
	15 OC-12 PMC carss (Cyclonwe PMC59) \$60k						

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont.	Level
<b>"Event-Builder Upgrade" continued</b>							
<u>Notes</u>							
	Total	\$305k					
Spares							
	1 Spare switch backbone	\$51k					
	1 Spare switch module	\$40k					
	3 Spare PCI cards	\$6k					
	3 Spare ATM cards	\$12k					
	Total	\$109k					
	Total including spares	\$414k					
	Including 30% contingency	\$538k					

1.3.4.1	Start Event-Builder Upgrade	\$0.00	\$0.00	\$0.00	0	0	3
---------	-----------------------------	--------	--------	--------	---	---	---

Notes

WBS Description:

This milestone marks the beginning date for work on the upgrade of the Event-Builder.

1.3.4.2	technology evaluation	\$0.00	\$0.00	\$0.00	0.3	0	0
---------	-----------------------	--------	--------	--------	-----	---	---

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PostDocU	40%	384 hrs	0 days	Wed 10/30/02	Thu 4/24/03	\$0.00	\$0.00	\$0.00	\$0.00

Notes

WBS Description:

Before starting to buy a prototype system an evaluation of the present technology will be performed. This evaluation results in the purchase of a prototype which is the most promising technology. The further schedule has been designed to fit the schedule for an upgrade using more powerful successor of the ATM technology. In case a different technology is chosen the schedule should still be appropriate. The price for the ATM technology is almost certainly higher than an alternative technology like Gigabit Ethernet.

M&S BOE: N/A

Labor BOE:

Based upon experience with the Run 2a system.

1.3.4.3	upgrade software	\$0.00	\$0.00	\$0.00	0	0	0
---------	------------------	--------	--------	--------	---	---	---

Notes

WBS description:

This summary element covers the software development for the Event-Builder upgrade. It includes an evaluation of the operating system and the associated driver, the work needed for adjusting the drivers and the remaining software.

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
1.3.4.4	<b>construct prototype</b>	<b>\$103,500.00</b>	<b>\$103,500.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary element covers the construction of a prototype. It includes the purchase of the necessary elements, the installation and evaluation of a test stand.						
	The cost is based on a quote from a possible vendor in December 2001.						
1.3.4.5	<b>construct full size system</b>	<b>\$310,500.00</b>	<b>\$310,500.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary element covers the construction of the full size Event-Builder system. It includes a readiness review, the purchase, installation and evaluation of the hardware and finally the completion of the system.						
	M&S BOE:						
	The cost is based on a quote by a possible vendor from December 2001.						
1.3.4.6	commissioning of hardware and software	\$0.00	\$0.00	\$0.00	0.3	0.5	0
	<u>Notes</u>						
	WBS Description:						
	Hardware and software commissioning involves data taking since only then the last problems can be found and corrected. Experience from Run IIa show that 2 month is a reasonable time to fix the most important problems.						
	M/S BOE: N/A						
	Labor BOE:						
	Based upon experience with the Run 2a system.						
1.3.4.8	Finish Event-Builder Upgrade	\$0.00	\$0.00	\$0.00	0	0	2
	<u>Notes</u>						
	WBS Description:						
	This milestone marks the end of the Event-Builder upgrade. This means that the hardware is in place and has been proven to technically work, the software development has been finished and its functionality has been proven with real data.						
1.3.5	<b>Computer for Level3 PC Farm / DAQ</b>	<b>\$382,500.00</b>	<b>\$382,500.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	This summary task covers the computer purchases for the general DAQ system and the Level-3 PC Farm. The purchases are staged since they are replacing PCs which become obsolete. Prices are based on a recent purchase of similar hardware.						

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
1.3.5.1	Start Computers for Level3 PC Farm/DAQ	\$0.00	\$0.00	\$0.00	0	0	3
	<u>Notes</u> WBS Description:						
	This milestone marks the beginning of the DAQ and Level3 computer purchases.						
1.3.5.2	replace 10 DAQ PCs (2003)	\$15,000.00	\$15,000.00	\$0.00	0	0	0
	<u>Notes</u> WBS Description:						
	Summary task describing the purchase of 10 DAQ computers in FY2003.						
1.3.5.3	replace 15 DAQ PCs (2004)	\$22,500.00	\$22,500.00	\$0.00	0	0	0
	<u>Notes</u> WBS Description:						
	Summary task describing the purchase of 15 DAQ computers in FY004.						
1.3.5.4	replace 20 DAQ PCs (2005)	\$30,000.00	\$30,000.00	\$0.00	0	0	0
	<u>Notes</u> WBS Description:						
	Summary task describing the purchase of 20 DAQ computers in FY2005.						
1.3.5.5	replace 70 Level 3 PCs (2004)	\$105,000.00	\$105,000.00	\$0.00	0	0	0
	<u>Notes</u> WBS Description:						
	Summary task describing the purchase of 70 level 3 computers in FY2004.						
1.3.5.6	replace 140 Level 3 PCs (2005)	\$210,000.00	\$210,000.00	\$0.00	0	0	0
	<u>Notes</u> WBS Description:						
	Summary task describing the purchase of 140 level 3 computers in FY2005.						
1.3.5.8	Finish Purchase of Computers for Level3/DAQ system	\$0.00	\$0.00	\$0.00	0	0	2
	<u>Notes</u> WBS Description:						
	This milestone marks the end of the PC purchases for the DAQ and the Level3 PC Farm.						

WBS Dictionary as of Mon 10/21/02  
CDF Run 2B Data Acquisition and Trigger Upgrade

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
1.3.6	<b>SVT upgrade</b>	<b>\$231,600.00</b>	<b>\$231,600.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	CDF Silicon Vertex Tracker Run 2b upgrade. Upgrade necessary due to differences between SVX IIa and SVX IIb detector geometry. System operation identical to the Run 2a SVT.						
1.3.6.1	Start of SVT upgrade	\$0.00	\$0.00	\$0.00	0	0	3
	<u>Notes</u>						
	WBS Description:						
	Milestone to begin SVT upgrade.						
1.3.6.2	<b>trackfitter boards</b>	<b>\$161,600.00</b>	<b>\$161,600.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task to produce new Track Fitter boards. New boards necessary to handle SVX IIb geometry.						
1.3.6.3	<b>Merger boards</b>	<b>\$70,000.00</b>	<b>\$70,000.00</b>	<b>\$0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>Notes</u>						
	WBS Description:						
	Summary task for the production of new SVT Merger boards. These boards are identical to the Run 2a Merger boards.						
1.3.6.5	SVT ready for installation	\$0.00	\$0.00	\$0.00	0	0	2
	<u>Notes</u>						
	WBS Description:						
	Milestone denoting the completion of the SVT.						
1.3.8	Finish Run 2b Trigger DAQ project	\$0.00	\$0.00	\$0.00	0	0	2
	<u>Notes</u>						
	WBS Description:						
	Milestone marking the end of the CDF Run 2b Trigger/DAQ upgrade subproject.						
1.3.9	Data Acquisition and Trigger Upgrades Ready for Installation	\$0.00	\$0.00	\$0.00	0	0	1
	<u>Notes</u>						
	WBS Description:						
	Milestone marking the end of the CDF Run 2b Trigger/DAQ upgrade subproject. This milestone is coupled to the corresponding level 2 milestone with added schedule contingency.						

WBS Dictionary as of Mon 10/21/02  
CDF Run 2B Data Acquisition and Trigger Upgrade

WBS	Name	Cost	M&S	Labor	M&S Cont.	Labor Cont	Level
1.31	Start of Run 2b DAQ and Trigger Project	\$0.00	\$0.00	\$0.00	0	0	3

Notes

WBS Description:  
Milestone - marking the beginning of the Run 2b DAQ and Trigger upgrade project