WBS	Component	Number	Unit	Comment
1	Control system	1	each	
1.1	Control Systems Engineering	1	each	
1.1.1	Management	1	each	
1.1.1.1	Reviewers (Q/A, high availability)	1	each	
1.1.2	Integration and Testing	1	each	
1.1.2.1	Quality Process(es)	1	each	
1.1.2.2	Verification Environment (requirement verification?)	1	each	
1.1.2.2.1	Component	1	each	
1.1.2.2.2	System (including high availability)	1	each	
1.1.2.3	Hardware test and inspection	1	each	
1.1.2.4	Staging Environment	1	each	
1.1.3	EDIA engineering design acceptance	1	each	
1.1.3.1	Includes HA	1	each	
1.1.3.2	Control Systems Engineering EDIA	1	man year	
1.1.3.3	Control Systems Engineering EDIA	1	man year	
1.1.4	Construction	1	each	
1.2	Central Control / Timing	1	each	
1.2.1	Computers	1	each	
1.2.1.1	EDIA	1	each	
1.2.1.1.1	Central Control/Timing Computers EDIA	1	man year	
1.2.1.1.2	Central Control/Timing Computers EDIA	1	man year	
1.2.1.2	Construction	1	each	
1.2.1.2.1	Central Control/Timing Computers Construction	1	man year	
1.2.1.2.2	Central Control/Timing Computers Construction	1	man year	
1.2.2	Networking	1	each	
1.2.2.1	EDIA	1	each	
1.2.2.1.1	Central Control/Timing Networking EDIA	1	man year	
1.2.2.1.2	Central Control/Timing Networking EDIA	1	man year	
1.2.2.2	Construction	1	each	
1.2.2.2.1	Data (general purpose)	1	each	
1.2.2.2.1.1	Central switches (small number)	1	each	
1.2.2.2.1.2	Workgroup switches (larger number)	1	each	
1.2.2.2.2	Real time buses	1	each	
1.2.2.2.2.1	Central switches	1	each	
1.2.2.2.2.2	Workgroup switches	1	each	
1.2.2.2.3	Cabling? Installation (may move later)	1	each	
1.2.2.2.3.1	Fiber	1	each	
1.2.2.2.3.2	Copper	1	each	
1.2.2.2.4	Central Control/Timing Networking Construction	1	man year	
1.2.2.2.5	Central Control/Timing Networking Construction	1	man year	
1.2.3	Software	1	each	
1.2.3.1	EDIA	1	each	
1.2.3.1.1	Cenral Control/Timing Software EDIA	1	man year	
1.2.3.1.2	Cenral Control/Timing Software EDIA	1	man year	
1.2.3.2	Construction	1	each	
1.2.3.2.1	Cenral Control/Timing Software Construction	1	man year	
1.2.3.2.2	Cenral Control/Timing Software Construction	1	man year	
1.2.3.3	Wt. 2 Applications	1	each	
1.2.3.3.1	Controls	1	each	
1.2.3.3.1.1	Alarm management	1	each	
1.2.3.3.1.2	Data trending	1	each	
1.2.3.3.1.3	Data logging	1	each	
1.2.3.3.1.4	Sequencer	1	each	
1.2.3.3.1.5	Graphical Display Manager (control room)	1	each	
1.2.3.3.1.6	Simulations/Modeling	1	each	
1.2.3.3.1.7	Elog	1	each	
1.2.3.3.1.8	Diagnostics	1	each	
1.2.3.3.1.9	Save/restore	1	each	
1.2.3.3.2	Physics	1	each	
1.2.3.3.2.1	Simulations/Modeling	1	each	
1.2.3.3.2.2	(slow) Feedback loops	1	each	
1.2.3.3.2.3	Analysis tools (construction?)	1	each	
1.2.3.4	Wt. 3 Framework	1	each	

WBS	Component	Number	Unit	Comment
1.2.3.4.1	Middleware	1	each	
1.2.3.4.1.1	Feedback	1	each	
1.2.3.4.2	Front end	1	each	
1.2.3.4.3	Application framework	1	each	
1.2.3.4.4	Diagnostics	1	each	
1.2.3.4.5	High availability (?)	1	each	
1.2.3.4.6	Cenral Control/Timing Software Wt. 3 Framework	1	man year	
1.2.3.5	Wt. 1 Infrastructure/admin	1	each	
1.2.3.5.1	Cybersecurity	1	each	
1.2.3.5.2	Code/release management/distribution	1	each	
1.2.3.5.3	Databases (license renewal)	1	each	
1.2.3.5.4	Interface to GIS	1	each	
1.2.3.5.5	System/network/db admins	1	each	
1.2.3.5.6	Cenral Control/Timing Software Wt. 1 Infrastructure/admin	1	man year	
1.2.4	Electronics	1	each	
1.2.4.1	EDIA	1	each	
1.2.4.2	Construction	1	each	
1.2.4.3	General purpose IO	1	each	
1.2.4.4	Firmware	1	each	
1.2.4.5	Test Equipment	1	each	
1.2.4.6	Frameworks	1	each	
1.2.4.6.1	Common hardware solutions	1	each	
1.2.4.6.2	Racks/cooling	1	each	
1.2.5	Control Rooms (not software, just infrastructure)	1	each	
1.2.5.1	EDIA	1	each	
1.2.5.1.1	Cenral Control/Timing Control Rooms EDIA	1	man year	
1.2.5.1.2	Cenral Control/Timing Control Rooms EDIA	1	man year	
1.2.5.2	Construction	1	each	
1.2.5.2.1	Cenral Control/Timing Control Rooms Construction	1	man year	
1.2.5.2.2	Cenral Control/Timing Control Rooms Construction	1	man year	
1.2.5.3	MCC Electronic Rack and AC (Electricity)	1	each	
1.2.5.4	EDIA	1	each	
1.2.5.5	Construction	1	each	
1.2.5.5.1	Cenral Control/Timing Control Rooms Construction2	1	man year	
1.2.6	Timing System	1	each	
1.2.6.1	EDIA	1	each	
1.2.6.1.1	Cenral Control/Timing Timing System EDIA	1	man year	
1.2.6.1.2	Cenral Control/Timing Timing System EDIA	1	man year	
1.2.6.2	Construction	1	each	
1.2.6.2.1	Cenral Control/Timing Timing System Construction	1	man year	
1.2.6.2.2	Cenral Control/Timing Timing System Construction	1	man year	
1.2.6.3	Central Timing	1	each	
1.2.6.4	Local Timing Distribution (one for each area? (many for linac))	1	each	
1.2.6.4.1	(receiver boards are costed by the areas?)	1	each	
1.2.6.4.1.1	Phased stabililzed links	1	each	
1.2.6.4.1.2	Local timing generator	1	each	
1.2.6.5	Cabling (stringent requires)	1	each	
1.2.7	Accelerator area/experiment/cryo Interface to global system	1	each	
1.2.7.1	EDIA	1	each	
1.2.7.1.1	Cenral Control/Timing Accelerator EDIA	1	man year	
1.2.7.1.2	Cenral Control/Timing Accelerator EDIA	1	man year	
1.2.7.2	Construction	1	each	
1.2.7.2.1	Cenral Control/Timing Accelerator Construction	1	man year	
1.2.7.2.2	Cenral Control/Timing Accelerator Construction	1	man year	
1.2.7.3	Who costs cryo controls? (info from tech division) here	1	each	
1.2.7.4	List each Area (9 areas)	1	each	
1.2.7.4.1	Main Linac (eg)	1	each	
1.2.7.4.1.1	Vacuum	1	each	
1.2.7.4.1.1.1	Controls	1	each	
1.2.7.5	Cryo	1	each	
1.2.7.6	Other Conventional Facilities	1	each	
1.2.7.6.1	HVAC	1	each	
1.2.7.6.2	Building Security	1	each	

WBS	Component	Number	Unit	Comment
1.2.7.6.3	Fire safety	1	each	
1.2.7.7	Experiment	1	each	
1.3	Protection Systems	1	each	
1.3.1	EDIA engineering design acceptance	1	each	
1.3.1.1	Protection Systems EDIA	1	man year	
1.3.1.2	Protection Systems EDIA	1	man year	
1.3.2	Construction	1	each	
1.3.2.1	Beam Containment	1	each	
1.3.2.2	MPS	1	each	
1.3.2.2.1	Logic implementation	1	each	
1.3.2.2.2	Sensors/actuators (himel's or marc's group)	1	each	
1.3.2.3	PPS	1	each	
1.3.2.4	Protection Systems Contruction	1	man year	
1.3.2.5	Protection Systems Contruction	1	man year	

We also need to develop costs for:
* LLRF subsystem generic package
* Standard front-end crates