



I&I Operations Budget Planning

Hal Evans



Indiana University

PO and L2 Discussions

24-Jul-2024



Outline



- **Current Budget Status**
 - Target total
- **Strategy for the Ops Review Target Budget**
 - System-by-System targets to reach \$12M total
 - Impact Statements
- **I&I Risks**
 - Mod's to NSF Risks to support Impact Statements
 - DOE Scope → Ops Risks
- **Timeline**
 - US ATLAS Operations Review: Sep. 10-13, 2024 at UC Santa Cruz

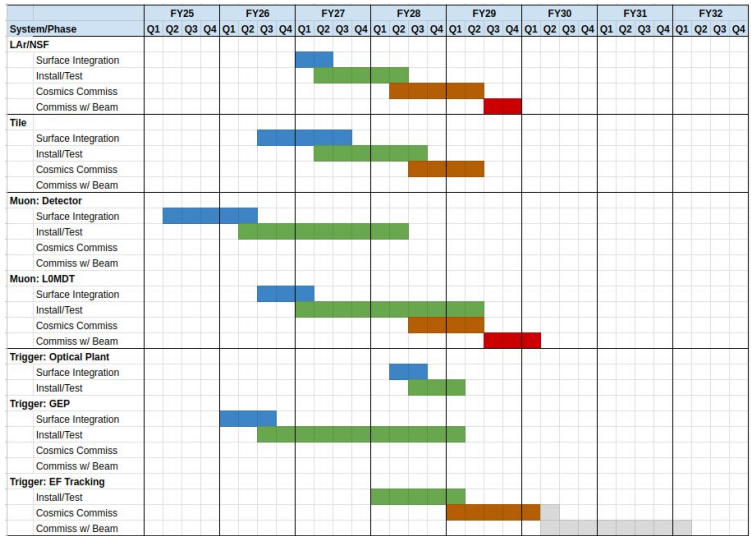
For Discussion



Current I&I Estimate: NSF



SUM of Total Cost (AY\$) FY									NSF Coop Agreement	July 2023					
System	FY25		FY26		FY27		FY28		FY29	FY30	FY31	Grand Total	31-Jan-2027	Scrubbing	
6.11.04 LAR-NSF	0		0		1,418,917		1,296,742		1,385,665		4,101,324		798,449	2,228,829	
6.11.05 Tile			241,961		1,219,552		871,644		399,806		2,732,962		289,881	496,705	
6.11.06 Muon	987,557		723,168		1,289,944		844,048		585,924		92,238		4,522,880	3,096,374	
6.11.08 Trigger			659,172		915,089		1,624,835		589,599		422,995		181,536		
Grand Total	987557.2		1,624,301		4,843,502		4,637,269		2,960,993		515,234		181,536		
													15,750,391	6,405,381	9,639,631



- Detailed Schedule in [google sheets](#)
- New Budget Target: \$12M
 - ~25% reduction from current budget
 - This target is arbitrary - a starting point for discussion with NSF
 - NSF's current assumption is that no I&I funding beyond the Coop Agreement and flat M&O levels is needed/available



Plans for the Target Budget



- **Statement of strategy changes for the September Ops Review**
 - We now have a full estimate of NSF I&I needs (until a fixed end-date, tbd)
 - The cost is substantially more than what is in the current Cooperative Agreement
 - But note that the current CA does not cover the full I&I period
 - However, significant pre-installation (surface) integration testing is included in the I&I estimate
 - That is a better fit to the MREFC, given that M&O support should really start with installation
- **Need to maintain flexibility to implement all options, while presenting a “reasonable” budget (e.g. \$12M total)**
 - We do not want to propose a budget that bakes in reductions in I&I scope that we may not need to make
 - Need to understand how to incorporate that flexibility: risks, opportunities, parallel budgets,... ?
- **Indicate the impact of not getting that budget ⇒ Impact Statements**
 - Do we need to prepare a Coop-Agreement + M&O budget?
- **Uniform Phases across all systems to simplify strategy discussion**
 - Surface Integration ; Install/Test ; Cosmics Commissioning ; Commissioning w/ Beam
- **Still need to get info on each system’s “fair share”**



Options for Reducing the Budget



- **Surface Integration Testing: up to \$3.1M**
 - Careful examination of Schedule \Rightarrow identify more surface activities
 - Previous (\$1.9M): \$260k (LAr) + \$988k (Muon/sMDT) + \$185k (Muon/L0MDT) + \$522k (Trigger/GEP)
 - New (\$1.1M): \$1,004k (Tile) + \$132k (Trigger/FOX) + \$0k (Trigger/EFTrack)
 - Need to prepare a Scope Opportunity for Tile
- **Define uniform I&I Budget End-Date: propose 31-Dec-2029 ?**
 - Assume that effort after that (above baseline M&O) will be uncOSTed
 - Trigger/EF Tracking savings ~\$428k
 - May require additions to Tile and Trigger/GEP budgets \$???
- **Other Phases/Activities**
 - Harder to define these clearly
- **Do not include any “Gap” / Standing Army support**



System-by-System Targets



- 25% Reduction vs Surface Integration Testing

System (k\$)	\$15.7M Budget*	25% Reduction	Surface Activities	Surface Start
LAr/NSF	4,101	1,025	260	Oct-2026
Tile	2,733	683	1,003	Jun-2026
Muon	4,523	1,131	1,173	Dec-2024
Trigger	3,965	991	664	Oct-2025
TOTAL	15,322	3,831	3,100	

* removing FY30-31 Trigger activities

- Plan for L2s: aim for 25% reduction in each system
 - Remove Surface and FY30-31 Activities from \$15.7M budget
 - If necessary, make further cuts to achieve 25% reduction target
 - Prepare Impact Statements detailing
 - Impact of not being able to increase MREFC Surface Integration - reductions in other phases of I&I
 - Added risks due to further reductions to achieve 25% cut
 - Need to be quantitative in these statements
 - Quantitative justification of I&I fair share
 - Use existing ATLAS-level I&I effort estimates (engineering only) and US share of CORE value



I&I Risk Strategy



- First pass at a Risk Register for all I&I scope: [docdb #196](#)

- Simple analysis to set cost/schedule impacts for each System at 90% CL
 - Cost Impact = $\sum \text{probability} \times 90\% \text{ CL cost}$
 - Schedule Impact = $\text{MAX}(\text{probability} \times 90\% \text{ CL delay})$

NSF System	Impacts at CL 90%	
	Cost (k\$)	Schedule (mo)
6.11.4 LAr/NSF	507	4.0
6.11.5 Tile	102	2.0
6.11.6 Muon	210	6.9
6.11.8 Trigger	754	9.6
NSF Total	1,573	9.6

- Strategy for RR Update

- Risk(s) to quantify exposure to DOE I&I scope
 - Is the probability of this just 10% (1 - 90% CL)
- Risks to indicate exposure to base-grant funded personnel
 - Would be best if scientific effort was included in the RLS - how possible is this?
- Risks to quantify the impact of not enhancing Surface Integration Testing in the MREFC ?
 - While still maintaining \$12M total Ops I&I budget
 - This is probably better discussed in the Impact Statements



Summary: Action Items



- Be very careful in the language you use if/when discussing these plans
 - Avoid statements like “move activities from Ops to MREFC”
 - Use rather “enhance surface integration testing”
 - Increases installation efficiency and decreases risk to Ops
- Add Scope Opportunity entry for Tile Surface Integration work
- Construct \$12M budget following guidelines on slide 6
 - Attempt to include scientific effort as much as possible
 - Make changes that are easy to describe (in terms of impact), rather than detailed fine-tuning
- Construct Impact Statement (see slide 6)
 - Specific statements are very important here
 - Include other I&I activities that would have to be removed if Surface Integration Testing cannot be supported by MREFC
- Update I&I Risk Register
 - Any changes to existing risks
 - Availability of Scientific Effort risk
 - Exposure to DOE I&I ⇒ We’ll do this centrally
- Timescale for all of this is: mid-August