

# Project Organization, Finances, and In-Kind Contributions

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NSF Mid-Term Review  
29 April 2024



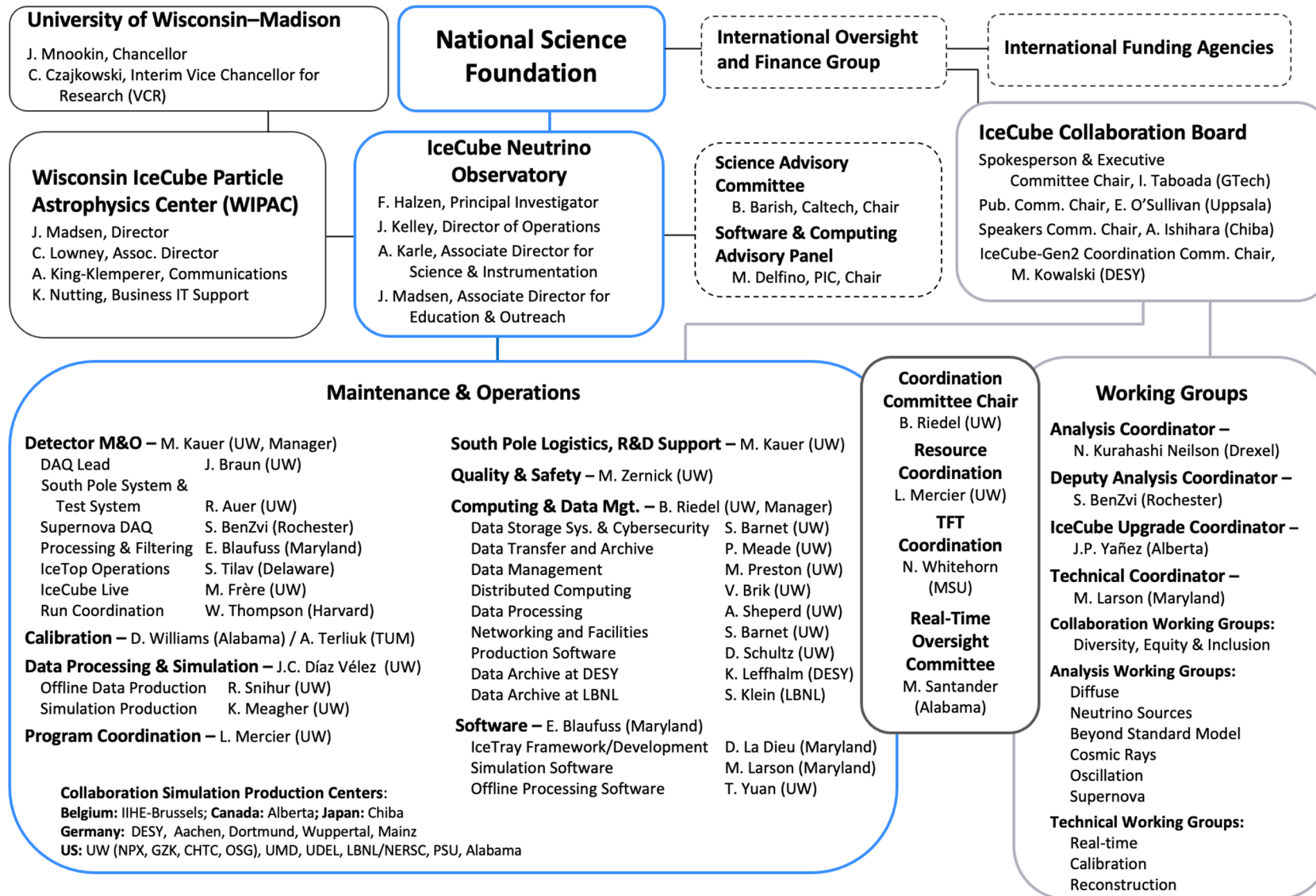


# Outline

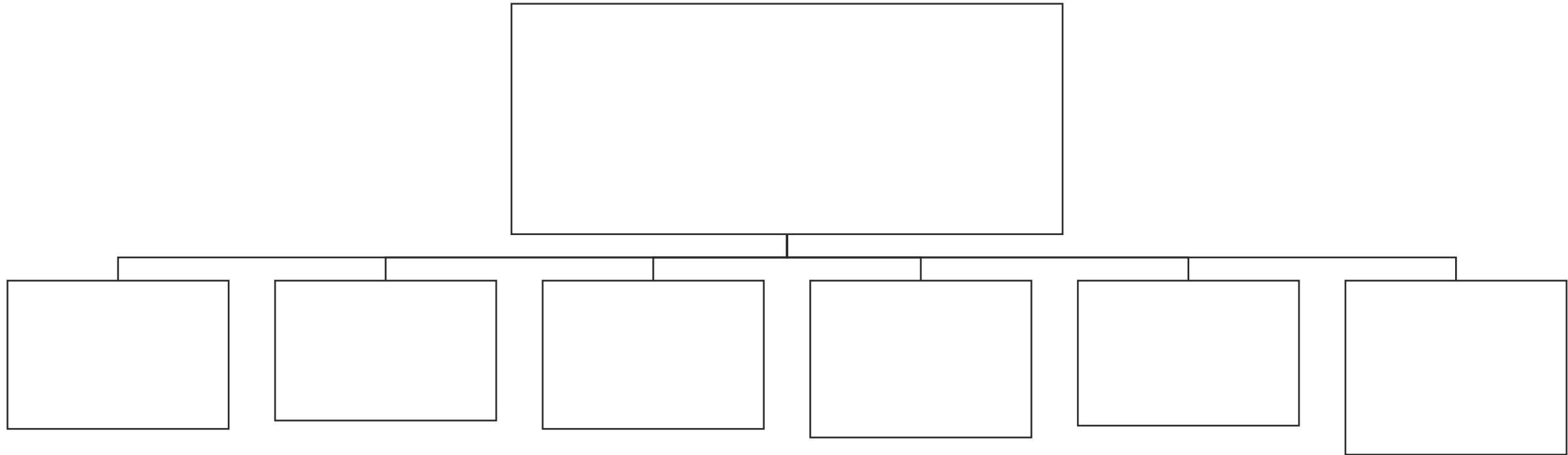
- Project Organization
  - ICNO organization chart
  - Work Breakdown Structure
  - M&O management and coordination
- Financial Management and Status
  - accounts
  - M&O award and subawards
  - common fund contributions and expenses
  - in-kind contributions
  - budget and actuals
  - labor inflation and PY4/PY5 plan



# ICNO Organization Chart

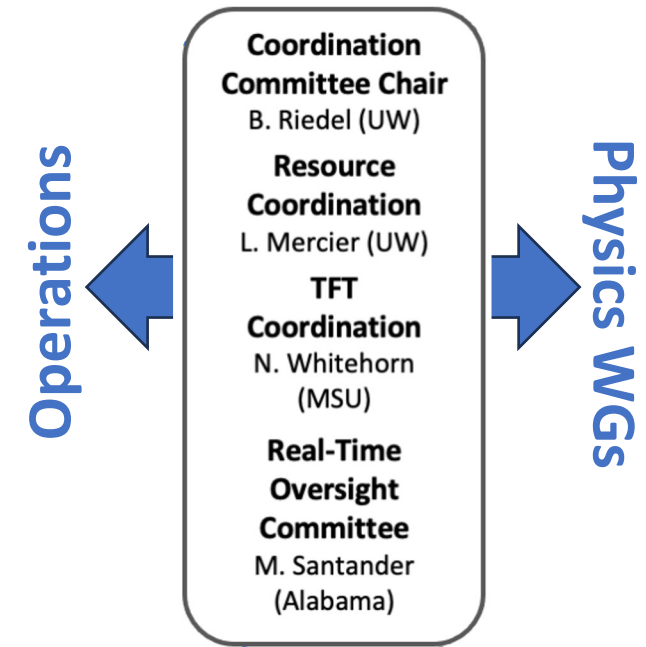


# Work Breakdown Structure (WBS)

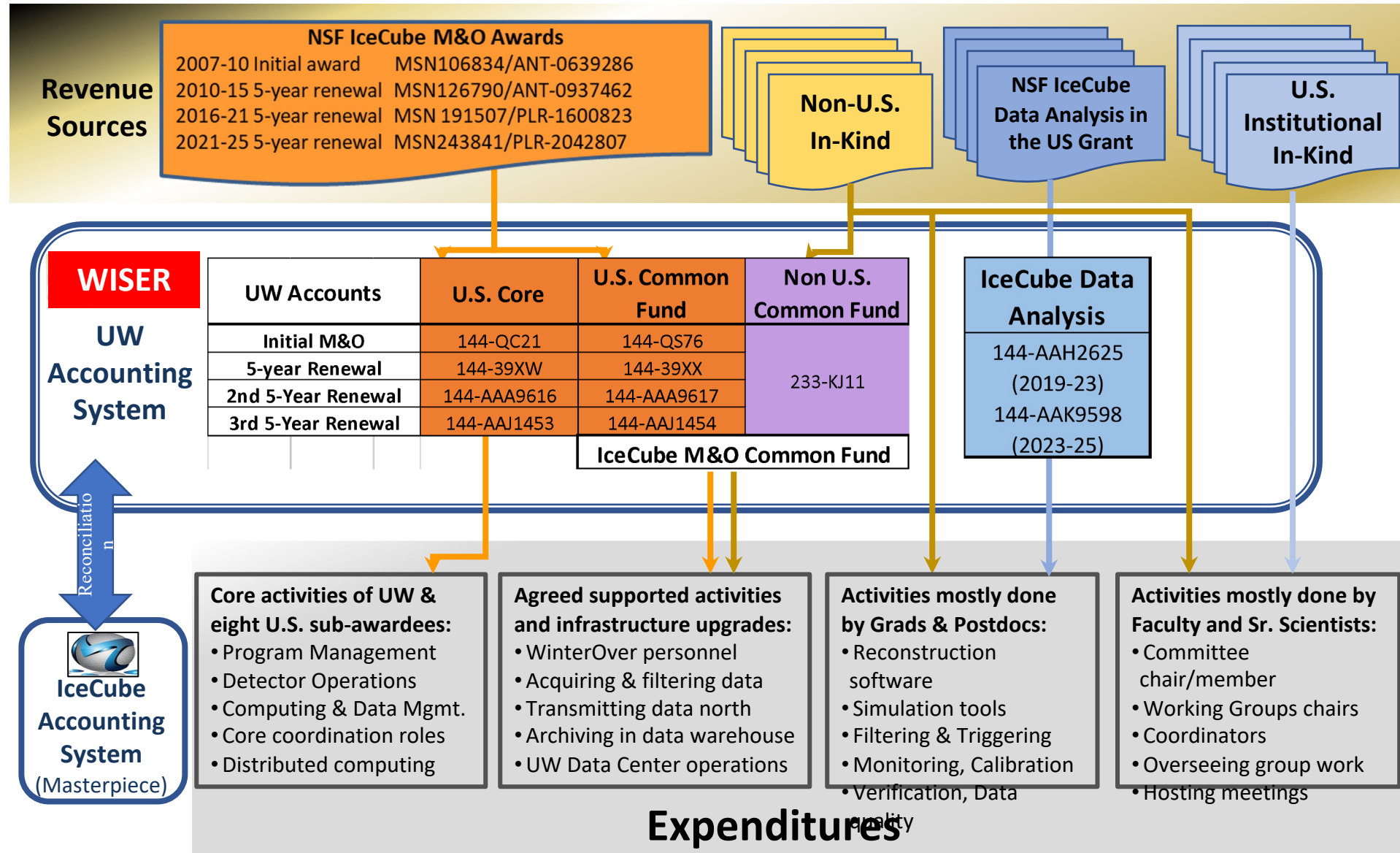


# M&O Management and Coordination

- Technical work by WBS
  - 2.2 Detector Operations: weekly operations calls
  - 2.3 Computing: daily standups, bi-weekly sprints
  - 2.4 Data Processing and Simulation: bi-weekly calls
  - 2.5 Software: bi-weekly software calls
  - 2.6 Calibration: weekly calibration calls
- Cross-WBS coordination + interface with physics working groups
  - bi-weekly IceCube Technical calls
  - monthly IceCube Coordination Committee (ICC) calls
- M&O leadership
  - weekly WIPAC M&O meetings
  - weekly calls with NSF program officers
  - bi-annual reports to NSF, collaboration (general and ICB), and annually to IOFG



# Monetary Flow and Accounts



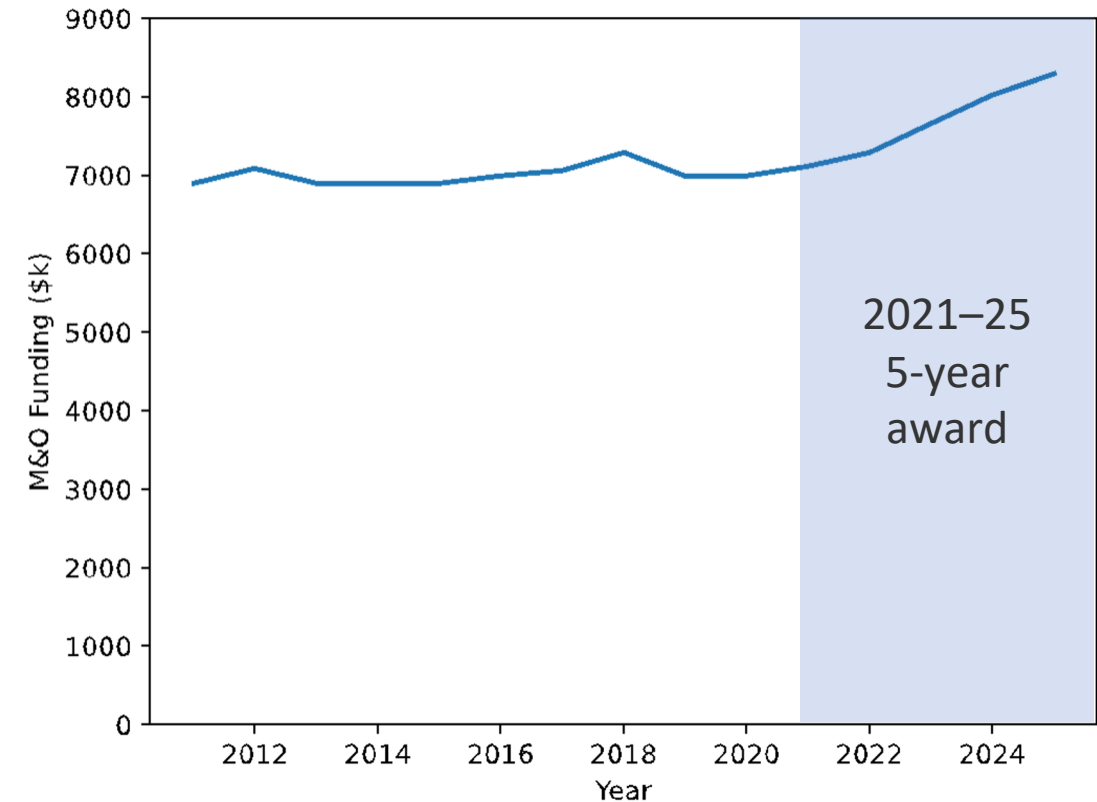


# Current M&O Award (2021–25)

Budget summary table

NSF Funds Request	Budget Elements	Total NSF					TOTAL
		YEAR1	YEAR2	YEAR3	YEAR4	YEAR5	
A	Total Senior Personnel	\$308,770	\$314,944	\$343,955	\$350,833	\$357,850	\$1,676,352
B	Other Personnel	\$2,344,998	\$2,388,752	\$2,487,896	\$2,583,654	\$2,635,327	\$12,440,627
A+B	<b>Total Salaries and Wages</b>	<b>\$2,653,768</b>	<b>\$2,703,696</b>	<b>\$2,831,851</b>	<b>\$2,934,487</b>	<b>\$2,993,177</b>	<b>\$14,116,979</b>
C	Total Fringe	\$891,662	\$908,442	\$951,498	\$985,984	\$1,005,708	\$4,743,294
A+B+C	<b>Total Salaries + Fringe</b>	<b>\$3,545,430</b>	<b>\$3,612,138</b>	<b>\$3,783,349</b>	<b>\$3,920,471</b>	<b>\$3,998,885</b>	<b>\$18,860,273</b>
D	Capital Equipment	\$0	\$0	\$0	\$0	\$0	\$0
E1	Travel Domestic	\$132,217	\$136,004	\$141,702	\$146,585	\$149,467	\$705,975
E2	Travel Foreign	\$85,869	\$88,766	\$92,685	\$95,447	\$97,315	\$460,082
G1	Materials & Supplies	\$72,679	\$72,921	\$73,136	\$73,617	\$73,975	\$366,328
G3	Consultant Services	\$0	\$0	\$0	\$0	\$106,405	\$106,405
G4	Computer Services	\$30,000	\$75,000	\$75,000	\$75,000	\$75,000	\$330,000
G5	Subawards	\$1,035,147	\$1,097,785	\$1,175,968	\$1,326,791	\$1,292,235	\$5,927,926
G	<b>Total Other Direct Cost</b>	<b>\$1,137,826</b>	<b>\$1,245,706</b>	<b>\$1,324,104</b>	<b>\$1,475,407</b>	<b>\$1,547,615</b>	<b>\$6,730,659</b>
H (A thr G)	<b>Total Direct Costs</b>	<b>\$4,901,342</b>	<b>\$5,082,614</b>	<b>\$5,341,840</b>	<b>\$5,637,910</b>	<b>\$5,793,282</b>	<b>\$26,756,989</b>
I1	Labor Indirect	\$1,949,986	\$2,004,736	\$2,099,762	\$2,175,861	\$2,219,380	\$10,449,725
I2	Travel Indirect	\$119,935	\$124,752	\$130,102	\$134,335	\$136,959	\$646,083
I3	Materials & Supplies Indirect	\$39,973	\$40,471	\$40,591	\$40,857	\$41,056	\$202,949
I4	Overhead Setup	\$82,500	\$0	\$0	\$0	\$0	\$82,500
I5	Consultant Services Indirect	\$0	\$0	\$0	\$0	\$59,055	\$59,055
I6	Computer Services Indirect	\$16,500	\$41,625	\$41,625	\$41,625	\$41,625	\$183,000
I	<b>Total Indirect Cost</b>	<b>\$2,208,894</b>	<b>\$2,211,584</b>	<b>\$2,312,080</b>	<b>\$2,392,678</b>	<b>\$2,498,075</b>	<b>\$11,623,311</b>
J=H+I	<b>Total Direct &amp; Indirect</b>	<b>\$7,110,237</b>	<b>\$7,294,199</b>	<b>\$7,653,920</b>	<b>\$8,030,589</b>	<b>\$8,291,357</b>	<b>\$38,380,301</b>

Award history



M&O budget largely flat vs. time (increase in PY3–PY5)



# Subawards

Institution	Major Responsibilities	Average FTE PY1–PY5	Dollars					Total PY1-PY5
			PY1	PY2	PY3	PY4	PY5	
Lawrence Berkeley National Laboratory	Computing infrastructure, long-term data archival, DOM firmware support	.05 Senior Personnel .14 Other Professional	\$ 82,688	\$ 91,822	\$ 95,571	\$ 106,807	\$ 110,475	\$ 487,363
Pennsylvania State	Simulation production, DAQ firmware support	.24 Post-Doctoral Scholars .25 Other Professionals	\$ 23,098	\$ 39,055	\$ 96,850	\$ 162,966	\$ 106,943	\$ 428,912
University of Delaware	IceTop calibration, monitoring and maintenance; IceTop simulation production	.65 Senior Personnel .25 Post-Doctoral Scholars	\$ 174,104	\$ 177,554	\$ 181,075	\$ 184,663	\$ 188,328	\$ 905,724
University of Maryland at College Park	Overall software coordination, IceTray software framework, online filter, simulation software and production	.02 Senior Personnel 2.4 Other Professional	\$ 635,366	\$ 643,918	\$ 652,605	\$ 718,288	\$ 728,089	\$ 3,378,266
	After CR PY3-PY5	same as above	\$ 635,366	\$ 643,918	\$ 762,484	\$ 811,590	\$ 812,369	\$ 3,665,727
University of Alabama at Tuscaloosa	Detector calibration, reconstruction and analysis tools	.08 Senior Personnel	\$ 30,101	\$ 30,703	\$ 31,318	\$ 31,944	\$ 32,584	\$ 156,650
Michigan State University	Simulation production, Northern Test System (NTS) maintenance	.2 Post-Doctoral Scholars	\$ 89,792	\$ 114,733	\$ 118,549	\$ 122,123	\$ 125,817	\$ 571,014

CR in PY3 to increase Univ. of Maryland subaward (same total budget)





# Common Fund Contributions

- Both U.S. and non-U.S. full member institutions contribute to IceCube M&O via the common fund
  - \$13,650 / Ph.D. author / year
- U.S. Common Fund: NSF award increment divided into appropriate accounts based on current author count
- Non-U.S. Common Fund: WIPAC invoices foreign institutions annually
- Used to support “*core activities that are agreed to be of common necessity for reliable operation of the IceCube detector and computing infrastructure*” including:
  - winterover detector operators
  - data acquisition and filtering hardware and software at the South Pole
  - data transfer and archival hardware and software at the WIPAC data center

# Common Fund PY1–PY3

	PY1		PY2		PY3	
	PhD. Authors	Planned	PhD. Authors	Planned	PhD. Authors	Planned
<b>Total CF Planned</b>	162	\$2,211,300	172	\$2,347,800	183.5	\$2,504,775
U.S. Contribution	88	\$1,201,200	97	\$1,324,050	106	\$1,446,900
Non-U.S. Contribution	74	\$1,010,100	75	\$1,023,750	77.5	\$1,057,875
		<b>Actual</b>		<b>Actual</b>		<b>Actual</b>
<b>Total CF Contributions</b>		\$2,136,225		\$2,327,325		\$2,445,145
U.S. Contribution		\$1,201,200		\$1,324,050		\$1,446,900
Non-U.S. Contribution		\$935,025		\$1,003,275		\$998,245
Difference (Actual-Planned)		\$(75,075)		\$(20,475)		\$(59,630)

- small fraction of Non-U.S. CF contributions are in-kind
- contributions are in line with plan (within ~few%)



# In-Kind Labor Contributions

- M&O labor contributions tracked through the MoU Dashboard
  - updates solicited bi-annually by Resource Coordinator
  - Institutional Leads update and confirm SoW
- Regular tasks include detector monitoring shifts by all institutions
  - training, organization by Run Coordinator
- Coordination boards prioritize work, set tasking
  - example: new offline filter development coordinated by ICC and TFT

**MOU / IceCube M&O** IceCube M&O IceCube Upgrade User Guide PDF jkelley Log Out

VIEW A SNAPSHOT UW-Madison SAVED

PHDS & AUTHORS: 28 | FACULTY: 5 | SCIENTISTS/POST-DOCS: 23 | GRADUATE STUDENTS: 14 CONFIRMED

*UW-MADISON'S STATEMENTS OF WORK*

AD - Administration    CS - Computer Science    DS - Data Science    EN - Engineering    GR - Graduate (PhD) Students    IT - Information Technology  
 KE - Key Personnel (Faculty)    MA - Manager    PO - Postdoctoral Associates    SC - Scientist    WO - Winterover

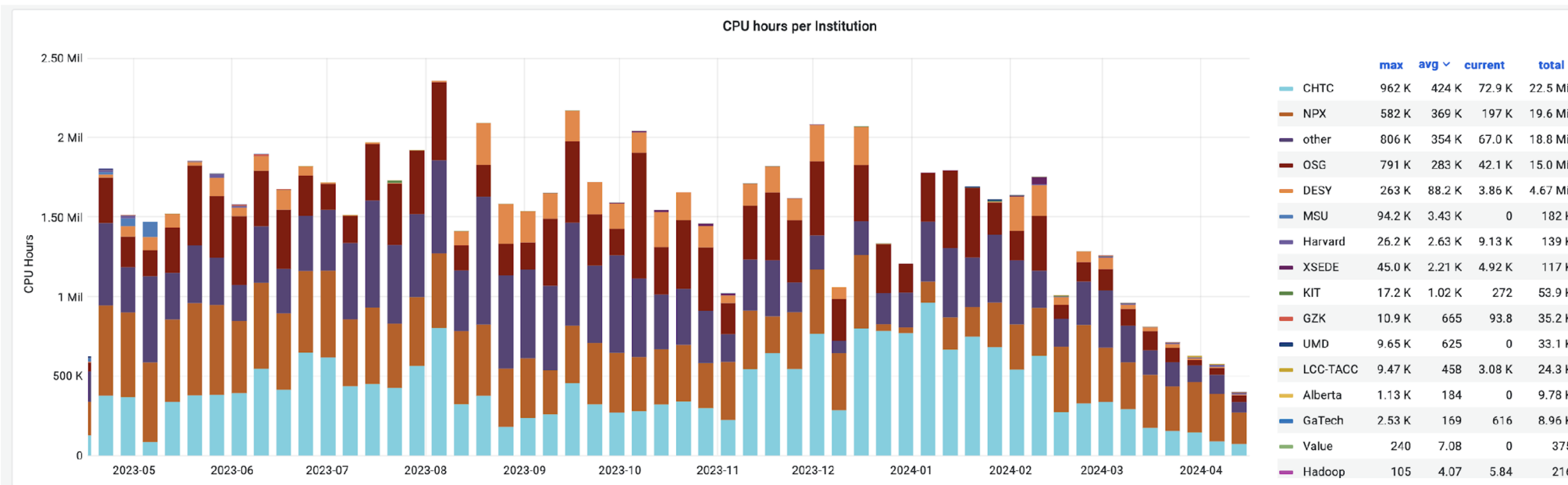
CREATE NEW STATEMENT OF WORK    CONFIRM ALL STATEMENTS OF WORK    TOTALS    EXTRA INFO    SHOW PAGES    EXPORT

WBS L2	WBS L3	LABOR CAT.	NAME	TASK DESCRIPTION	SOURCE OF FUNDS (U.S. ONLY)	FTE	
×	2.1 Program Coordination	2.1.1 Administration	AD	Lowney, Christy	Management/Administration	NSF M&O Core	0.1
×	2.1 Program Coordination	2.1.1 Administration	AD	MERCIER, LAURA	IceCube Resource Administrator Manager	NSF M&O Core	0.5
×	2.1 Program Coordination	2.1.1 Administration	GR	UW GR	Detector monitoring shifts	NSF Base Grants	0.3
×	2.1 Program Coordination	2.1.1 Administration	KE	HALZEN, FRANCIS	Principal Investigator	NSF M&O Core	0.25
×	2.1 Program Coordination	2.1.1 Administration	KE	HALZEN, FRANCIS	Principal Investigator	US In-Kind	0
×	2.1 Program Coordination	2.1.1 Administration	KE	HANSON, KAEL	Co-PI M&O	NSF M&O Core	0
×	2.1 Program Coordination	2.1.1 Administration	KE	Halzen, Francis	PI	NSF Base Grants	0.25
×	2.1 Program Coordination	2.1.1 Administration	KE	KARLE, ALBRECHT	Co-PI M&O, Associate Dir. Science Instr.	NSF M&O Core	0.5
×	2.1 Program Coordination	2.1.1 Administration	KE	KARLE, ALBRECHT	ExecCom member	US In-Kind	0
×	2.1 Program Coordination	2.1.1 Administration	KE	Lu Lu		NSF Base Grants	0.2
×	2.1 Program Coordination	2.1.1 Administration	KE	VANDENBROUCKE, JUSTIN	PubCom member	US In-Kind	0
×	2.1 Program Coordination	2.1.1 Administration	MA	Kelley, John	Director of Maintenance and Operations	NSF M&O Core	0.25
×	2.1 Program Coordination	2.1.1 Administration	MA	MADSEN, JIM	Interim Director of M&O	NSF M&O Core	0.17



# In-Kind Computing and Hardware Contributions

- In-kind computing resources integrated into IceCube grid
  - tracked per site and by resource type (CPU / normalized GPU)
  - DESY, MSU, Harvard, KIT, UMD *et al.* contributions
- Specialized hardware contributions also support M&O
  - example: surface array scintillator panels from KIT





# Budget and Expenditures Summary

**PY1–PY3 actual vs. budget**

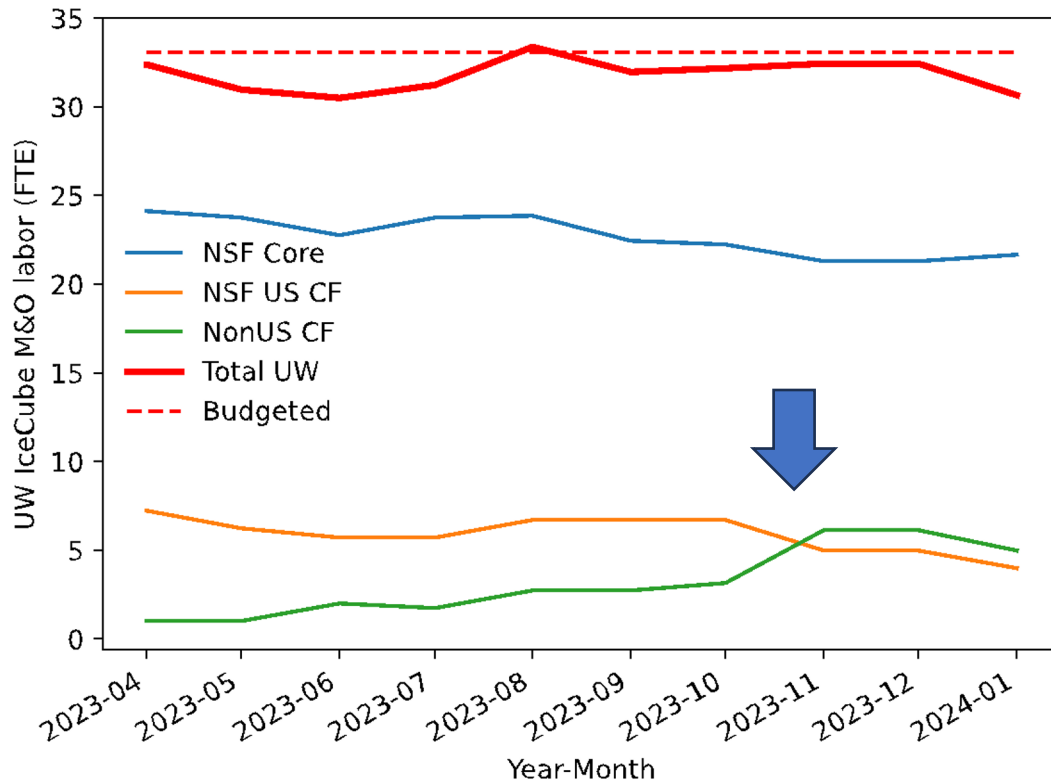
<b>(a)</b>	<b>(b)</b>	<b>(c)</b>	<b>(d)= a - b - c</b>
<b>PY1–3 Budget</b> (Apr. '21- Mar. '24)	<b>Actual Cost To Date</b> through Mar. 2024	<b>Open Commitments</b>	<b>End of YEAR3 Balance</b>
<b>\$22,058K</b>	<b>\$21,470K</b>	<b>\$658K</b>	<b>-\$70K</b>

- PY1-PY3 balance is -\$70K (-0.3%)
  - open commitments are subawards yet to invoice us
  - this is basically balanced (but after labor expenses shifted)
- Inflation has increased faster than award escalation
  - e.g. 4% COLA mandated by state of Wisconsin
  - personnel departures + rehiring at market rates



# Inflation Mitigation

UW M&O Labor in FTEs by Fund



- M&O labor FTEs under budgeted plan
  - action is still needed due to labor inflation
- Labor rebalanced between U.S. and Non-U.S. Common Funds
  - core hardware and software maintenance
- South Pole server upgrade deferred until after Upgrade installation
  - solid logistical and financial reasons
    - ~\$800k deferred
    - focus on Upgrade pole activities
  - minimal technical risk



# Non-U.S. Common Fund Expenditures

System	Computing Infrastructure	Detector Infrastructure	Labor	Total
South Pole System + Test System	\$4K	\$17K	\$201K	<b>\$222K</b>
Data Warehouse + UW Data Center	\$533K	—	\$21K	<b>\$554K</b>
<b>PY1 TOTAL</b>	<b>\$537K</b>	<b>\$17K</b>	<b>\$222K</b>	<b>\$776K</b>
South Pole System + Test System	\$231K	\$3K	\$162K	\$396K
Data Warehouse + UW Data Center	\$111K	—	\$56K	\$167K
<b>PY2 TOTAL</b>	<b>\$342K</b>	<b>\$3K</b>	<b>\$218K</b>	<b>\$563K</b>
South Pole System + Test System	\$281K	\$40K	\$330K	<b>\$651K</b>
Data Warehouse + UW Data Center	\$867K	—	\$75K	<b>\$942K</b>
<b>PY3 TOTAL</b>	<b>\$1,148K</b>	<b>\$40K</b>	<b>\$405K</b>	<b>\$1,593K</b>

- Caught up with infrastructure upgrades post-COVID
- Shift of labor to Non-U.S. CF will continue for PY4 and PY5
  - will maintain at least \$300K/yr budget for hardware upgrades

# Summary

- Robust M&O management at all levels
  - WBS organization tracks technical effort
  - maintain active communication with stakeholders
  - continue to work to direct and manage in-kind contributions
- Significant hardware upgrades in PY1–3
  - largely funded by Non-U.S. Common Fund
  - caught up post-COVID
- Labor inflation challenging but under control
  - some maintenance deferred but minimal technical risk

# Supplemental Slides



