The DUNE-US Software and Computing Operations Program: Pre-kickoff Meeting
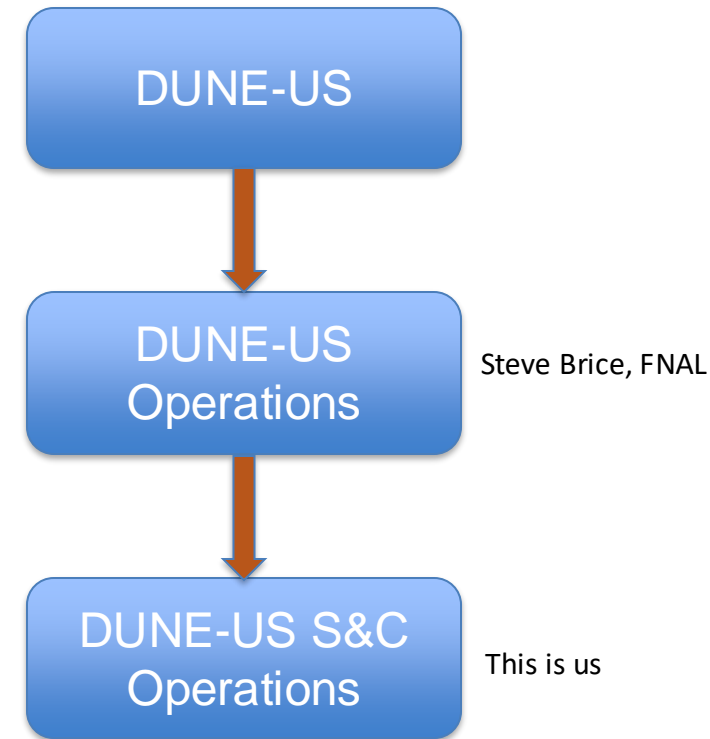
Ken Herner

DUNE-US Workshop

16 Sep 2024

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Intro to the DUNE-US S&C Ops Program

- Modelled after US-ATLAS and US-CMS programs, sits under DUNE-US ops program

- Responsible for setting scope of US contributions (CSC consortium determines what work the collaboration needs), coordinating effort, interacting with funding agencies

- Work began informally in fall 2023; focused on program setup, initial scope and planning, and effort recruitment

- Expect to grow eventually to ~25 US FTE from under 15 now
  - Some things can't and shouldn't wait until then, however

DUNE-US

DUNE-US Operations

Steve Brice, FNAL

DUNE-US S&C Operations
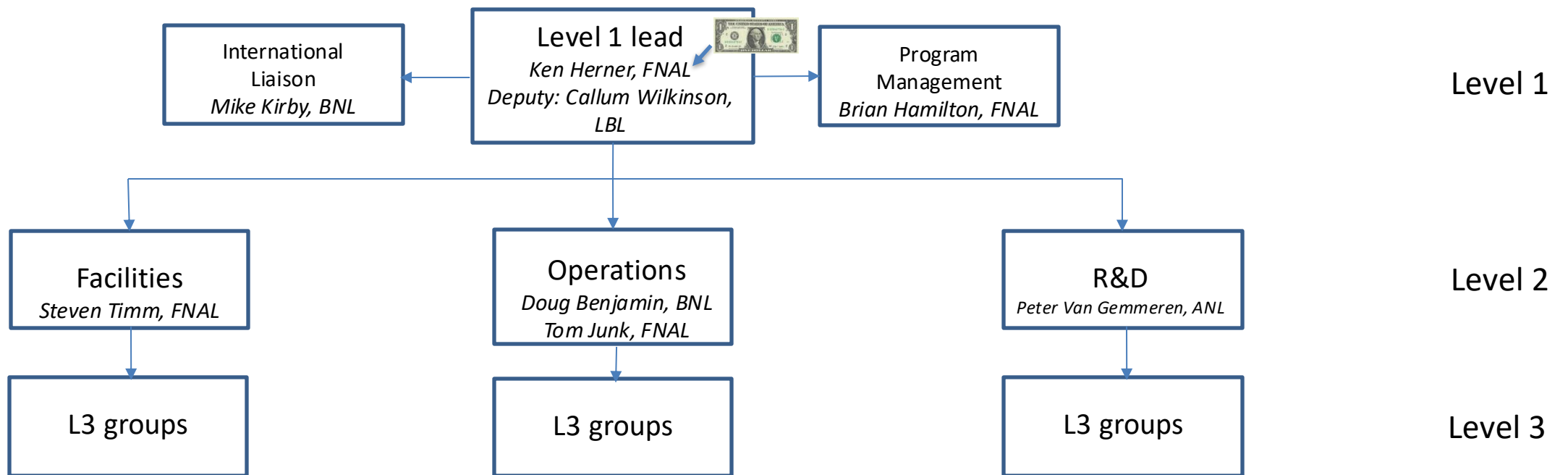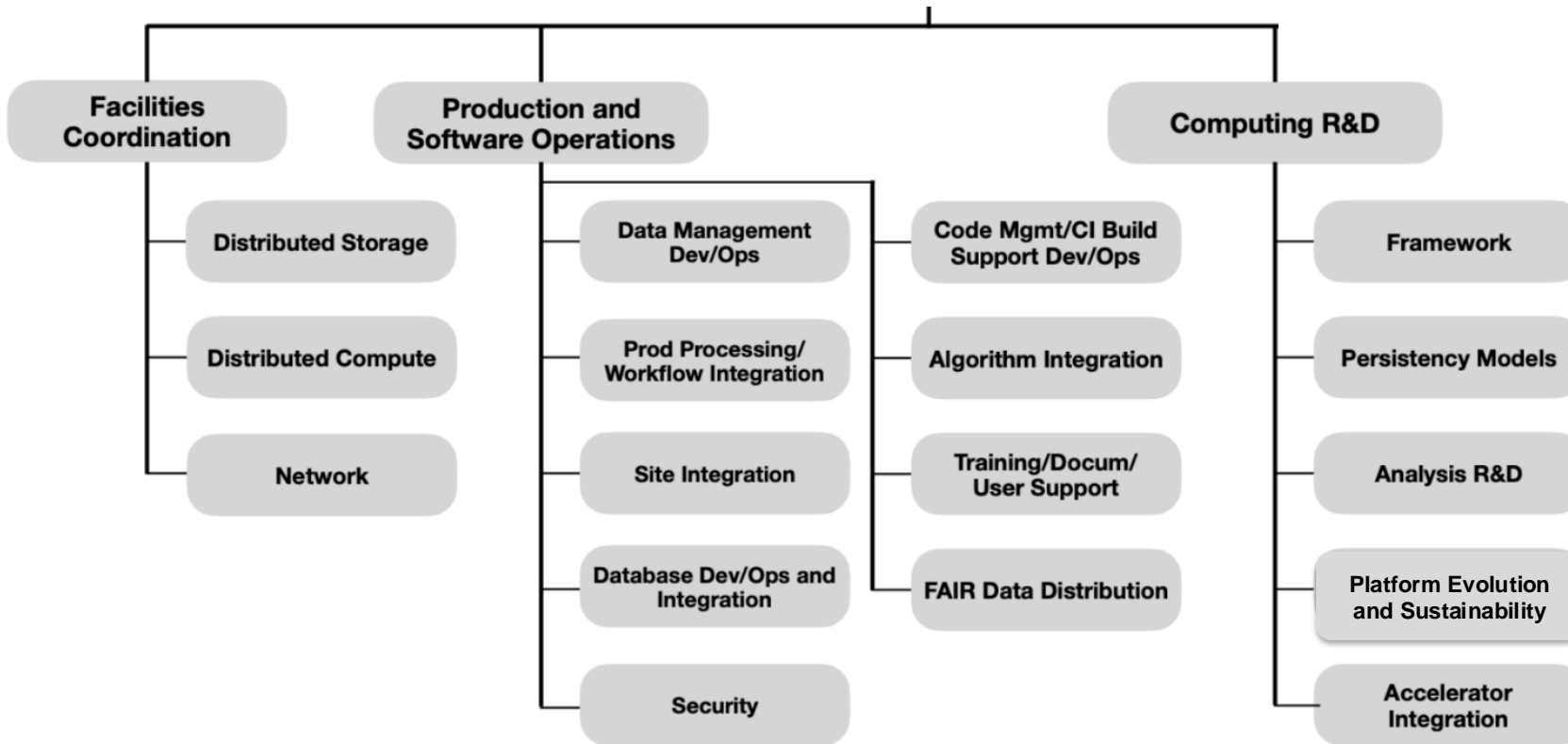
This is us

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General scope

- US has identified the following deliverables and will be the main driver of them:

  - Core framework development and interface layer with detector-specific modules

  - Persistency and IO infrastructure

  - Databases

- Significant (but shared) involvement in such items as

  - Networking (100% US; 0% outside)

  - Code management (~50%)

  - Documentation and training (~50%)

  - Data management (Currently well above 50% goal)

  - R&D beyond FW and persistency (e.g. platform evolution, accelerator integration) 50%

- Minor role in workflow management middleware development (more on the integration side)

- **Default involvement on computing items not listed here is ~50%, consistent w/authorship fraction**

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DUNE-US S&C Organization

- As mentioned, modelled after US-ATLAS and US-CMS
- No rule or requirement all senior leadership must be laboratory personnel
- Initial terms were for 1 year (expiring soon); expect 2-year terms in the steady state
  - Will be consistent with wider ops program guidelines, if any

L2/L3 areas

Level 2

Level 3

Confirmed L3 leadership

In no particular order:

Position (L2 area)	Name	Institution	Position (L2 area)	Name	Institution
Distributed Storage (Facilities)	Tammy Walton	FNAL	Production Processing (Prod Ops)	Aaron Higuera	Rice
Distributed Compute (Facilities)	Jeffrey Kleykamp	Ole Miss	Databases (Prod Ops)	Ana Paula Vizcaya	Colorado State
Networking (Facilities)	Ryan Heath	FNAL	Data Management DevOps (ProdOps)	Yuyi Guo	FNAL
Framework Development (R&D)	Kyle Knoepfel	FNAL	Code Management (Software Ops)	Andrew Olivier	Notre Dame
Persistency Models (R&D)	Barnali Chowdhury	ANL	Security (Prod Ops)	Mine Altunay	FNAL
Accelerator Integration (R&D)	(co-)Amit Bashyal	ANL	Analysis R&D (R&D)	Jeremy Wolcott	Tufts
Accelerator Integration (R&D)	(co-)Meghna Bhattacharya	FNAL	Documentation and Training (SW Ops)	Dave DuMuth	VCSU

Of 13 positions, 7 (6) filled by lab (university) personnel
Currently, some L3s also have Consortium leadership positions
Consortium sets overall direction and requirements ("this is what DUNE needs")
L3s work to ensure that US deliverables are on track

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Progress on DOE Review recommendations

- July review resulted in 9 recommendations

- All complete other than full staffing (more later), which is also budget-limited right now
  - Technically we only needed a plan ;)

- This was shown at the last LBNC/NSG cycle; plan to close out next time

Legend:
- 🟢 Complete
- 🟡 In progress, minor delay
- 🔴 Major delay

DUNE-US S&C	DOE June 2023 Recommendations	Status
1	Clearly delineate US Scope	🟢
2	Technical requirements flow from DUNE Phase-1 physics goals	🟢
3	Plan to respond to future software tasks and projects	🟢
4	Prioritize developing technical requirements of software framework	🟢
5	Develop more detailed plan to meet staffing needs	🟡 ← Budget limited
6	More formal management structure appropriate to the collab. size	🟢
7	Systematic tracking mechanisms for progressions of individuals	🟢
8	Prioritize the support on high impact PIER in case of funding shortfall	🟢
9	Further pursue data access plan consistent with Nelson memo	🟢

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Funding system and priorities

- Separate program within DOE

- Officially starting on May 1, 2025

  - Most things covered for full FY and we start 1 Oct

  - Effort currently on Computing Essentials grant (PI: Heidi Schellman) will roll into ops program on that date

  - Heidi applied for costed extension to computing essentials grant until then

    - **Covers existing personnel**, but not enough to expand funded efforts

- Regular meetings with Jeremy Love, Brian Beckford, Eric Feng in DOE

- For FY25, all funded work except for Essentials extension submitted through integrated DUNE Ops FWP via Fermilab (4% passthrough cost)

- Does NOT plan to cover all required computing effort from the US. Some effort still needed from shifters and non-experts

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US Computing FWP Items

- FY25 Computing total is about $5.4 M

  - About $2.8 M was pre-existing effort

  - Modest amount ($700k) for CPU/disk/tape

- Priorities were existing efforts (including extending computing essentials grant work), framework development (cannot defer without serious risk)

- Prioritized walkup in FWP

DUNE Computing	Accelerator Integration/R&D FNAL	FNAL	11
	Accelerator Integration/R&D US	ANL	8
	Accelerator Integration/R&D US	LBNL	84
	Analysis infrastructure FNAL	FNAL	112
	Code Management Dev US	Wichita State	67
	Code Management Ops US	Oregon State	14
	Core Software Development FNAL	FNAL	1679
	Core Software Development US	ANL	80
	Core Software Development US- Persistency models and data formats	ANL	67
	Data Management Development FNAL	FNAL	286
	Data Management Operations FNAL	FNAL	164
	Data Management Operations - US	BNL	87
	Data Management Operations- Collection Manager	Rice University	55
	Data Management Operations- US	Oregon State	17
	Database Administration FNAL	FNAL	223

Database Development FNAL	FNAL	190
Database Development US	Colorado State	49
Database Development US	U Minnesota	67
Distributed CPU FNAL	FNAL	149
Distributed Disk Storage FNAL HW	FNAL	403
Distributed Tape Storage FNAL media	FNAL	177
DUNE-US S&C Management	ANL	144
DUNE-US S&C Management	BNL	113
DUNE-US S&C Management	FNAL	307
DUNE-US S&C Management	LBNL	114
FD DAQ Development and integration	FNAL	670
Offline Production Operations US	Oregon State	14
Offline Security Development	FNAL	45
User support, training, and documentation US	Oregon State	7
DUNE Computing Total		**5402**

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Priorities and available funding levels made

Left table:

FY25 Priority	Thrust	Cost Name	Institution providing resource	FY25 Request (k$)	Cumulative FY25 Request (k$)
Priority 1 (highest)	LBNF	ES&H Staff	FNAL	1106	1106
		Priority 1 (highest) Total		**1106**	**1106**
Priority 2	LBNF	General Liability Insurance	FNAL	1091	2197
		Gen. Site Supt. Serv. contract with SDSTA	FNAL	337	2534
		Hoisting	FNAL	3062	5596
		Power	FNAL	822	6417
		Priority 2 Total		**5312**	**6417**
Priority 3	DUNE Computing	Code Management Dev US	Wichita State	67	6485
		Code Management Ops US	Oregon State	14	6498
		Core Software Development FNAL	FNAL	1679	8178
		Core Software Development US	ANL	80	8258
		Core Software Development US- Persistency models and data formats	ANL	67	8325
		Data Management Operations- US	Oregon State	17	8342
		Database Development US	Colorado State	49	8391
		Database Development US	U Minnesota	67	8458
		Distributed CPU FNAL	FNAL	149	8606
		Distributed Disk Storage FNAL HW	FNAL	403	9010
		Distributed Tape Storage FNAL media	FNAL	177	9187
		Offline Production Operations US	Oregon State	14	9201
		User support, training, and documentation US	Oregon State	7	9207
	Information Technology	Network Services (Ops Funded)	FNAL	469	9677
		Priority 3 Total		**3259**	**9677**
Priority 4	DUNE Central Operations	Salaries/teaching buyouts for spokes.	FNAL	150	9826
	DUNE Computing	Accelerator Integration/R&D FNAL	FNAL	11	9838
		Accelerator Integration/R&D US	ANL	8	9846
		DUNE-US S&C Management	ANL	144	9990
		DUNE-US S&C Management	BNL	113	10103
		DUNE-US S&C Management	FNAL	307	10410
		DUNE-US S&C Management	LBNL	114	10524
		FD DAQ Development and integration	FNAL	670	11194
	LBNF	Joint Project Office Staff	FNAL	420	11613
		PPE for underground staff	FNAL	4	11617
	South Dakota Services	SDS staff	FNAL	1029	12646
		Priority 4 Total		**2970**	**12646**
Priority 5	DUNE Central Operations	Collaboration support	FNAL	478	13125
	DUNE Computing	Accelerator Integration/R&D US	LBNL	84	13209
		Analysis infrastructure FNAL	FNAL	112	13320
		Data Management Development FNAL	FNAL	286	13606

Right table (continuation of Priority 5):

FY25 Priority	Thrust	Cost Name	Institution providing resource	FY25 Request (k$)	Cumulative FY25 Request (k$)
		Data Management Operations FNAL	FNAL	164	13693
		Data Management Operations - US	BNL	87	13857
		Data Management Operations-Collection Manager	Rice University	55	13911
		Database Administration FNAL	FNAL	223	14134
		Database Development FNAL	FNAL	190	14325
		Offline Security Development	FNAL	45	14370
	DUNE Coordination Office	DUNE Coordination Office staff	FNAL	754	15124
	South Dakota Services	Housing Leases	FNAL	295	15418
		SDS staff	FNAL	512	15930
		Priority 5 Total		**3284**	**15930**

↑ Priorities 1-5 requested in this FWP

↓ Priorities 6-9 walkup to optimal

FY25 Priority	Thrust	Cost Name	Institution providing resource	FY25 Request (k$)	Cumulative FY25 Request (k$)
Priority 6	DUNE Computing	Data Management Development US	Univ/Lab TBD	82	16012
		Database Development US	Univ/Lab TBD	148	16160
		Database Operations US	Univ/Lab TBD	82	16242
	DUNE Coordination Office	DUNE Coordination Office staff	FNAL	90	16332
		Lease warehouse near FNAL -store APAs	FNAL	55	16387
		Priority 6 Total		**456**	**16387**
Priority 7	DUNE Computing	Accelerator Integration/R&D US	Univ/Lab TBD	21	16407
		Analysis infrastructure US	Univ/Lab TBD	55	16462
		Monitoring Devel FNAL	FNAL	45	16506
		Offline Production Operations US	Univ/Lab TBD	41	16547
		Priority 7 Total		**161**	**16547**
Priority 8	Communications	Leased storefront	FNAL	31	16579
	DUNE Computing	BNL Travel	BNL	24	16603
		Offline Production and Workflow Development US	Univ/Lab TBD	16	16619
	Human Resources	Marketing campaign and career fairs	FNAL	9	16628
	Infrastructure Services	Regular Management Visits	FNAL	6	16634
		Priority 8 Total		**86**	**16634**
Priority 9 (lowest)	Communications	Travel	FNAL	10	16644
	DUNE Coordination Office	Travel	FNAL	11	16655
	Environment,Safety,Health	Travel for ORC SMEs	FNAL	55	16710
	Finance and Procurement	Travel	FNAL	2	16712
	Human Resources	Travel	FNAL	17	16729
	Information Technology	Travel	FNAL	5	16735
	LBNF	Travel	FNAL	12	16747
	South Dakota Services	Travel	FNAL	10	16757
		Priority 9 (lowest) Total		**123**	**16757**

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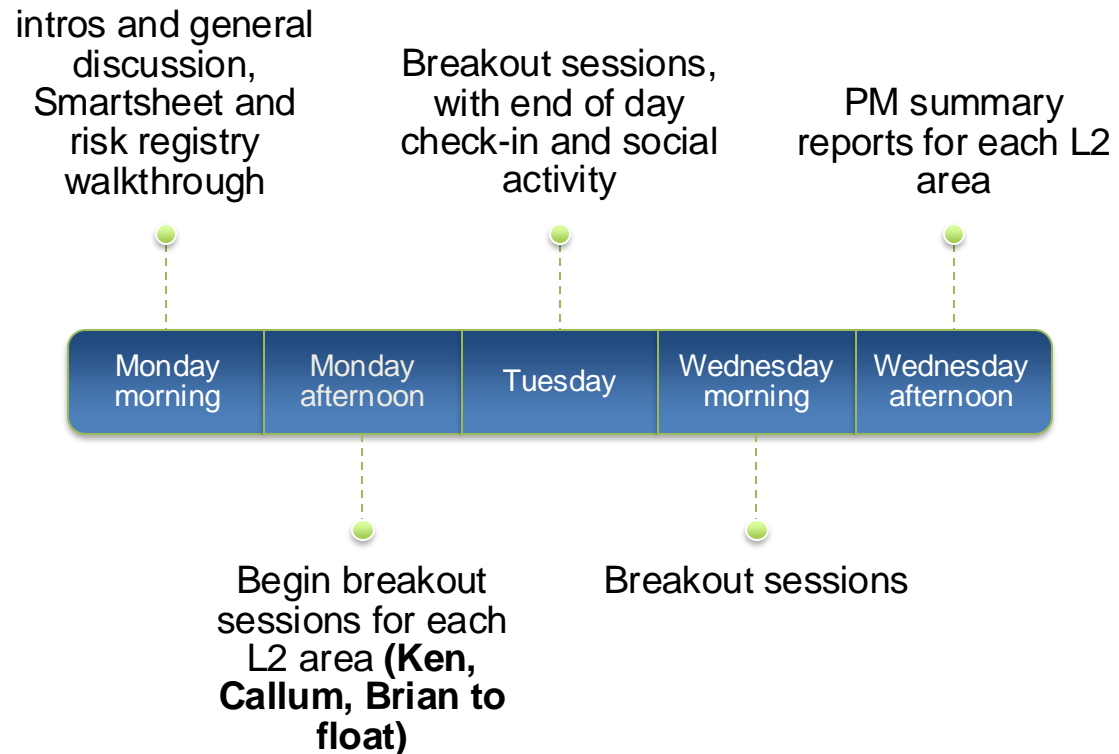
Notable Events Coming in FY25

- PDVD beam run

- 2x2 second run

- Continued infrastructure upgrades

- Begin detailed framework design and implementation efforts

- Coming soon:

  - LBNC October 3-4 (want to see more detailed plans and schedule for framework)

  - NSG October 22-25 (mostly about high-level milestones and international coordination)

  - First DUNE S&C Week Nov 6-8 (good chance to show plans and iterate w/other countries)

  Why we're meeting now

- **Next DOE review tentatively week of January 13, 2025, part of full Ops prog. review**

  - **Will have a practice review in early-mid December, similar to the 2023 review**

  - **Want to have plans for the year in good shape by practice review**

- Expect funding increase in FY26 according to current guidance (no guarantees)

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Goals for This Week (or, "Why Are We Here?")

- Map out long-term milestones if not already done (say to start of datataking)

- Come up with prioritized effort estimates (we know the available effort levels and people; will discuss in breakouts)

  - Assume we have full funding for this exercise, but have a priority list in mind just in case

  - Use knowledge of Consortium priorities!

- Match effort levels on a *task* basis (not on a budget basis)

- Make distinctions between tasks capable of being done by non-experts

- Review and update Risk Registry

- Prepare proposed WBS in advance of November S&C week

  - Don't expect a final version this week, but good to get everyone together, learn the tools, and make progress

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Schedule for the workshop

intros and general discussion, Smartsheet and risk registry walkthrough

Breakout sessions, with end of day check-in and social activity

PM summary reports for each L2 area

| Monday morning | Monday afternoon | Tuesday | Wednesday morning | Wednesday afternoon |

Begin breakout sessions for each L2 area **(Ken, Callum, Brian to float)**

Breakout sessions

- L2s: if there are specific topics for which you need Ken/Callum/Brian in the room, let us know and we can try to work out a common schedule

- There are some joint sessions between L2 areas to discuss areas of mutual interest and/or overlap

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Summary

- Inspiring and energizing message goes here

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