

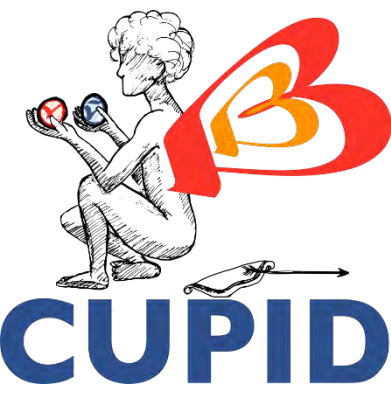
Project Controls

Kerry Minor
LBNL

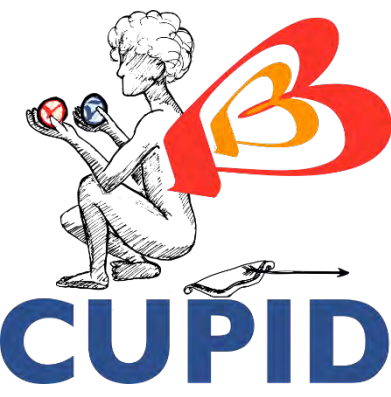
CUPID LBNL Project Review
December 16-17, 2024



Outline



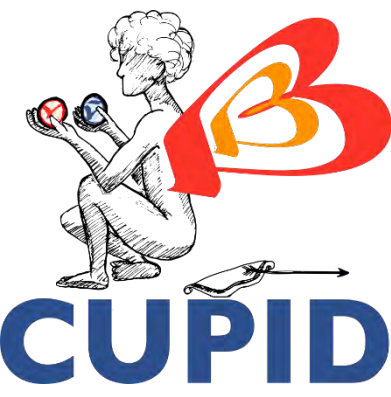
- Responsible Control Account Managers
- Tools
- Schedule Assumptions
- L1/2/3 Milestones
- Schedule
- Critical Path
- Cost Assumptions
- BOE Types and Distributions
- Budget/Actuals
- FTE Distribution
- 413 vs Non-413 Project Totals



Responsible Control Account Managers

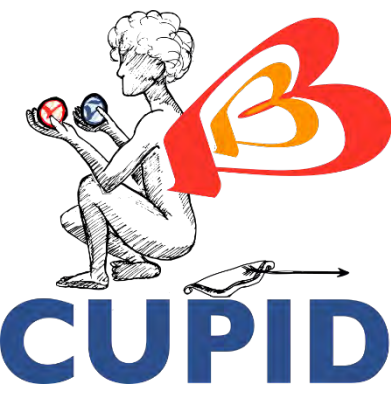
| CUPID Level 2 Managers (CAMs) | |
|--|-----------------|
| Description | CAM (US) |
| 1.00 CUPID Milestones | Brian Fujikawa |
| 1.01 Project Management | Brian Fujikawa |
| 1.02 Detector Components | Lindley Winslow |
| 1.03 Detector Structure | Brian Fujikawa |
| 1.04 Host Lab Infrastructure & Cryogenic Systems | Brian Fujikawa |
| 1.05 Data Readout | Brad Welliver |
| 1.06 Background Control | Tommy O'Donnell |

- There are four US L2 CAMs
- 1.03 and 1.04: primarily foreign scope. US CAM in charge of US procurement support



CUPID Specific Tools

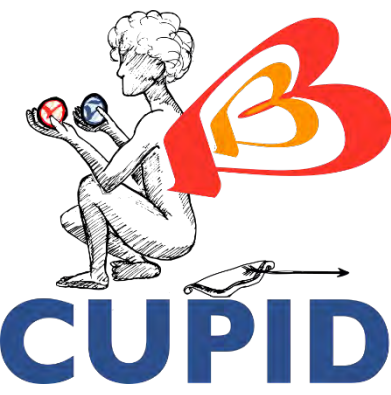
- Primavera (P6) Scheduling Software
 - Estimates provided by the Control Account Managers (CAMs) and assigned appropriate resources
 - Labor provided in hours
 - Materials/services provided in direct dollars
 - Activities then given proper durations and logic links for time-phasing
- Deltek Cobra (Cobra) Cost Processor/EVMS Software
 - Holds all labor rates, overhead rates, and escalation
 - P6 Integration - Cobra calculates proper overheads/escalations to all resource loaded activities resulting in a fully burdened and time-phased cost estimate.
- Hammer Cost Estimating Tool (CET)
 - Loaded from data from P6 and Cobra and contains links to BOEs



Schedule Assumptions

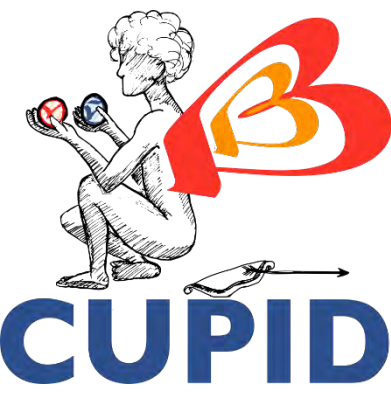
- CUPID spans from FY21 through FY37
- Critical Decision Milestones (Level 1)
 - CD-1/3A ESAAB Approval, Q4 FY25
 - CD-2/3B ESAAB Approval, Q4 FY26
 - CD-4 ESAAB Approval/Project Complete (BCD), Q1 FY37
- ~30 months (24 months for schedule contingency and 6 months for CD4 prep/meeting) of float exist between MSL2 “COMP: Early Finish” Q4 FY34 and MSL1 “COMP: CD-4 ESAAB Approval/Project Complete (BCD)” Q1 FY37
- One Full Time Equivalent = 1,820 hours/year
- Standard calendars are available for resource planning
- The beginning of a Fiscal Year starts on October 1st and ends on September 30th, e.g. FY25 = 10/1/2024 – 9/30/2025
- P6 is resource loaded, contains budgeted quantities for labor hours and nonlabor dollars but does not contain total costs.

Level 1 & 2 Milestones



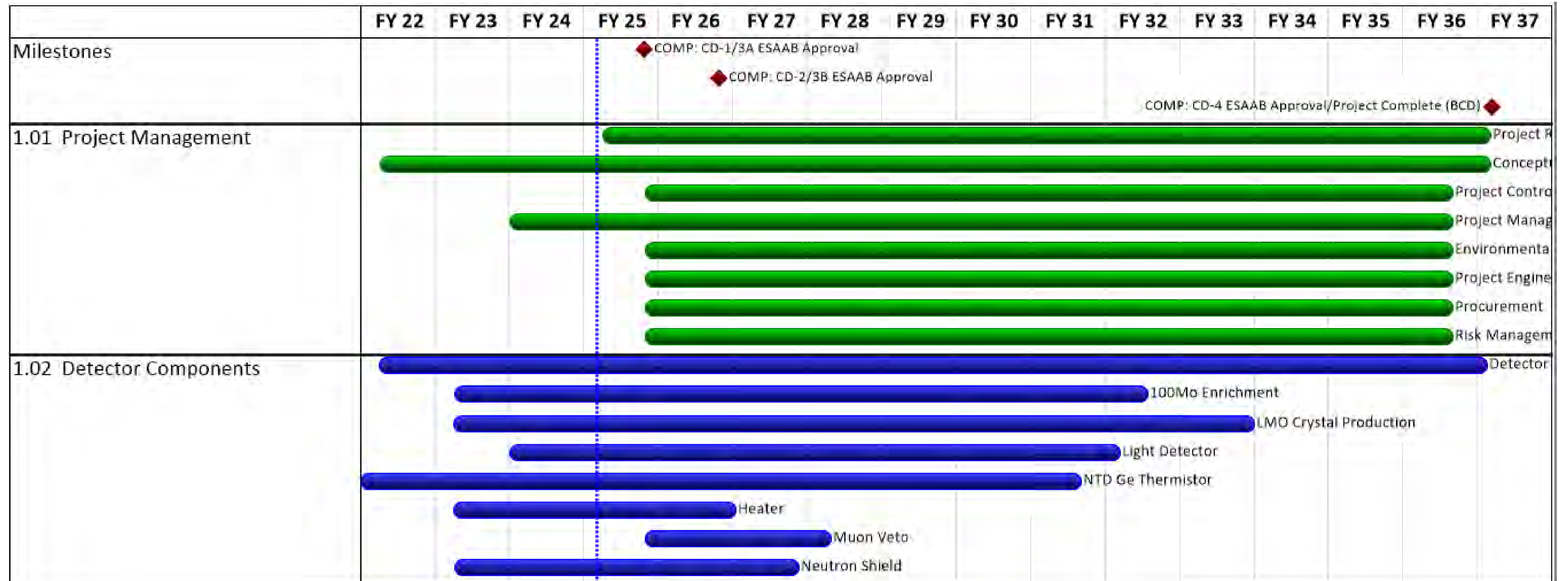
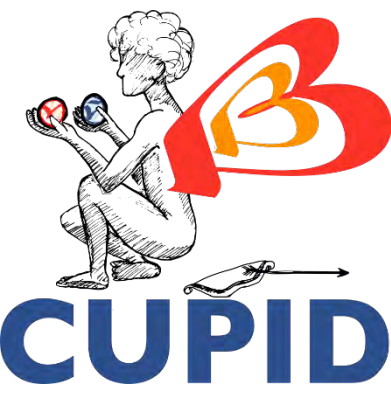
| | | | | |
|---|---|---------|-------------------|-------------------|
| WBS: CUPID_WM-1.1.00.01 Level 1 Milestones - DOE Headquarters (HQ) | | | 10/01/2021 | 12/09/2036 |
| CUPID_MS1_0010 | Project Start | Phase 1 | 10/01/2021* | |
| CUPID_MS1_0020_C | COMP: CD-1/3A ESAAB Approval | Phase 1 | | 07/25/2025 |
| CUPID_MS1_0030_C | COMP: CD-2/3B ESAAB Approval | Phase 1 | | 07/27/2026 |
| CUPID_MS1_0050_C | COMP: CD-4 ESAAB Approval/Project Complete (BCD) | Phase 2 | | 12/09/2036 |
| WBS: CUPID_WM-1.1.00.02 Level 2 Milestones - DOE Site Office | | | 04/30/2025 | 07/27/2034 |
| CUPID_MS2_0010_C | COMP: CD-1/3A Independent Project Review (IPR) Complete | Phase 1 | | 04/30/2025 |
| CUPID_MS2_0020_C | COMP: CD-2/3B Independent Project Review (IPR) Complete | Phase 1 | | 04/30/2026 |
| CUPID_MS2_0040_C | COMP: Early Finish | Phase 2 | | 07/27/2034 |

Level 3 Milestones

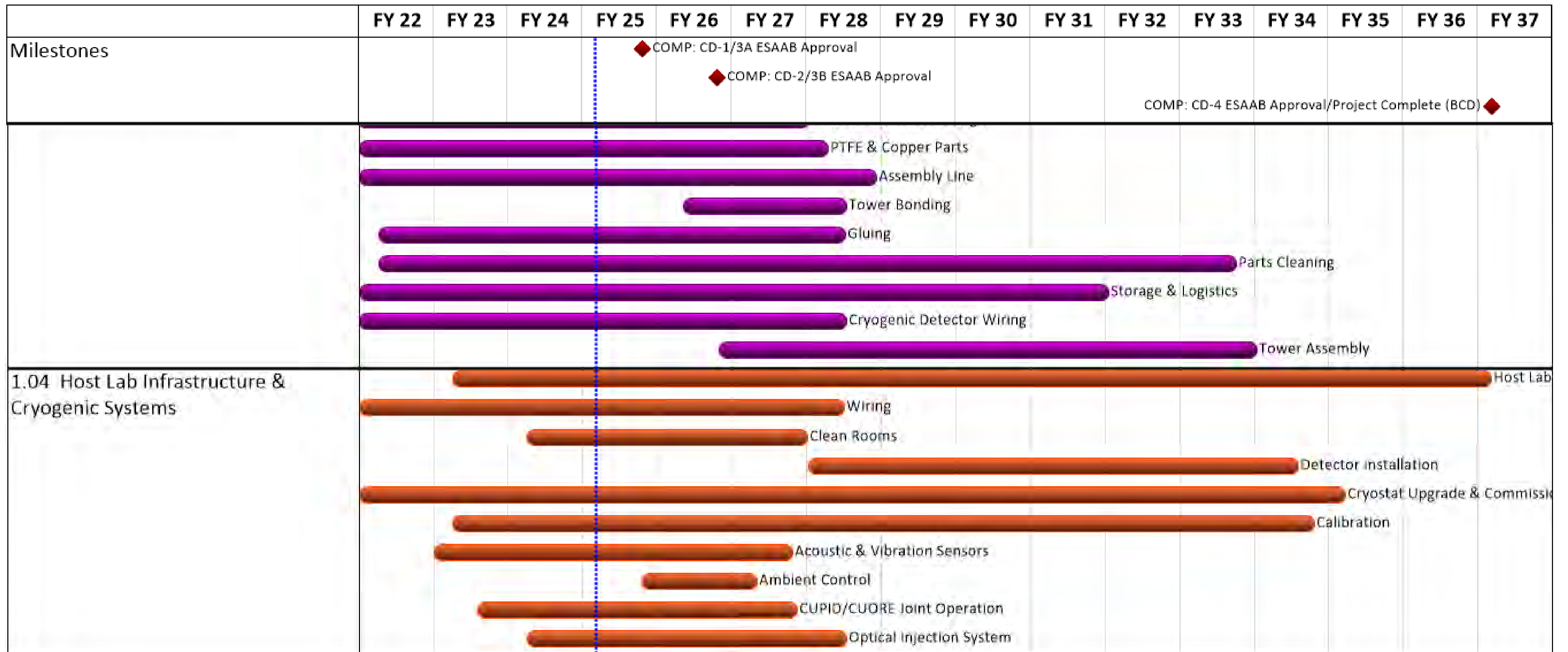
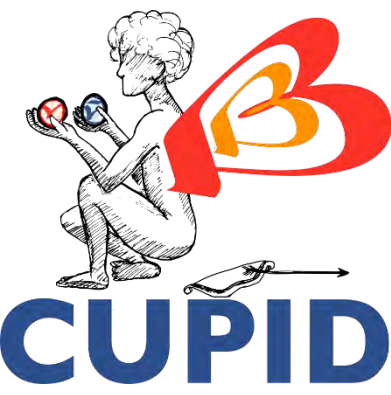


| WBS: CUPID_WM-1.1.00.03 Level 3 Milestones - Project Office | | | 10/01/2021 | 07/28/2036 |
|---|---|---------|------------|------------|
| CUPID_MS3_0100_C | COMP: CCVR Lab Complete | Phase 1 | | 10/01/2021 |
| CUPID_MS3_0010_C | COMP: CD-1/3A Director's Review Complete | Phase 1 | | 03/14/2025 |
| CUPID_MS3_0020_C | COMP: CD-2/3B Director's Review Complete | Phase 1 | | 03/16/2026 |
| CUPID_MS3_0070_C | COMP: Bessel + Digitizer Prototype Complete | Phase 1 | | 06/09/2026 |
| CUPID_MS3_0060_C | COMP: Subsystems CRRs Complete | Phase 1 | | 01/27/2027 |
| CUPID_MS3_0030_C | COMP: Radon System Complete | Phase 1 | | 02/03/2027 |
| CUPID_MS3_0050_C | COMP: Vibration Sensors Complete | Phase 1 | | 07/29/2027 |
| CUPID_MS3_0040_C | COMP: NTD Thermometer Complete | Phase 1 | | 10/12/2027 |
| CUPID_MS3_0110_C | COMP: Bessel + Digitizer Complete - Phase 1 | Phase 1 | | 11/03/2027 |
| CUPID_MS3_0080_K | COMP: KPP: Muon Veto Complete | Phase 1 | | 11/22/2027 |
| CUPID_MS3_0190_C | COMP: Slow Control & Monitoring Complete | Phase 1 | | 03/07/2028 |
| CUPID_MS3_0130_K | COMP: KPP: Computing and Data Storage Complete | Phase 1 | | 03/15/2028 |
| CUPID_MS3_0140_K | COMP: KPP: Data Throughput | Phase 1 | | 03/15/2028 |
| CUPID_MS3_0120_K | COMP: KPP: DAQ Complete | Phase 1 | | 12/17/2029 |
| CUPID_MS3_0220_K | COMP: KPP: Computing and Data Storage Complete | Phase 2 | | 08/27/2030 |
| CUPID_MS3_0230_K | COMP: KPP: Data Throughput | Phase 2 | | 08/27/2030 |
| CUPID_MS3_0240_C | COMP: Bessel + Digitizer Complete - Phase 2 | Phase 2 | | 01/21/2031 |
| CUPID_MS3_0090_C | COMP: NTDs for LMOs Complete | Phase 2 | | 06/11/2031 |
| CUPID_MS3_0150_K | COMP: KPP: US LDs Complete | Phase 2 | | 12/12/2031 |
| CUPID_MS3_0170_K | COMP: KPP: US CCVR Complete and Crystals Returned | Phase 2 | | 09/27/2033 |
| CUPID_MS3_0180_C | COMP: Tower Assembly Complete | Phase 2 | | 10/18/2033 |
| CUPID_MS3_0200_C | COMP: Calibration System Complete | Phase 2 | | 07/27/2034 |
| CUPID_MS3_0160_C | COMP: Pulser Board | Phase 2 | | 07/27/2034 |
| CUPID_MS3_0210_C | COMP: CD-4 Director's Review Complete | Phase 2 | | 07/28/2036 |

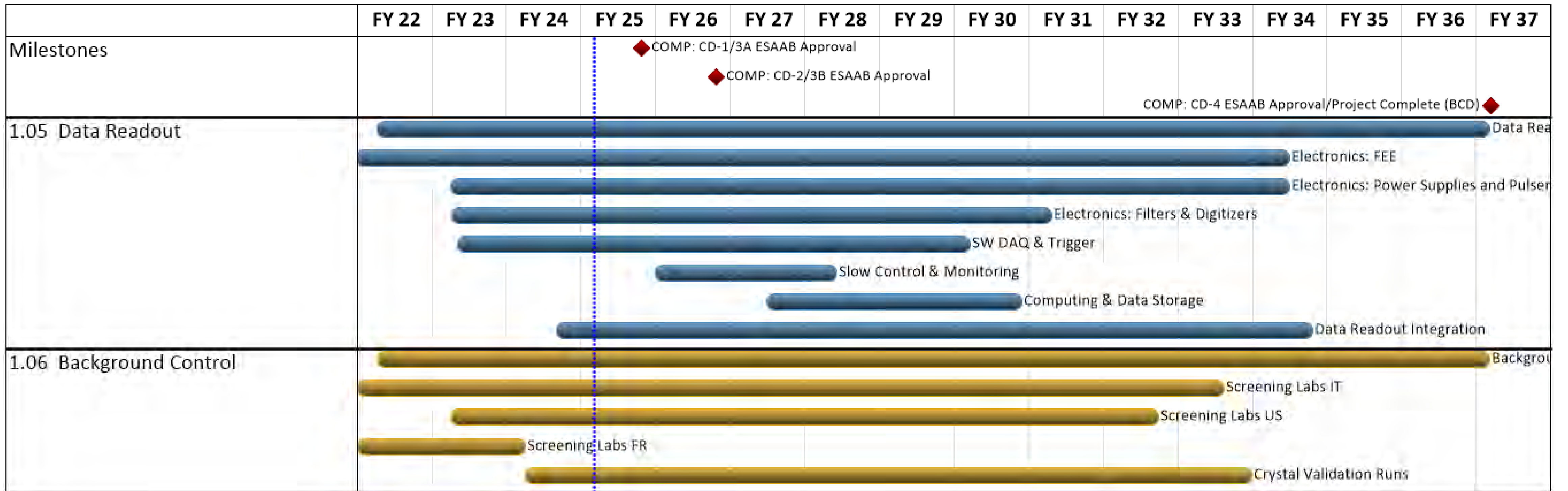
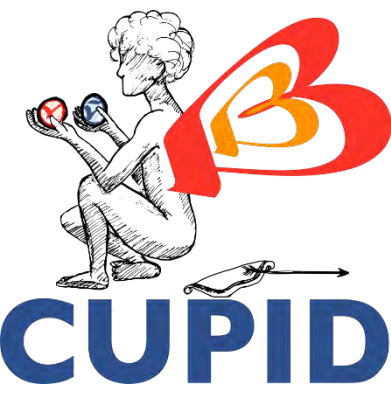
CUPID Schedule

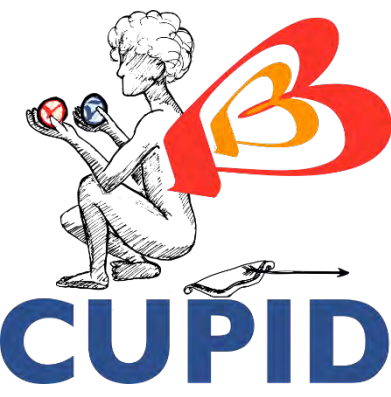


CUPID Schedule



CUPID Schedule

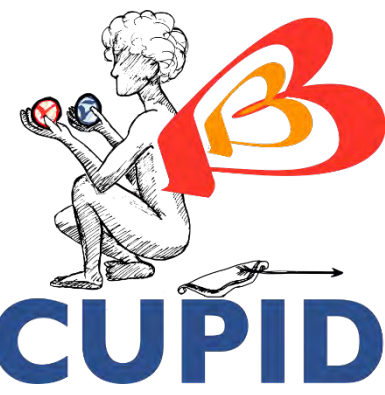




CUPID Critical Path

- The critical path is run by the 2 Phases and contains 194 activities.
- Phase 1 CR runs through:
 - NTD Ge Wafer Irradiation
 - Thermistor Production
 - LD & LMO NTD Testing
 - Tower Assembly (1-19)
 - Installation (1-19)
- Phase 2 CR runs through:
 - Main Boards (Procurement)
 - Power Supplies
 - Pulsers
 - Preamps
 - Calibration
 - Installation (20-57)
 - Full deployment
 - CD-4 Project Completion Review

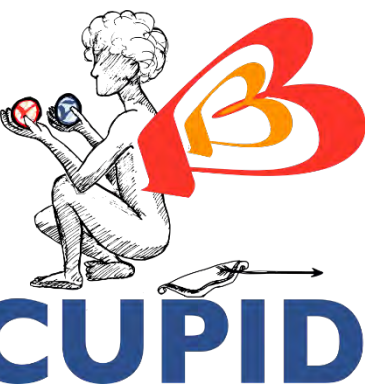
CUPID Critical Path



| CUPID-MASTER - Phased Deployment | | | | CUPID: Critical Path | | | | | 11/14/2024 15:34 | | | | | | | | | | | | | |
|----------------------------------|---------------------------------------|-------------------------------|------------------|---|------------------|-------------|-------------|------------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----|---|
| # | WBS Path | WBS Name | Activity ID | Activity Name | Planned Duration | Total Float | Start | Finish | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | 37 | |
| | | | | | | | | | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 1 | CUPID Task Grouping 1: Phase 1 | | | | 2173 | 0 | 11/25/2024 | 09/19/2033 | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 2 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125500_0030 | MITR Calibration Only Run: NAA of Materials for Safety Review | 10 | 0 | 11/25/2024* | 12/10/2024 | | | | | | | | | | | | | | |
| 3 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_370 | MITR Calibration Only Run: 2 cans, 6 hr irradiation max | 10 | 0 | 12/11/2024 | 01/02/2025 | | | | | | | | | | | | | | |
| 4 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_400 | MITR Calibration Only Run: Cooldown at MITR | 120 | 0 | 01/03/2025 | 06/24/2025 | | | | | | | | | | | | | | |
| 5 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_410 | MITR Calibration Only Run: Shipping & Handling from MITR to LBL | 10 | 0 | 06/25/2025 | 07/09/2025 | | | | | | | | | | | | | | |
| 6 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0200 | NAA of Materials for Safety Review | 5 | 0 | 07/10/2025 | 07/16/2025 | | | | | | | | | | | | | | |
| 7 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0210 | Calibration Run: 2 cans, 6 hr irradiation max | 10 | 0 | 07/17/2025 | 07/30/2025 | | | | | | | | | | | | | | |
| 8 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0220 | Initial Run: 4 cans, 48 hr irradiation | 5 | 0 | 07/31/2025 | 08/06/2025 | | | | | | | | | | | | | | |
| 9 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0230 | Additional Run: 2 cans, 6 hr irradiation max | 5 | 0 | 08/07/2025 | 08/13/2025 | | | | | | | | | | | | | | |
| 10 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0240 | Cooldown at MITR | 120 | 0 | 08/14/2025 | 02/12/2026 | | | | | | | | | | | | | | |
| 11 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0250 | Shipping & Handling from MITR to LBL | 10 | 0 | 02/13/2026 | 02/27/2026 | | | | | | | | | | | | | | |
| 12 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0260 | Production of Prototype Characterization Samples | 20 | 0 | 03/02/2026 | 03/27/2026 | | | | | | | | | | | | | | |
| 13 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0270 | Ship Prototype Samples to JHU and VT for Cold Testing | 20 | 0 | 03/30/2026 | 04/24/2026 | | | | | | | | | | | | | | |
| 14 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0280 | Cold Testing of Prototype Samples at JHU and VT | 10 | 0 | 04/27/2026 | 05/08/2026 | | | | | | | | | | | | | | |
| 15 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0300 | NTD Working Group & Decision Board for Top-Off Irradiation | 5 | 0 | 05/11/2026 | 05/15/2026 | | | | | | | | | | | | | | |
| 16 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0310 | Irradiation 2nd Batch NAA of Materials for Safety Review | 5 | 0 | 05/18/2026 | 05/22/2026 | | | | | | | | | | | | | | |
| 17 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0330 | Irradiation 2nd Batch Initial Run: 4 cans, 48 hr irradiation | 5 | 0 | 05/26/2026 | 06/01/2026 | | | | | | | | | | | | | | |
| 18 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0360 | Irradiation 2nd Batch Cooldown at MITR | 120 | 0 | 06/02/2026 | 11/18/2026 | | | | | | | | | | | | | | |
| 19 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0320 | Irradiation 2nd Batch Calibration Run: 2 cans, 6 hr irradiation max | 10 | 0 | 11/19/2026 | 12/04/2026 | | | | | | | | | | | | | | |
| 20 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0340 | Irradiation 2nd Batch Additional Run: 3 cans, 6 hr irradiation max | 5 | 0 | 12/07/2026 | 12/11/2026 | | | | | | | | | | | | | | |
| 21 | 1.02.05.05 | OPC: NTD Ge Wafer Irradiation | ODC_125900_0350 | Irradiation 2nd Batch Additional Run, 2 cans, 6 hr irradiation max | 5 | 0 | 12/14/2026 | 12/18/2026 | | | | | | | | | | | | | | |
| 22 | 1.02.05.01 | NTD Ge Wafer Irradiation | DC_125100_0110 | Irradiation 2nd Batch Shipping from MITR to LBNL | 10 | 0 | 12/21/2026 | 01/12/2027 | | | | | | | | | | | | | | |
| 23 | 1.02.05.01 | NTD Ge Wafer Irradiation | DC_125100_0120 | Irradiation 2nd Batch Production of Prototype Characterization Samples | 20 | 0 | 01/13/2027 | 02/10/2027 | | | | | | | | | | | | | | |
| 24 | 1.02.05.01 | NTD Ge Wafer Irradiation | DC_125100_0130 | Irradiation 2nd Batch Ship Prototype Samples to JHU and VT for Cold Testing | 20 | 0 | 02/11/2027 | 03/11/2027 | | | | | | | | | | | | | | |
| 25 | 1.02.05.01 | NTD Ge Wafer Irradiation | DC_125100_0140 | Irradiation 2nd Batch Cold Testing of Prototype Samples at JHU and VT | 10 | 0 | 03/12/2027 | 03/25/2027 | | | | | | | | | | | | | | |
| 26 | 1.02.05.03 | Thermistor Production | DC_125300_0170 | Set 1 Wafer 5 - Make Devices | 5 | 0 | 03/26/2027 | 04/01/2027 | | | | | | | | | | | | | | |
| 27 | 1.02.05.03 | Thermistor Production | DC_125300_0190 | Set 1 Wafer 5 Test | 10 | 0 | 04/02/2027 | 04/15/2027 | | | | | | | | | | | | | | |
| 28 | 1.02.05.03 | Thermistor Production | DC_125300_0200 | NTD Set Selection | 10 | 0 | 04/16/2027 | 04/29/2027 | | | | | | | | | | | | | | |
| 29 | 1.02.05.03 | Thermistor Production | DC_125300_0210 | Chosen Set Wafer for the Thermometer - Production | 20 | 0 | 04/30/2027 | 05/27/2027 | | | | | | | | | | | | | | |
| 30 | 1.02.05.03 | Thermistor Production | DC_125300_0230 | Batch 1: Chosen Set Wafer for the LMOs - Production | 36 | 0 | 05/28/2027 | 07/20/2027 | | | | | | | | | | | | | | |
| 31 | 1.02.05.03 | Thermistor Production | DC_125300_0250 | Batch 2: Chosen Set Wafer for the LMOs - Production | 36 | 0 | 07/21/2027 | 09/09/2027 | | | | | | | | | | | | | | |
| 32 | 1.02.05.03 | Thermistor Production | DC_125300_0270 | Batch 3: Chosen Set Wafer for the LMOs - Production | 36 | 0 | 09/10/2027 | 10/29/2027 | | | | | | | | | | | | | | |
| 33 | 1.02.05.03 | Thermistor Production | DC_125300_0290 | Batch 4: Chosen Set Wafer for the LMOs - Production | 36 | 0 | 11/01/2027 | 12/22/2027 | | | | | | | | | | | | | | |
| 34 | 1.02.05.03 | Thermistor Production | DC_125300_0310 | Batch 5: Chosen Set Wafer for the LMOs - Production | 36 | 0 | 12/23/2027 | 02/23/2028 | | | | | | | | | | | | | | |
| 35 | 1.02.05.03 | Thermistor Production | DC_125300_0330 | Batch 6: Chosen Set Wafer for the LMOs - Production | 36 | 0 | 02/24/2028 | 04/13/2028 | | | | | | | | | | | | | | |
| 36 | 1.02.05.04 | LD & LMO NTD Testing | DC_125400_1450 | Batch 6: LMO Testing at VT | 10 | 0 | 04/14/2028 | 04/27/2028 | | | | | | | | | | | | | | |
| 37 | 1.02.05.04 | LD & LMO NTD Testing | DC_125400_1470 | Batch 6: LMO Testing at UCLAB | 10 | 0 | 04/14/2028 | 04/27/2028 | | | | | | | | | | | | | | |
| 38 | 1.02.05.04 | LD & LMO NTD Testing | DC_125400_1490 | Batch 6: LMO Decision Point at VT | 5 | 0 | 04/28/2028 | 05/04/2028 | | | | | | | | | | | | | | |
| 39 | 1.02.05.04 | LD & LMO NTD Testing | DC_125400_1510 | Batch 6: LMO Decision Point at UCLAB | 5 | 0 | 04/28/2028 | 05/04/2028 | | | | | | | | | | | | | | |
| 40 | 1.02.05.04 | LD & LMO NTD Testing | DC_125400_1530 | Batch 6: LMO Shipping - VT | 20 | 0 | 05/05/2028 | 06/02/2028 | | | | | | | | | | | | | | |
| 41 | 1.02.05.04 | LD & LMO NTD Testing | DC_125400_1550 | Batch 6: LMO Shipping - UCLAB | 20 | 0 | 05/05/2028 | 06/02/2028 | | | | | | | | | | | | | | |
| 42 | 1.02.05.04 | LD & LMO NTD Testing | DC_125400_1565_A | AVAIL: LMO NTDs Phase1 available | 5 | 0 | 06/05/2028 | 06/09/2028 | | | | | | | | | | | | | | |
| 43 | 1.03.10.02 | Tower Assembly | DS_131020_0055 | Delay Tower Assembly Start - Phase1 | 260 | 0 | 06/12/2028 | 06/27/2029 | | | | | | | | | | | | | | |
| 44 | 1.03.10.02 | Tower Assembly | DS_131020_0100 | Assembly: Tower 1 | 5 | 0 | 06/28/2029 | 07/05/2029 | | | | | | | | | | | | | | |
| 45 | 1.03.10.02 | Tower Assembly | DS_131020_0070 | Labor for Tower Assembly - Phase 1 | 102 | 0 | 06/28/2029 | 11/20/2029 | | | | | | | | | | | | | | |
| 46 | 1.03.10.02 | Tower Assembly | DS_131020_0060 | Consumables for tower assembly | 102 | 0 | 06/28/2029 | 11/20/2029 | | | | | | | | | | | | | | |
| 47 | 1.03.10.02 | Tower Assembly | DS_131020_0080 | Labor for Tower Assembly Line and Storage Monitoring - Phase 1 | 102 | 0 | 06/28/2029 | 11/20/2029 | | | | | | | | | | | | | | |
| 48 | 1.03.10.02 | Tower Assembly | DS_131020_0110 | Assembly: Tower 2 | 5 | 0 | 07/06/2029 | 07/12/2029 | | | | | | | | | | | | | | |
| 49 | 1.03.10.02 | Tower Assembly | DS_131020_0120 | Assembly: Tower 3 | 5 | 0 | 07/13/2029 | 07/19/2029 | | | | | | | | | | | | | | |
| 50 | 1.03.10.02 | Tower Assembly | DS_131020_0130 | Assembly: Tower 4 | 5 | 0 | 07/20/2029 | 07/26/2029 | | | | | | | | | | | | | | |
| 51 | 1.03.10.02 | Tower Assembly | DS_131020_0140 | Assembly: Tower 5 | 5 | 0 | 07/27/2029 | 08/02/2029 | | | | | | | | | | | | | | |
| 52 | 1.03.10.02 | Tower Assembly | DS_131020_0160 | Assembly: Tower 6 | 5 | 0 | 08/03/2029 | 08/09/2029 | | | | | | | | | | | | | | |
| 53 | 1.03.10.02 | Tower Assembly | DS_131020_0170 | Assembly: Tower 7 | 5 | 0 | 08/10/2029 | 08/16/2029 | | | | | | | | | | | | | | |
| 54 | 1.03.10.02 | Tower Assembly | DS_131020_0180 | Assembly: Tower 8 | 5 | 0 | 08/17/2029 | 08/23/2029 | | | | | | | | | | | | | | |
| 55 | 1.03.10.02 | Tower Assembly | DS_131020_0190 | Assembly: Tower 9 | 5 | 0 | 08/24/2029 | 08/30/2029 | | | | | | | | | | | | | | |

Primary Baseline
 Remaining Work
 Baseline Milestone
 Actual Work
 Critical Remaining Work
 Milestone

CUPID Critical Path



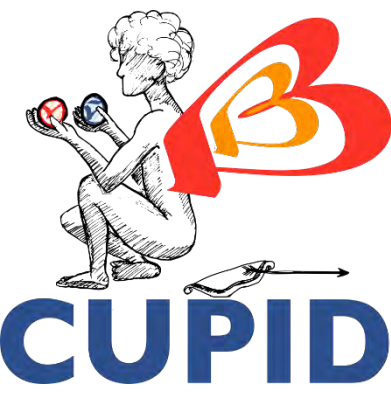
| CUPID-MASTER - Phased Deployment | | CUPID: Critical Path | | | | | | | | | | | 11/14/2024 15:34 | | | | | | | | |
|----------------------------------|------------|----------------------|--------------------|--|------------------|-------------|------------|------------|--------|--------|--------|--------|------------------|--------|--------|--------|--------|--------|--------|--------|----|
| # | WBS Path | WBS Name | Activity ID | Activity Name | Planned Duration | Total Float | Start | Finish | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | 37 |
| | | | | | | | | | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 111 | 1.05.02.02 | Main Boards | DR_152200_0250 | Main Boards - QC Completed - Phase 2 | 20 | 0 | 02/22/2033 | 03/21/2033 | | | | | | | | | | | | | |
| 112 | 1.05.02.01 | Preamps | PROC_152100_2050 | Procurement Reviews SOW & Docs - Procurement Boards for Phase 2 | 2 | 0 | 03/01/2033 | 03/02/2033 | | | | | | | | | | | | | |
| 113 | 1.05.02.01 | Preamps | PROC_152100_2070 | Issue RFP to sam.gov - Procurement Boards for Phase 2 | 1 | 0 | 03/03/2033 | 03/03/2033 | | | | | | | | | | | | | |
| 114 | 1.05.02.01 | Preamps | PROC_152100_2090 | Vendor Proposal Development - Procurement Boards for Phase 2 | 10 | 0 | 03/04/2033 | 03/17/2033 | | | | | | | | | | | | | |
| 115 | 1.05.03.02 | Power Supplies | DR_153200_4000 | AWARD: LPS - Procure Test Boards Phase 2 | 1 | 0 | 03/15/2033 | 03/15/2033 | | | | | | | | | | | | | |
| 116 | 1.05.03.02 | Power Supplies | DR_153200_4030 | Labor for LPS - Procure Test Boards Phase 2 | 200 | 0 | 03/15/2033 | 01/05/2034 | | | | | | | | | | | | | |
| 117 | 1.05.03.02 | Power Supplies | DR_153200_4020 | ACCEPT: LPS - Procure Test Boards Phase 2 | 200 | 0 | 03/15/2033 | 01/05/2034 | | | | | | | | | | | | | |
| 118 | 1.05.02.01 | Preamps | PROC_152100_2110 | Preliminary Bid Evaluation and Short List or Finalist Selection - Procurement Boards for | 5 | 0 | 03/18/2033 | 03/24/2033 | | | | | | | | | | | | | |
| 119 | 1.05.02.02 | Main Boards | DR_152200_0260 | Main Boards - Ship to LNGS - Phase 2 | 95 | 0 | 03/22/2033 | 08/04/2033 | | | | | | | | | | | | | |
| 120 | 1.05.02.01 | Preamps | PROC_152100_2130 | Write Subcontract and Supporting Documents - Procurement Boards for Phase 2 | 5 | 0 | 03/25/2033 | 03/31/2033 | | | | | | | | | | | | | |
| 121 | 1.05.02.01 | Preamps | PROC_152100_2150 | AWARD: Procurement Boards for Phase 2 | 1 | 0 | 04/01/2033 | 04/01/2033 | | | | | | | | | | | | | |
| 122 | 1.05.02.01 | Preamps | PROC_152100_2170 | Vendor Lead Time - Procurement Boards for Phase 2 | 84 | 0 | 04/04/2033 | 08/02/2033 | | | | | | | | | | | | | |
| 123 | 1.05.03.01 | Pulsers | DR_153100_0450 | Pulser Board - QC on Production - Phase 2 | 30 | 0 | 06/30/2033 | 08/11/2033 | | | | | | | | | | | | | |
| 124 | 1.05.02.01 | Preamps | PROC_152100_2190 | QA: - Procurement Boards for Phase 2 | 1 | 0 | 08/03/2033 | 08/03/2033 | | | | | | | | | | | | | |
| 125 | 1.05.02.01 | Preamps | PROC_152100_2200 | ACCEPT: Procurement Boards for Phase 2 | 1 | 0 | 08/04/2033 | 08/04/2033 | | | | | | | | | | | | | |
| 126 | 1.05.02.01 | Preamps | DR_152100_2100 | Preamps - Integrate to Main Board for Phase 2 | 40 | 0 | 08/05/2033 | 09/30/2033 | | | | | | | | | | | | | |
| 127 | 1.05.03.01 | Pulsers | DR_153100_0480 | ACCEPT: Pulser Board - Ship to LNGS | 35 | 0 | 08/12/2033 | 09/30/2033 | | | | | | | | | | | | | |
| 128 | 1.05.03.01 | Pulsers | DR_153100_0470 | AWARD: Pulser Board - Ship to LNGS | 1 | 0 | 08/12/2033 | 08/12/2033 | | | | | | | | | | | | | |
| 129 | 1.04.05.10 | Full deployment | IS_144200_1010 | CUORE warm-up full deployment | 45 | 0 | 09/20/2033 | 11/21/2033 | | | | | | | | | | | | | |
| 130 | 1.05.02.01 | Preamps | DR_152100_2110 | Preamps - Characterize T. Drift for Phase2 | 120 | 0 | 10/03/2033 | 04/03/2034 | | | | | | | | | | | | | |
| 131 | 1.05.03.01 | Pulsers | DR_153100_0485 | Pulser Board - Test and Calibration - Phase 2 | 120 | 0 | 10/03/2033 | 04/03/2034 | | | | | | | | | | | | | |
| 132 | 1.04.05.10 | Full deployment | IS_144200_1020 | Complete cryostat opening full deployment | 26 | 0 | 11/22/2033 | 01/09/2034 | | | | | | | | | | | | | |
| 133 | 1.05.03.02 | Power Supplies | DR_153200_4040 | LPS - Test Production Phase 2 | 60 | 0 | 01/06/2034 | 04/03/2034 | | | | | | | | | | | | | |
| 134 | 1.05.03.02 | Power Supplies | DR_153200_4050 | LPS - Test Firmware Phase 2 | 60 | 0 | 01/06/2034 | 04/03/2034 | | | | | | | | | | | | | |
| 135 | 1.04.05.10 | Full deployment | IS_144200_1030 | Installation of CR6 full deployment | 20 | 0 | 01/10/2034 | 02/07/2034 | | | | | | | | | | | | | |
| 136 | 1.04.06.01 | Calibration | IS_146100_0160 | ACCEPT: Production of the Sources at LNL | 126 | 0 | 01/20/2034 | 07/20/2034 | | | | | | | | | | | | | |
| 137 | 1.04.06.01 | Calibration | IS_146100_0170 | Labor for ACCEPT: Production of the Sources at LNL | 126 | 0 | 01/20/2034 | 07/20/2034 | | | | | | | | | | | | | |
| 138 | 1.04.05.10 | Full deployment | IS_144200_1040 | Opening 10 mK full deployment | 5 | 0 | 02/08/2034 | 02/14/2034 | | | | | | | | | | | | | |
| 139 | 1.04.04.02 | Installation | IS_144200_1100_R10 | REQD: cryostat ready for full deployment | 5 | 0 | 02/15/2034 | 02/22/2034 | | | | | | | | | | | | | |
| 140 | 1.04.04.02 | Installation | IS_144200_1250 | Installation; Tower 20 | 1 | 0 | 02/23/2034 | 02/23/2034 | | | | | | | | | | | | | |
| 141 | 1.04.04.02 | Installation | IS_144200_1260 | Installation; Tower 21 | 1 | 0 | 02/24/2034 | 02/24/2034 | | | | | | | | | | | | | |
| 142 | 1.04.04.02 | Installation | IS_144200_1270 | Installation; Tower 22 | 1 | 0 | 02/27/2034 | 02/27/2034 | | | | | | | | | | | | | |
| 143 | 1.04.04.02 | Installation | IS_144200_1280 | Installation; Tower 23 | 1 | 0 | 02/28/2034 | 02/28/2034 | | | | | | | | | | | | | |
| 144 | 1.04.04.02 | Installation | IS_144200_1290 | Installation; Tower 24 | 1 | 0 | 03/01/2034 | 03/01/2034 | | | | | | | | | | | | | |
| 145 | 1.04.04.02 | Installation | IS_144200_1300 | Installation; Tower 25 | 1 | 0 | 03/02/2034 | 03/02/2034 | | | | | | | | | | | | | |
| 146 | 1.04.04.02 | Installation | IS_144200_1310 | Installation; Tower 26 | 1 | 0 | 03/03/2034 | 03/03/2034 | | | | | | | | | | | | | |
| 147 | 1.04.04.02 | Installation | IS_144200_1320 | Installation; Tower 27 | 1 | 0 | 03/06/2034 | 03/06/2034 | | | | | | | | | | | | | |
| 148 | 1.04.04.02 | Installation | IS_144200_1330 | Installation; Tower 28 | 1 | 0 | 03/07/2034 | 03/07/2034 | | | | | | | | | | | | | |
| 149 | 1.04.04.02 | Installation | IS_144200_1340 | Installation; Tower 29 | 1 | 0 | 03/08/2034 | 03/08/2034 | | | | | | | | | | | | | |
| 150 | 1.04.04.02 | Installation | IS_144200_1350 | Installation; Tower 30 | 1 | 0 | 03/09/2034 | 03/09/2034 | | | | | | | | | | | | | |
| 151 | 1.04.04.02 | Installation | IS_144200_1360 | Installation; Tower 31 | 1 | 0 | 03/10/2034 | 03/10/2034 | | | | | | | | | | | | | |
| 152 | 1.04.04.02 | Installation | IS_144200_1370 | Installation; Tower 32 | 1 | 0 | 03/13/2034 | 03/13/2034 | | | | | | | | | | | | | |
| 153 | 1.04.04.02 | Installation | IS_144200_1380 | Installation; Tower 33 | 1 | 0 | 03/14/2034 | 03/14/2034 | | | | | | | | | | | | | |
| 154 | 1.04.04.02 | Installation | IS_144200_1390 | Installation; Tower 34 | 1 | 0 | 03/15/2034 | 03/15/2034 | | | | | | | | | | | | | |
| 155 | 1.04.04.02 | Installation | IS_144200_1400 | Installation; Tower 35 | 1 | 0 | 03/16/2034 | 03/16/2034 | | | | | | | | | | | | | |
| 156 | 1.04.04.02 | Installation | IS_144200_1410 | Installation; Tower 36 | 1 | 0 | 03/17/2034 | 03/17/2034 | | | | | | | | | | | | | |
| 157 | 1.04.04.02 | Installation | IS_144200_1420 | Installation; Tower 37 | 1 | 0 | 03/20/2034 | 03/20/2034 | | | | | | | | | | | | | |
| 158 | 1.04.04.02 | Installation | IS_144200_1430 | Installation; Tower 38 | 1 | 0 | 03/21/2034 | 03/21/2034 | | | | | | | | | | | | | |
| 159 | 1.04.04.02 | Installation | IS_144200_1440 | Installation; Tower 39 | 1 | 0 | 03/22/2034 | 03/22/2034 | | | | | | | | | | | | | |
| 160 | 1.04.04.02 | Installation | IS_144200_1450 | Installation; Tower 40 | 1 | 0 | 03/23/2034 | 03/23/2034 | | | | | | | | | | | | | |
| 161 | 1.04.04.02 | Installation | IS_144200_1460 | Installation; Tower 41 | 1 | 0 | 03/24/2034 | 03/24/2034 | | | | | | | | | | | | | |
| 162 | 1.04.04.02 | Installation | IS_144200_1470 | Installation; Tower 42 | 1 | 0 | 03/27/2034 | 03/27/2034 | | | | | | | | | | | | | |
| 163 | 1.04.04.02 | Installation | IS_144200_1480 | Installation; Tower 43 | 1 | 0 | 03/28/2034 | 03/28/2034 | | | | | | | | | | | | | |
| 164 | 1.04.04.02 | Installation | IS_144200_1490 | Installation; Tower 44 | 1 | 0 | 03/29/2034 | 03/29/2034 | | | | | | | | | | | | | |
| 165 | 1.04.04.02 | Installation | IS_144200_1500 | Installation; Tower 45 | 1 | 0 | 03/30/2034 | 03/30/2034 | | | | | | | | | | | | | |

■ Primary Baseline
 ■ Remaining Work
 ■ Actual Work
 ■ Critical Remaining Work
 ◆ Baseline Milestone
 ◆ Milestone

TASK filters: Activity Type- Task Dep, Critical.

Data Date: 01/01/2021

CUPID Critical Path

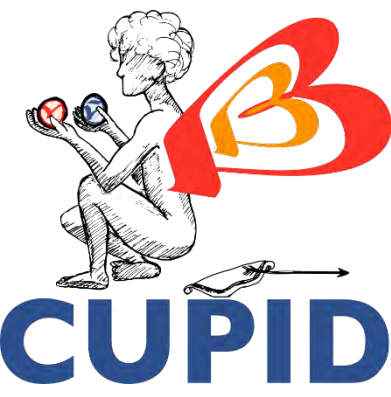


| CUPID-MASTER - Phased Deployment | | | | | CUPID: Critical Path | | | | | | | | | | 11/14/2024 15:34 | | | | | | |
|----------------------------------|------------|--------------------------------|----------------|--|----------------------|-------------|------------|------------|--------|--------|--------|--------|--------|--------|------------------|--------|--------|--------|--------|--------|----|
| # | WBS Path | WBS Name | Activity ID | Activity Name | Planned Duration | Total Float | Start | Finish | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | 37 |
| | | | | | | | | | F | F | F | F | F | F | F | F | F | F | F | F | F |
| 166 | 1.04.04.02 | Installation | IS_144200_1510 | Installation; Tower 46 | 1 | 0 | 03/31/2034 | 03/31/2034 | | | | | | | | | | | | | |
| 167 | 1.04.04.02 | Installation | IS_144200_1520 | Installation; Tower 47 | 1 | 0 | 04/03/2034 | 04/03/2034 | | | | | | | | | | | | | |
| 168 | 1.05.08.01 | Data Readout Integration | DR_158100_0210 | Readout Integration and Test - Phase 2 | 40 | 0 | 04/04/2034 | 05/30/2034 | | | | | | | | | | | | | |
| 169 | 1.04.04.02 | Installation | IS_144200_1530 | Installation; Tower 48 | 1 | 0 | 04/04/2034 | 04/04/2034 | | | | | | | | | | | | | |
| 170 | 1.04.04.02 | Installation | IS_144200_1540 | Installation; Tower 49 | 1 | 0 | 04/05/2034 | 04/05/2034 | | | | | | | | | | | | | |
| 171 | 1.04.04.02 | Installation | IS_144200_1550 | Installation; Tower 50 | 1 | 0 | 04/06/2034 | 04/06/2034 | | | | | | | | | | | | | |
| 172 | 1.04.04.02 | Installation | IS_144200_1560 | Installation; Tower 51 | 1 | 0 | 04/07/2034 | 04/07/2034 | | | | | | | | | | | | | |
| 173 | 1.04.04.02 | Installation | IS_144200_1570 | Installation; Tower 52 | 1 | 0 | 04/10/2034 | 04/10/2034 | | | | | | | | | | | | | |
| 174 | 1.04.04.02 | Installation | IS_144200_1580 | Installation; Tower 53 | 1 | 0 | 04/11/2034 | 04/11/2034 | | | | | | | | | | | | | |
| 175 | 1.04.04.02 | Installation | IS_144200_1590 | Installation; Tower 54 | 1 | 0 | 04/12/2034 | 04/12/2034 | | | | | | | | | | | | | |
| 176 | 1.04.04.02 | Installation | IS_144200_1600 | Installation; Tower 55 | 1 | 0 | 04/13/2034 | 04/13/2034 | | | | | | | | | | | | | |
| 177 | 1.04.04.02 | Installation | IS_144200_1610 | Installation; Tower 56 | 1 | 0 | 04/14/2034 | 04/14/2034 | | | | | | | | | | | | | |
| 178 | 1.04.04.02 | Installation | IS_144200_1620 | Installation; Tower 57 | 1 | 0 | 04/17/2034 | 04/17/2034 | | | | | | | | | | | | | |
| 179 | 1.04.04.02 | Installation | IS_144200_1630 | Tower Installation Contingency | 10 | 0 | 04/18/2034 | 05/01/2034 | | | | | | | | | | | | | |
| 180 | 1.04.04.02 | Installation | IS_144200_1640 | 10 mK Vessel Sectors Preparation | 5 | 0 | 05/02/2034 | 05/08/2034 | | | | | | | | | | | | | |
| 181 | 1.04.05.10 | Full deployment | IS_144200_1660 | Radon-free CR dismounting | 5 | 0 | 05/09/2034 | 05/15/2034 | | | | | | | | | | | | | |
| 182 | 1.04.05.10 | Full deployment | IS_144200_1670 | Thermal shields closure | 15 | 0 | 05/16/2034 | 06/06/2034 | | | | | | | | | | | | | |
| 183 | 1.05.08.01 | Data Readout Integration | DR_158100_0220 | Readout Installation - Phase 2 | 40 | 0 | 05/31/2034 | 07/27/2034 | | | | | | | | | | | | | |
| 184 | 1.04.05.10 | Full deployment | IS_144200_1680 | Full CUPID Detector Cooldown | 30 | 0 | 06/07/2034 | 07/20/2034 | | | | | | | | | | | | | |
| 185 | 1.04.06.01 | Calibration | IS_146100_0210 | Labor for ACCEPT: Shipment of sources from LNL | 5 | 0 | 07/21/2034 | 07/27/2034 | | | | | | | | | | | | | |
| 186 | 1.04.06.01 | Calibration | IS_146100_0200 | ACCEPT: Shipment of sources from LNL | 5 | 0 | 07/21/2034 | 07/27/2034 | | | | | | | | | | | | | |
| 187 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0010 | Preparations for CD-4 EF Director's Review | 30 | 0 | 06/06/2036 | 07/21/2036 | | | | | | | | | | | | | |
| 188 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0020 | CD-4 Director's Review | 5 | 0 | 07/22/2036 | 07/28/2036 | | | | | | | | | | | | | |
| 189 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0110 | CD-4 Director's Review Auditor Travel | 5 | 0 | 07/22/2036 | 07/28/2036 | | | | | | | | | | | | | |
| 190 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0030 | Respond to CD-4 Director's Review | 20 | 0 | 07/29/2036 | 08/25/2036 | | | | | | | | | | | | | |
| 191 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0040 | Prepare for CD-4 IPR Documents for Reviewers | 20 | 0 | 07/29/2036 | 08/25/2036 | | | | | | | | | | | | | |
| 192 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0070 | CD-4 OPA IPR Review | 3 | 0 | 09/10/2036 | 09/12/2036 | | | | | | | | | | | | | |
| 193 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0120 | CD-4 OPA IPR Review Auditor Travel | 3 | 0 | 09/10/2036 | 09/12/2036 | | | | | | | | | | | | | |
| 194 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0080 | Respond to CD-4 OPA IPR Review | 20 | 0 | 09/15/2036 | 10/10/2036 | | | | | | | | | | | | | |
| 195 | 1.01.01.04 | CD-4 Project Completion Review | PM_111400_0090 | DOE ESAAB Approval Process Time | 40 | 0 | 10/13/2036 | 12/09/2036 | | | | | | | | | | | | | |

— Primary Baseline
 — Remaining Work
 — Actual Work
 — Critical Remaining Work
 ◆ Baseline Milestone
 ◆ Milestone

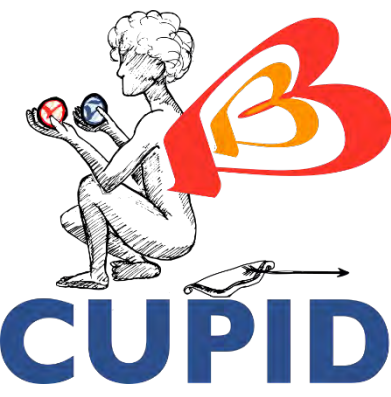
TASK filters: Activity Type- Task Dep, Critical.

Data Date: 01/01/2021



Cost Assumptions

- Base year cost estimates for Labor and Non-labor begin in FY2023
- Rates and Escalation collected from each contributing institution
 - Escalation varies from 3.0%-11.4%
- Cobra applies all escalation and indirect taxes
- Performance Measurement Baseline is maintained in Cobra and is the official source for all cost and EV data
- COBRA rate build-up validated by Office of Chief Financial Officer
- US calculates labor costs, whereas Italy and France do not



CUPID BOE Type Allocation

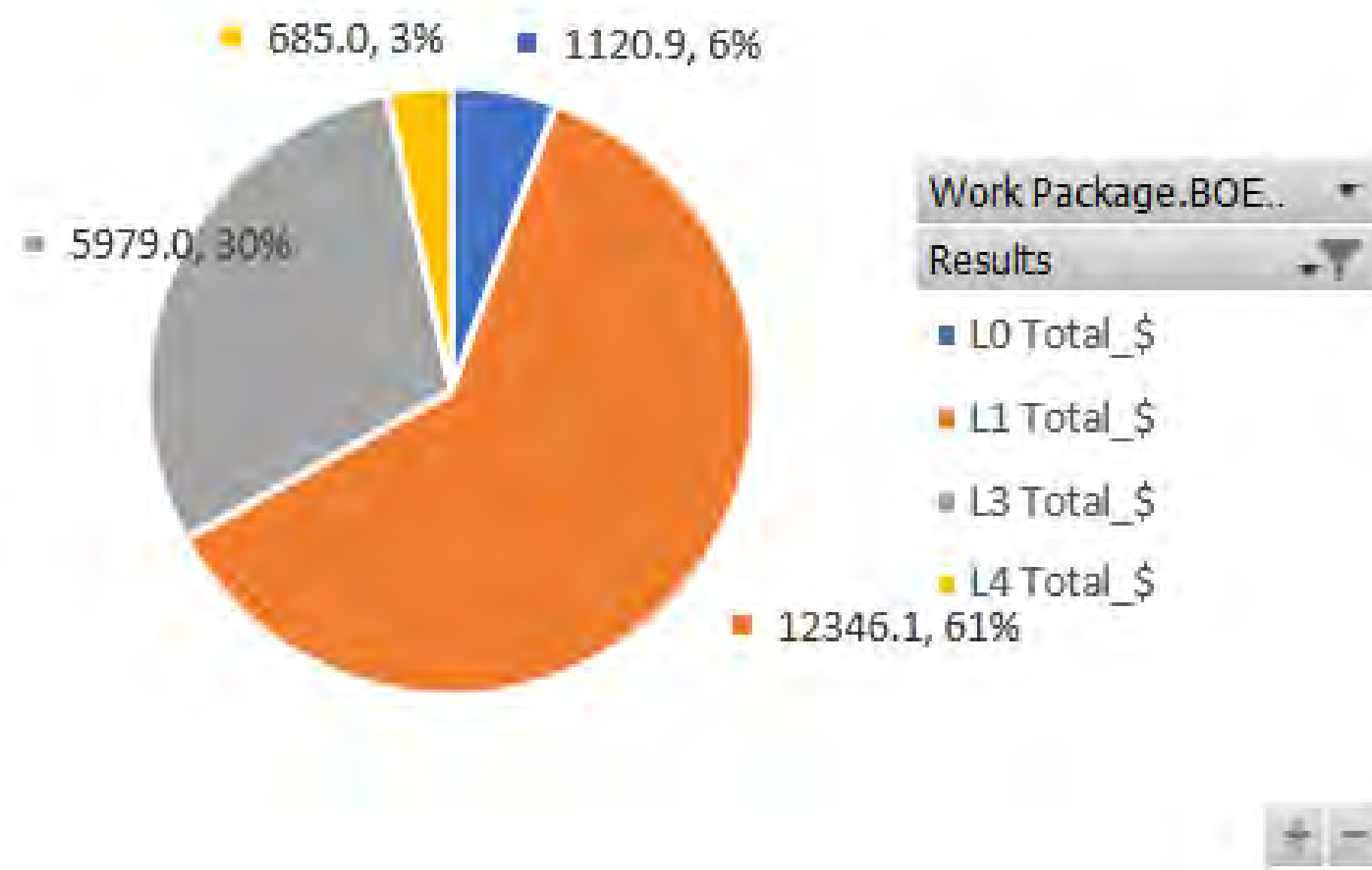
| Control Account | Work Package. BOE Type | Estimate Uncertainty | CAM |
|-----------------|------------------------|----------------------|------------|
| 1.01.02.03 | L0 | 1.00 | Fujikawa_B |
| 1.02.04.02 | L0 | 1.00 | Winslow_L |
| 1.05.01.02 | L0 | 1.00 | Welliver_B |
| 1.02.01.01 | L1 | 1.15 | Winslow_L |
| 1.06.01.02 | L1 | 1.15 | ODonnell_T |
| 1.04.06.01 | L3 | 1.25 | Fujikawa_B |
| 1.05.04.01 | L3 | 1.25 | Welliver_B |
| 1.02.04.01 | M0 | 1.00 | Winslow_L |
| 1.05.07 | M0 | 1.00 | Welliver_B |
| 1.02.04.01 | M2 | 1.15 | Winslow_L |
| 1.06.03.01 | M2 | 1.15 | ODonnell_T |
| 1.04.06.02 | M3 | 1.25 | Fujikawa_B |
| 1.06.03.02 | M3 | 1.25 | ODonnell_T |
| 1.02.04.01 | M4 | 1.30 | Winslow_L |
| 1.05.04.01 | M4 | 1.30 | Welliver_B |
| 1.06.05.02 | M4 | 1.30 | ODonnell_T |
| 1.02.08 | M7 | 1.25 | Fujikawa_B |
| 1.03.01.01 | T1 | 1.20 | Fujikawa_B |
| 1.05.01.01 | T1 | 1.20 | Welliver_B |
| 1.06.01.01 | T1 | 1.20 | ODonnell_T |

- L2s and L3s assigned BOE Estimate type against all resource loaded activity in P6
- The Contingency % is then applied against the total cost estimate of each activity to derive bottom-up contingency estimates.

| CUPID BOE Type & Estimate Uncertainty | | |
|---------------------------------------|---|----------------------------|
| Code | Estimate Type | Estimate Uncertainty Value |
| L0 | No Contingency | 1.00 |
| L1 | Level of Effort | 1.15 |
| L2 | Standard Activity | 1.15 |
| L3 | Similar Design Done | 1.25 |
| L4 | Conventional Design | 1.30 |
| L5 | Conceptual Design | 1.40 |
| L6 | Not Defined Yet | 1.80 |
| M0 | No Contingency | 1.00 |
| M1 | Recent Firm Quotes (<1yr) | 1.15 |
| M2 | Firm Quote (sole or <2yr) | 1.15 |
| M3 | Budgetary Quote | 1.25 |
| M4 | Conceptual Design | 1.30 |
| M5 | Novel Fabrication | 1.40 |
| M6 | Preconceptual Design | 1.80 |
| M7 | Recent Firm Quotes (<1yr); Foreign | 1.25 |
| M8 | Firm Quote (sole or <2yr); Foreign | 1.25 |
| M9 | Preliminary Design; Foreign | 1.35 |
| T1 | Standard contingency level for all travel | 1.20 |

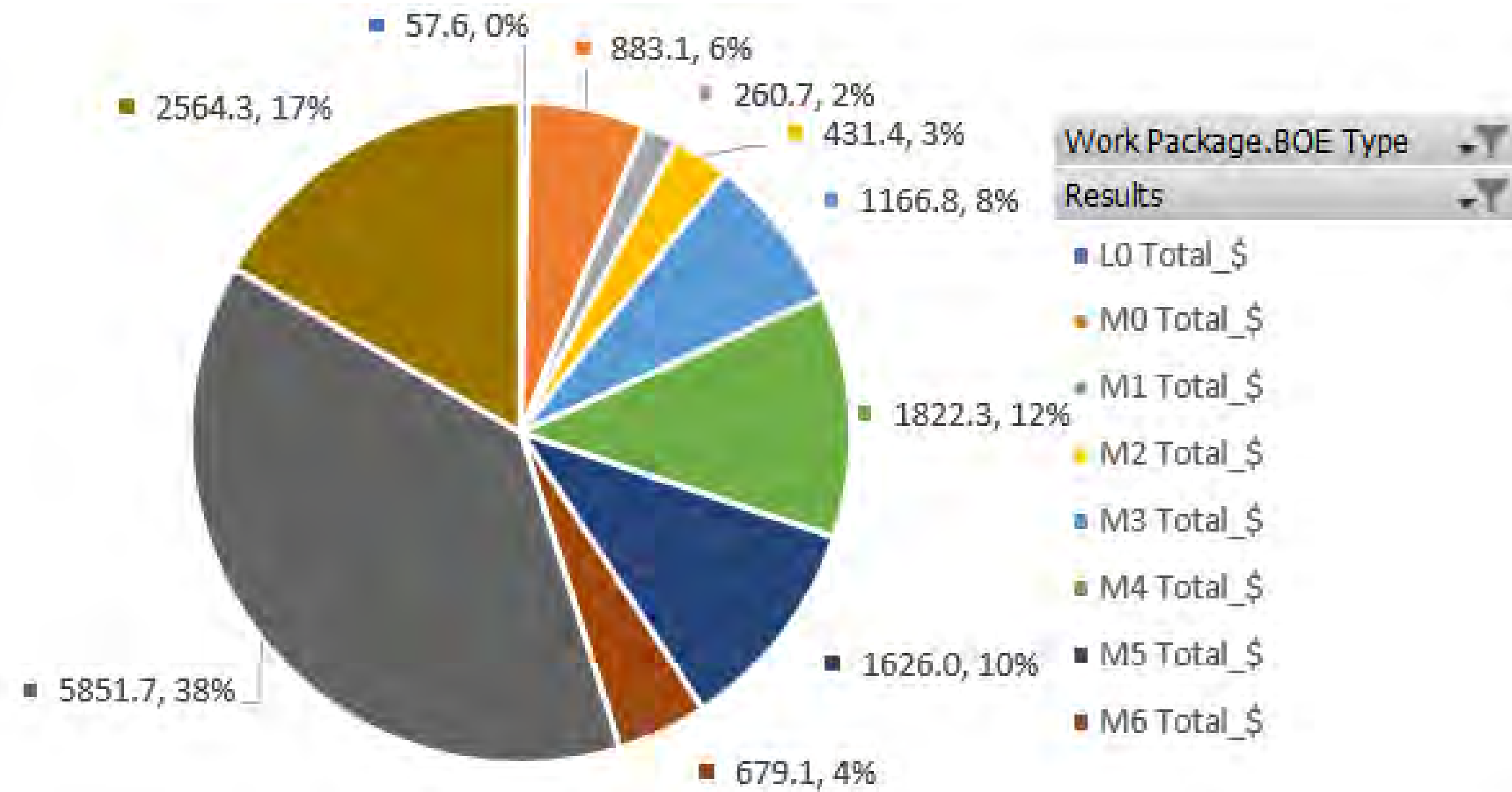
* BOE list by CA is an example and not comprehensive

BOE Types – Labor

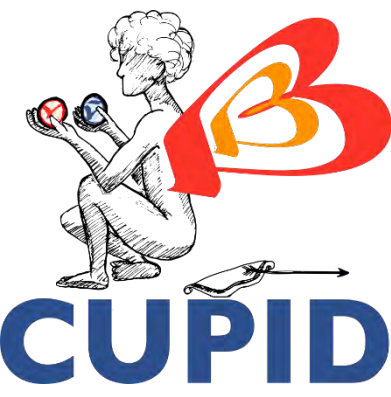


| CUPID BOE Type & Estimate Uncertainty | | |
|---------------------------------------|---------------------|----------------------------|
| Code | Estimate Type | Estimate Uncertainty Value |
| L0 | No Contingency | 1.00 |
| L1 | Level of Effort | 1.15 |
| L2 | Standard Activity | 1.15 |
| L3 | Similar Design Done | 1.25 |
| L4 | Conventional Design | 1.30 |
| L5 | Conceptual Design | 1.40 |
| L6 | Not Defined Yet | 1.80 |

BOE Types – Nonlabor



| CUPID BOE Type & Estimate Uncertainty | | |
|---------------------------------------|---|----------------------------|
| Code | Estimate Type | Estimate Uncertainty Value |
| M0 | No Contingency | 1.00 |
| M1 | Recent Firm Quotes (<1yr) | 1.15 |
| M2 | Firm Quote (sole or <2yr) | 1.15 |
| M3 | Budgetary Quote | 1.25 |
| M4 | Conceptual Design | 1.30 |
| M5 | Novel Fabrication | 1.40 |
| M6 | Preconceptual Design | 1.80 |
| M7 | Recent Firm Quotes (<1yr); Foreign | 1.25 |
| M8 | Firm Quote (sole or <2yr); Foreign | 1.25 |
| M9 | Preliminary Design; Foreign | 1.35 |
| T1 | Standard contingency level for all travel | 1.20 |

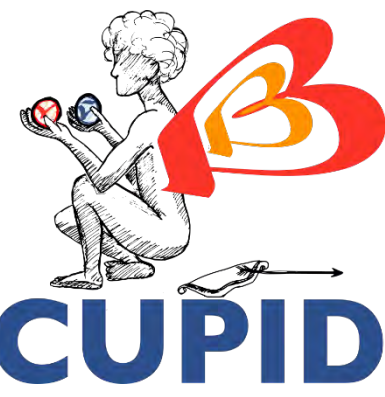


Budget Summary by Country (in k)

| Sum of Value | Total_ \$ Total | ⊕ Contingency |
|--------------------|-----------------|----------------|
| Row Labels | | |
| [-] US | 33885.4 | 41314.6 |
| ⊕ Phase 1 | 20487.0 | 25086.4 |
| ⊕ Phase 2 | 13398.4 | 16228.2 |
| [-] IT | 37982.4 | 39856.9 |
| ⊕ Phase 1 | 15342.6 | 16065.1 |
| ⊕ Phase 2 | 22639.8 | 23791.8 |
| [-] FR | 3547.6 | 3646.6 |
| ⊕ Phase 1 | 3141.0 | 3223.5 |
| ⊕ Phase 2 | 406.6 | 423.2 |
| Grand Total | 75415.4 | 84818.1 |

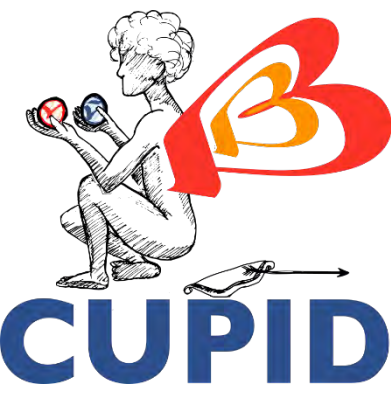
| Sum of Value | Column Labels |
|--------------------|---------------|
| Row Labels | HOURS |
| ⊕ US | 160.8 |
| ⊕ IT | 114.2 |
| ⊕ FR | 31.2 |
| Grand Total | 306.2 |

- US costs are fully burdened and contingency is calculated at the activity level
- US utilizes off project effort and captures those hours in an uncosted resource
- IT and FR do not track labor in the same way the US does and all labor is uncosted
- IT and FR costs only contain contingency for a few large procurements



FY Budget Summary by Country (in \$k)

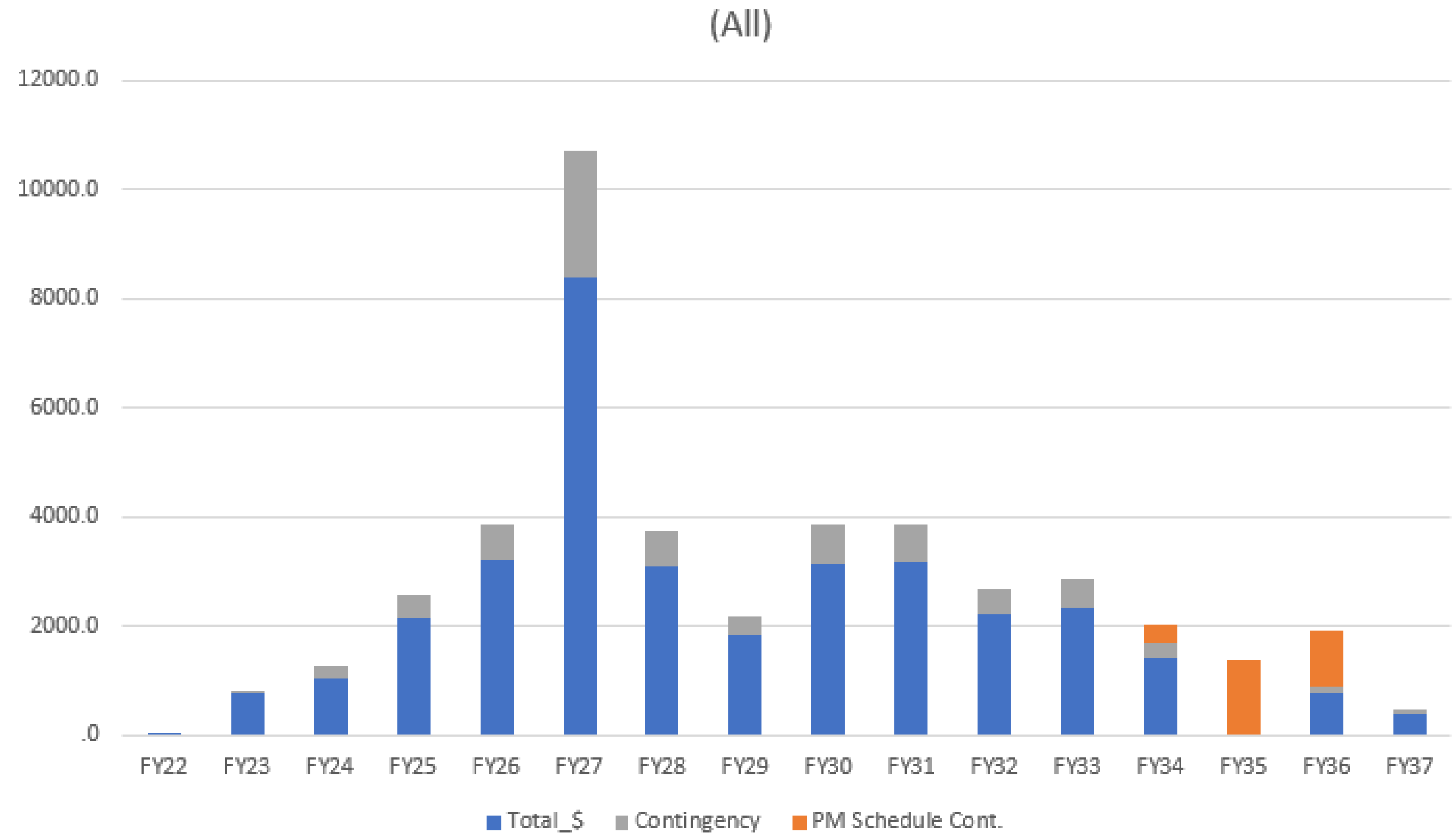
| Sum of Value | Column Labels | | | | | | | | | | | | | | | | Total_ \$ Total | Contingency |
|--------------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|---------------|---------------|----------------|---------------|---------------|---------------|-----------|--------------|--------------|-----------------|----------------|
| Row Labels | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | FY33 | FY34 | FY35 | FY36 | FY37 | Total_ \$ Total | Contingency |
| US | 28.6 | 784.0 | 1033.7 | 2156.2 | 3199.4 | 8379.5 | 3075.0 | 1843.3 | 3132.1 | 3163.8 | 2212.7 | 2313.2 | 1426.5 | .6 | 751.2 | 385.4 | 33885.4 | 41314.6 |
| Phase 1 | 28.6 | 784.0 | 1033.7 | 2156.2 | 3199.4 | 8379.5 | 3075.0 | 1781.6 | 15.0 | 34.0 | | | | | | | 20487.0 | 25086.4 |
| Phase 2 | | | | | | | | 61.7 | 3117.1 | 3129.8 | 2212.7 | 2313.2 | 1426.5 | .6 | 751.2 | 385.4 | 13398.4 | 16228.2 |
| IT | 476.4 | 482.0 | 707.4 | 924.3 | 765.5 | 4038.5 | 7416.5 | 426.2 | 6463.7 | 9590.8 | 6233.4 | 276.3 | 181.5 | | | | 37982.4 | 39856.9 |
| Phase 1 | 476.4 | 482.0 | 707.4 | 924.3 | 765.5 | 4038.5 | 7416.5 | 426.2 | 69.6 | 36.3 | | | | | | | 15342.6 | 16065.1 |
| Phase 2 | | | | | | | | | 6394.1 | 9554.5 | 6233.4 | 276.3 | 181.5 | | | | 22639.8 | 23791.8 |
| FR | 101.1 | 60.0 | 675.1 | 1108.4 | 265.0 | 537.7 | 393.6 | 2.0 | 169.0 | 5.0 | | 198.8 | 31.9 | | | | 3547.6 | 3646.6 |
| Phase 1 | 101.1 | 60.0 | 675.1 | 1108.4 | 265.0 | 537.7 | 393.6 | | | | | | | | | | 3141.0 | 3223.5 |
| Phase 2 | | | | | | | | 2.0 | 169.0 | 5.0 | | 198.8 | 31.9 | | | | 406.6 | 423.2 |
| Grand Total | 606.1 | 1326.0 | 2416.2 | 4188.9 | 4229.9 | 12955.8 | 10885.1 | 2271.6 | 9764.8 | 12759.5 | 8446.2 | 2788.3 | 1639.9 | .6 | 751.2 | 385.4 | 75415.4 | 84818.1 |



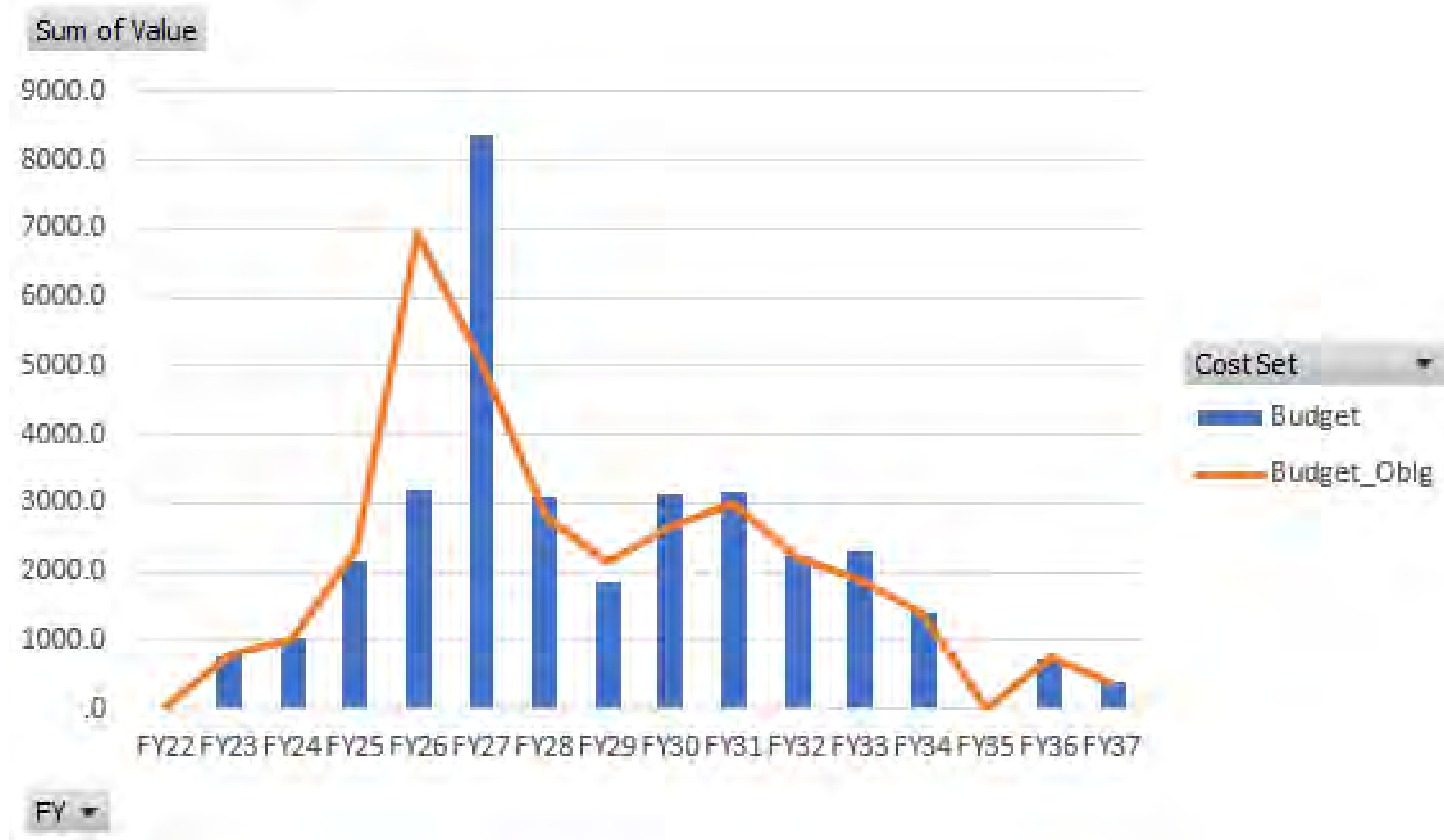
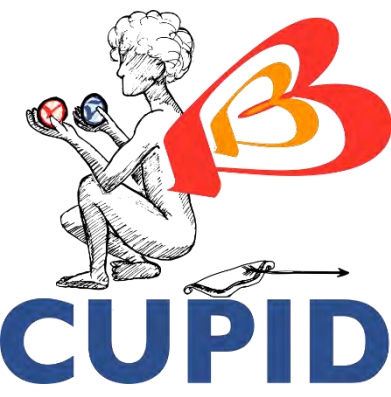
CUPID US FY Budget Summary (in \$k)

| Sum of Value | Column Labels | Grand Total | |
|--------------|---------------|-------------|-------------------|
| Row Labels | Total_ \$ | Contingency | PM Schedule Cont. |
| Grand Total | 33885.4 | 41314.6 | 44060.7 |

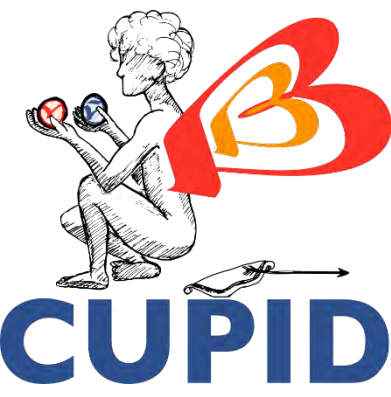
- Schedule contingency project management hours have been added in between early finish (7/34) to CD4 prep (6/36)
 - ~3,800 hours per year
 - ~\$1,373,000 per year
- In FY27 contains several larger procurements
 - 1.02.04 Light Detector ~\$1.5M
 - 1.02.05 NTD Ge Thermistor ~\$.5M
 - 1.02.07 Muon Veto ~.67M
 - 1.03.09 Cryogenic Detector Wiring ~\$1.2M
 - 1.04.02 Wiring ~\$1M



CUPID US FY Budget Obligation Summary (in \$k)



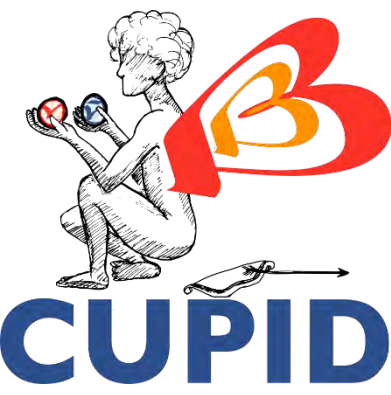
| Row Labels | Budget | Budget_Oblig |
|--------------------|----------------|----------------|
| FY22 | 28.6 | 28.6 |
| FY23 | 784.0 | 784.0 |
| FY24 | 1033.7 | 1033.7 |
| FY25 | 2156.2 | 2340.9 |
| FY26 | 3199.4 | 6919.1 |
| FY27 | 8379.5 | 5041.4 |
| FY28 | 3075.0 | 2810.6 |
| FY29 | 1843.3 | 2120.1 |
| FY30 | 3132.1 | 2669.9 |
| FY31 | 3163.8 | 3008.6 |
| FY32 | 2212.7 | 2204.3 |
| FY33 | 2313.2 | 1864.1 |
| FY34 | 1426.5 | 1398.9 |
| FY35 | .6 | .6 |
| FY36 | 751.2 | 751.2 |
| FY37 | 385.4 | 385.4 |
| Grand Total | 33885.4 | 33361.4 |



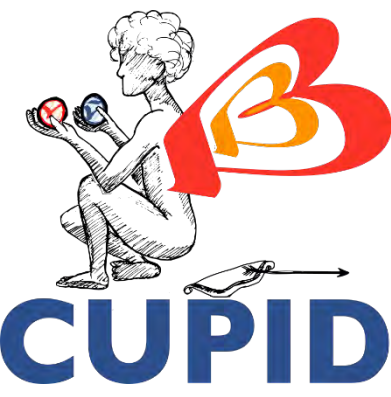
CUPID US Budget Breakdown (in \$k)

| Sum of Value | Column Labels | | | |
|--|---------------|----------------|----------------|----------------|
| Row Labels | HOURS | DOLLARS | Total_ \$ | Contingency |
| US | 160.8 | 10360.7 | 33885.4 | 41314.6 |
| Phase 1 | 111.4 | 7074.3 | 20487.0 | 25086.4 |
| 1.01 Project Management | 18.5 | 727.5 | 5563.1 | 6289.1 |
| 1.02 Detector Components | 53.7 | 2173.6 | 6798.1 | 8762.0 |
| 1.03 Detector Structure | 2.2 | 1817.7 | 3067.0 | 3799.1 |
| 1.04 Host Lab Infrastructure & Cryogenic Systems | 8.2 | 1130.2 | 2209.7 | 2723.4 |
| 1.05 Data Readout | 15.8 | 869.5 | 2058.2 | 2548.5 |
| 1.06 Background Control | 13.0 | 355.8 | 791.0 | 964.3 |
| Phase 2 | 49.4 | 3286.4 | 13398.4 | 16228.2 |
| 1.01 Project Management | 13.2 | 367.4 | 5299.1 | 6117.8 |
| 1.02 Detector Components | 11.7 | 318.2 | 1759.2 | 2148.7 |
| 1.03 Detector Structure | .7 | 1008.4 | 2032.2 | 2589.7 |
| 1.04 Host Lab Infrastructure & Cryogenic Systems | 2.0 | .0 | 380.8 | 476.0 |
| 1.05 Data Readout | 6.7 | 1404.1 | 3018.7 | 3757.9 |
| 1.06 Background Control | 15.1 | 188.3 | 908.5 | 1138.1 |
| Grand Total | 160.8 | 10360.7 | 33885.4 | 41314.6 |

Preliminary TPC

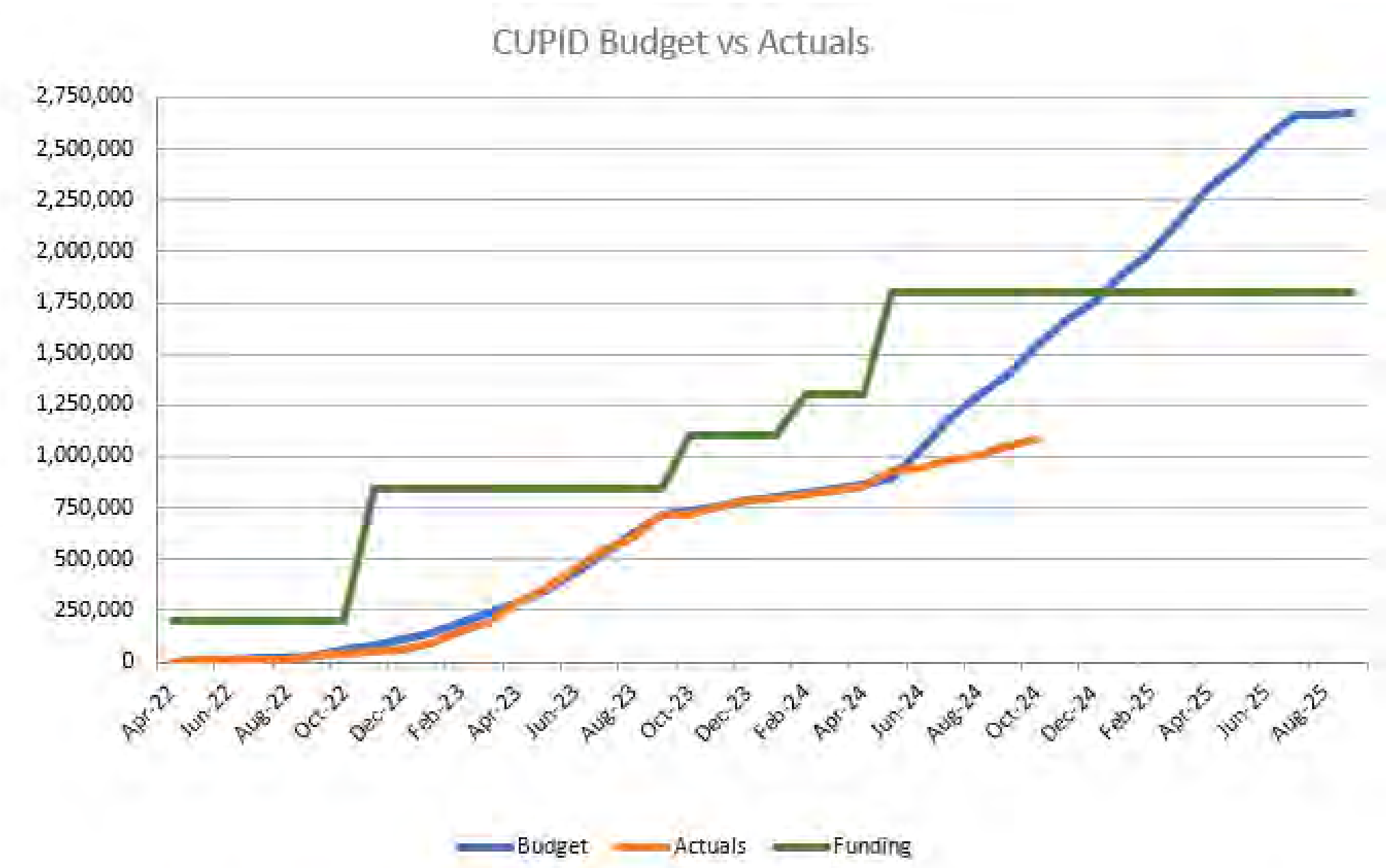


| US Budget | |
|--|-------------------|
| WBS # and Title | BAC \$ |
| 1.01 Project Management | 8,399,680 |
| 1.02 Detector Components | 7,597,296 |
| 1.03 Detector Structure | 5,099,230 |
| 1.04 Host Lab Infrastructure & Cryogenic Systems | 2,590,447 |
| 1.05 Data Readout | 4,820,057 |
| 1.06 Background Control | 1,645,344 |
| Subtotal TEC | 30,152,053 |
| TEC Contingency | 6,875,417 |
| Total Estimated Cost (TEC) | 37,027,470 |
| 1.01 Project Management | 2,462,427 |
| 1.02 Detector Components | 959,918 |
| 1.03 Detector Structure | - |
| 1.04 Host Lab Infrastructure & Cryogenic Systems | - |
| 1.05 Data Readout | 256,907 |
| 1.06 Background Control | 54,112 |
| Subtotal OPC | 3,733,364 |
| OPC Contingency | 553,780 |
| Total Other Project Cost (OPC) | 4,287,144 |
| Total TEC and OPC Cost | 33,885,417 |
| Total Project Contingency Cost | 7,429,196 |
| Project Management Schedule Contingency | 2,746,100 |
| Total Project Cost (TPC) | 44,060,714 |



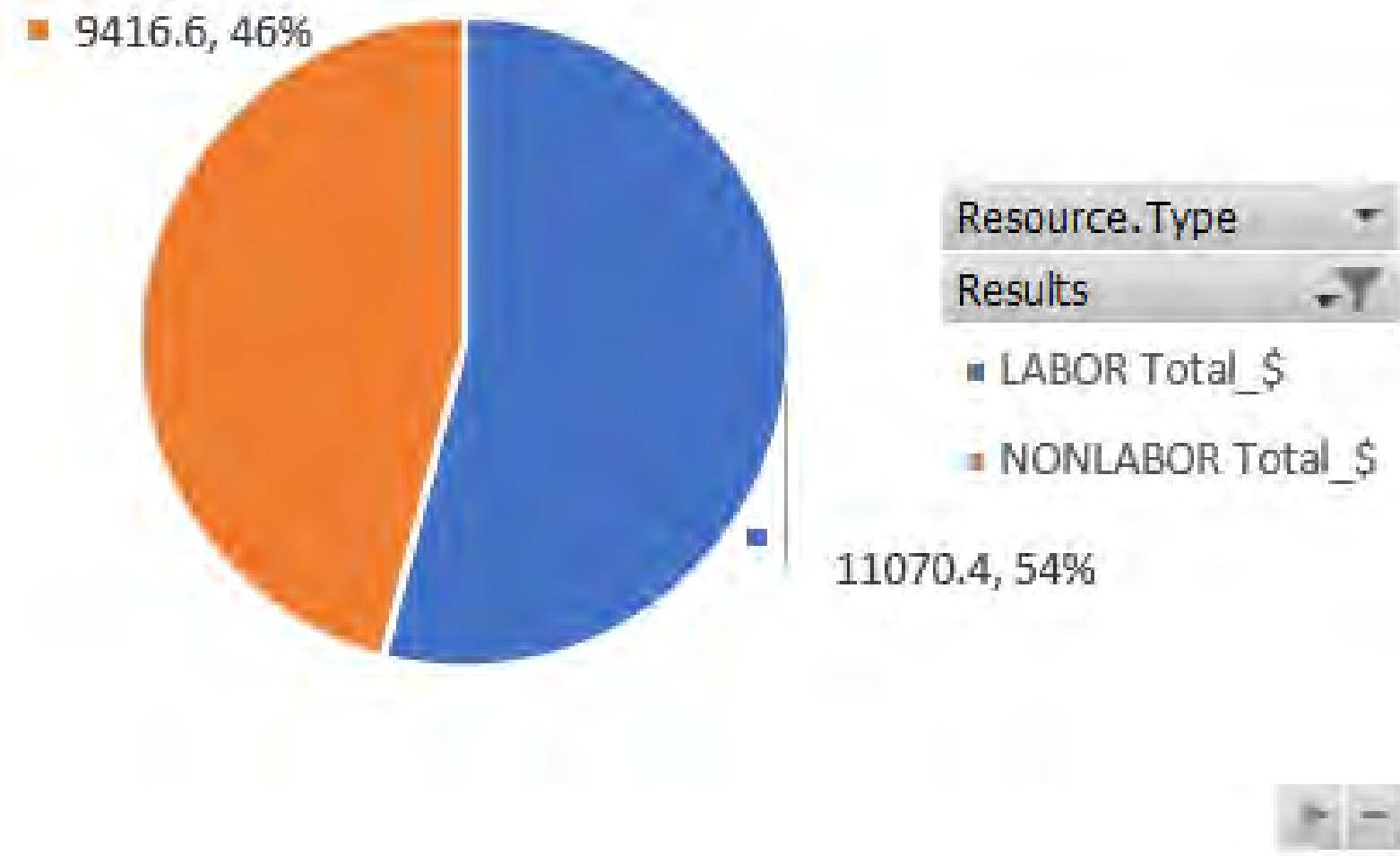
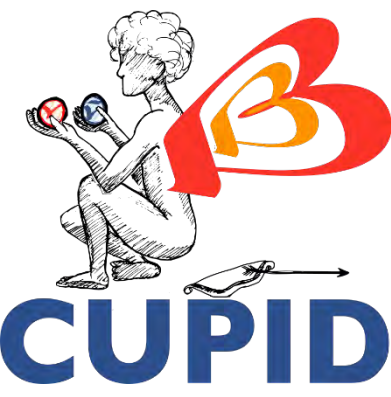
CUPID OPC Budget vs Actuals

| CUMULATIVE | One Month | | Cumulative | |
|---------------------------------------|------------------------|-----------------------|------------------------|-----------------------|
| | Past Month (Sept24) | Last Month (Oct24) | Past Month (Sept24) | Last Month (Oct24) |
| Funds Received | | | \$1,800,000 | \$1,800,000 |
| *FY22 pre-CD1 funds | \$0 | \$0 | \$200,000 | \$200,000 |
| *IRA Funds (FY23) | \$0 | \$0 | \$650,000 | \$650,000 |
| *R&D Funds (FY24) | \$0 | \$0 | \$250,000 | \$250,000 |
| *Prototyping R&D Funds (FY24) | \$0 | \$0 | \$700,000 | \$700,000 |
| Spending | \$50,585 | \$30,643 | \$1,055,771 | \$1,086,414 |
| *1.01 Project Management (108511-001) | \$50,726 | \$13,752 | \$406,827 | \$420,580 |
| *1.01 Project Management (108511-002) | -\$141 | \$0 | \$648,944 | \$648,944 |
| *ANL Spending | \$0 | \$16,890 | \$0 | \$16,890 |
| | | | | |
| Net Remaining | | | \$744,229 | \$713,586 |

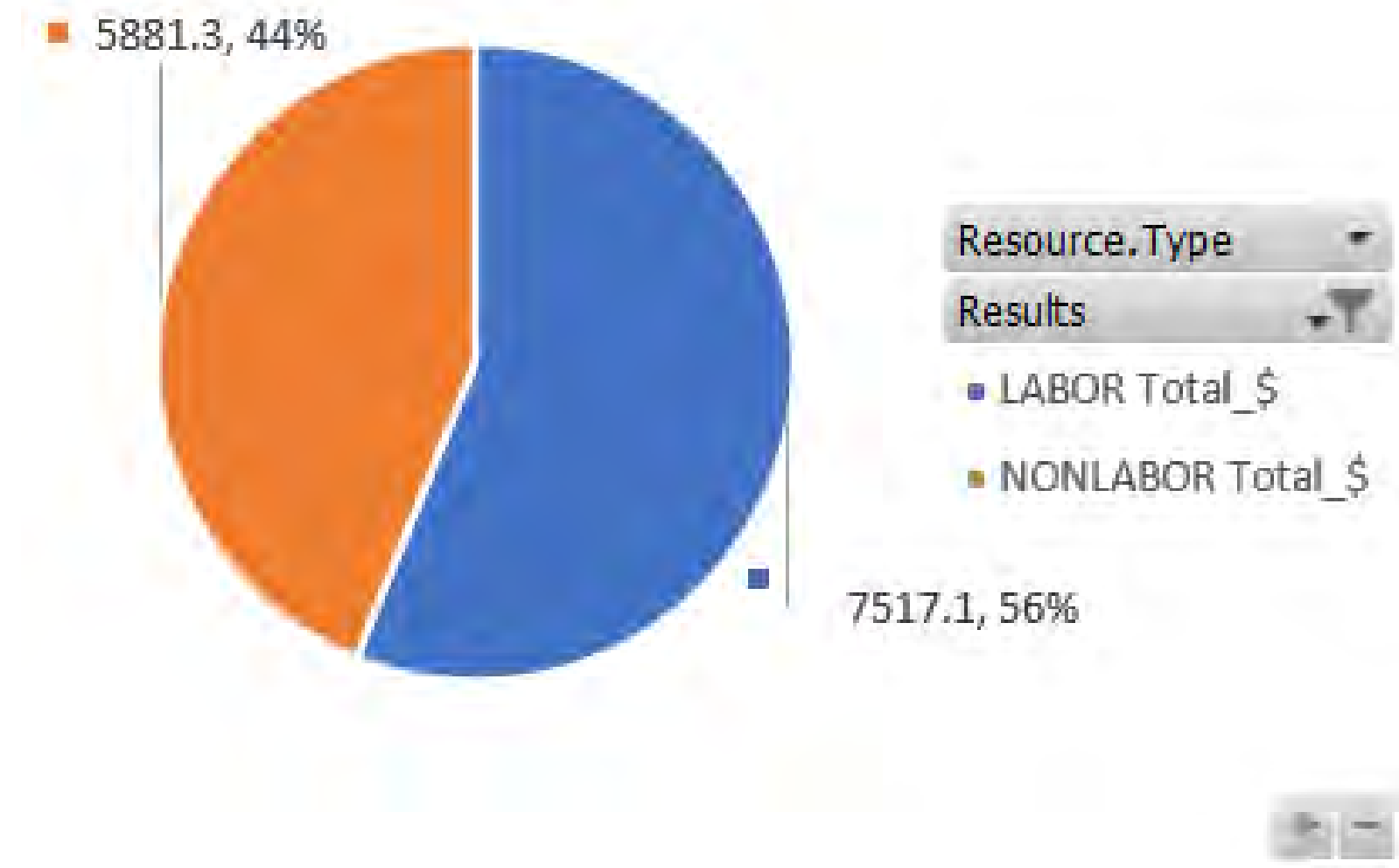


- Expect carryover through early 2025
- Will need increments to successfully mount VSTT on March 2025
- Actuals mapped to budget in April 2024

CUPID US Budget by Resource Type (in \$k)

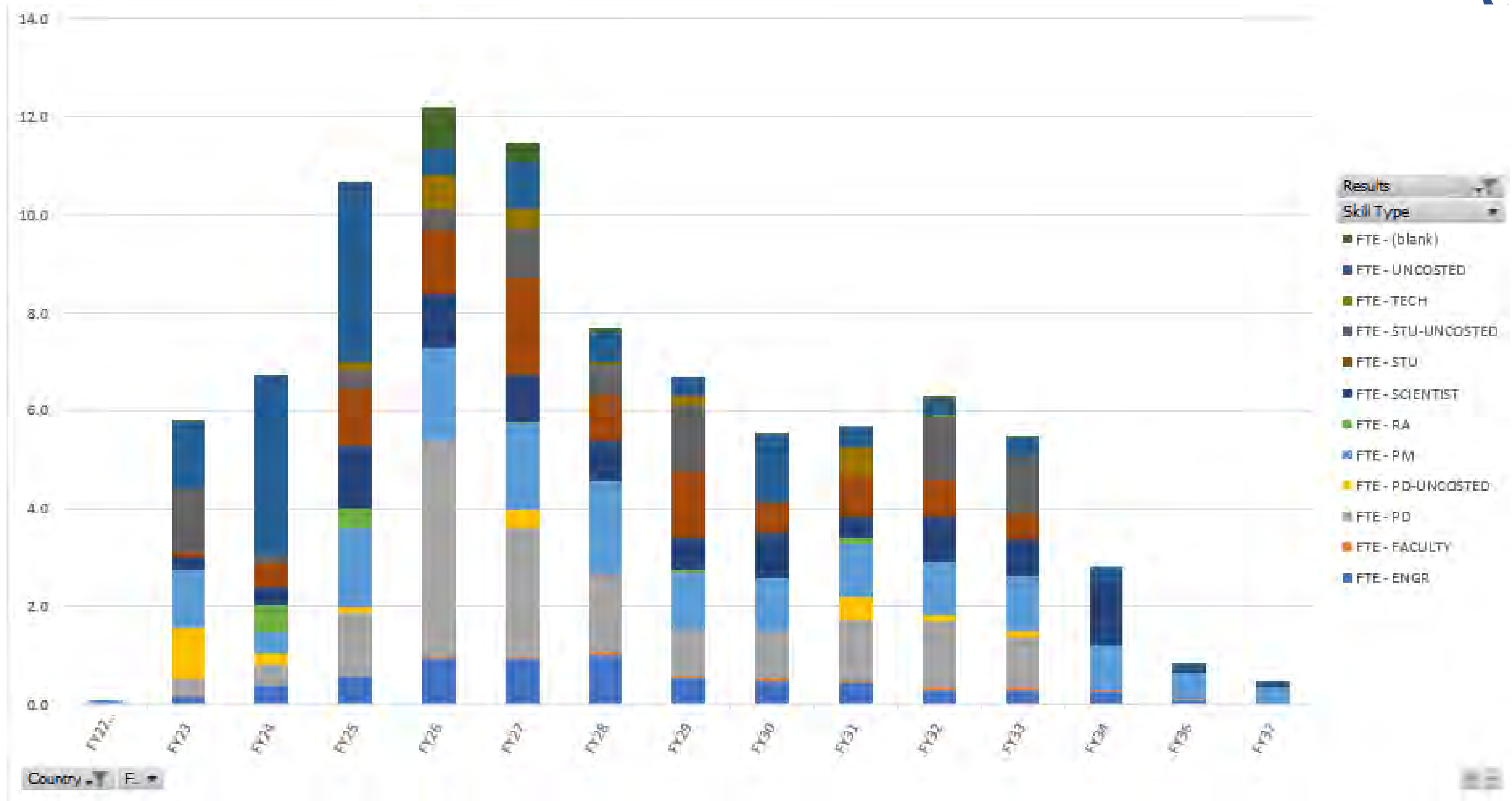
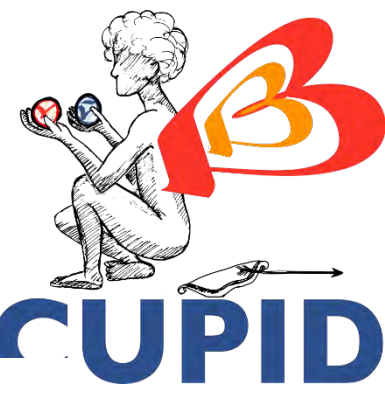


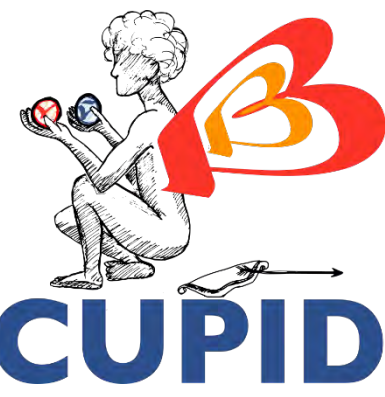
Phase 1



Phase 2

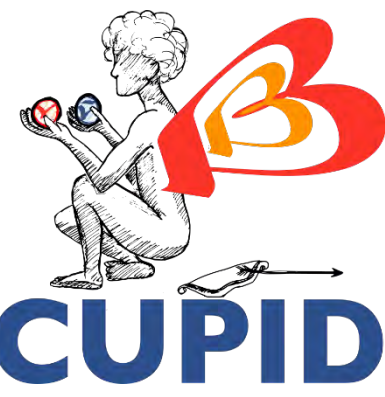
CUPID US FTEs by Skill Type





CUPID US FTEs by Institution

| Sum of Value | Column Labels | | | | | | | | | | | | | | | |
|--------------------|---------------|------------|------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--|
| Row Labels | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | FY33 | FY34 | FY36 | FY37 | |
| US | 0.1 | 5.8 | 6.7 | 10.7 | 12.2 | 11.5 | 7.7 | 6.7 | 5.5 | 5.7 | 6.3 | 5.5 | 2.8 | 0.8 | 0.5 | |
| Phase 1 | 0.1 | 5.8 | 6.7 | 10.7 | 12.2 | 11.4 | 7.7 | 6.6 | | 0.1 | | | | | | |
| ANL | | | 0.7 | 0.5 | 0.1 | 0.6 | 0.8 | 0.3 | | | | | | | | |
| BU | | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | | | | | | | | | | |
| JHU | | | 0.2 | 1.2 | 1.4 | 1.5 | 0.5 | 0.2 | | | | | | | | |
| LBNL | 0.1 | 1.5 | 0.9 | 2.6 | 3.6 | 3.0 | 2.7 | 1.6 | | | | | | | | |
| MIT | | 0.0 | 0.1 | 0.5 | 0.1 | 0.1 | 0.2 | 0.0 | | | | | | | | |
| NW | | | 0.7 | | | | 0.4 | 2.0 | | | | | | | | |
| UCB | | 0.0 | | 0.3 | 0.2 | 0.2 | 0.2 | 0.3 | | | | | | | | |
| UCLA | | 0.3 | | 0.2 | 0.3 | 0.5 | 0.8 | 0.3 | | | | | | | | |
| UNCOSTED | | 3.7 | 4.1 | 4.2 | 1.0 | 2.3 | 1.2 | 1.7 | | | | | | | | |
| VT | | 0.2 | 0.1 | 0.2 | 1.1 | 1.5 | 0.5 | 0.2 | | 0.1 | | | | | | |
| YALE | | | | 1.0 | 3.3 | 1.1 | 0.4 | | | | | | | | | |
| PITT | | | | 0.0 | 0.8 | 0.4 | 0.1 | | | | | | | | | |
| Phase 2 | | | | | | 0.0 | | 0.1 | 5.5 | 5.6 | 6.3 | 5.5 | 2.8 | 0.8 | 0.5 | |
| ANL | | | | | | | | | | 0.7 | 0.0 | | | | | |
| BU | | | | | | | | | 0.1 | 0.2 | 0.4 | 0.5 | | | | |
| JHU | | | | | | | | 0.1 | 0.5 | 0.5 | | | | | | |
| LBNL | | | | | | | | | 2.6 | 2.0 | 1.3 | 1.4 | 1.1 | 0.6 | 0.4 | |
| MIT | | | | | | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| NW | | | | | | | | | | 0.1 | 2.0 | 1.6 | | | | |
| UCB | | | | | | | | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.0 | |
| UCLA | | | | | | | | | 0.2 | 0.3 | 0.2 | | | | | |
| UNCOSTED | | | | | | 0.0 | | 0.0 | 1.4 | 0.9 | 1.8 | 1.7 | 0.3 | 0.1 | 0.1 | |
| VT | | | | | | | | 0.1 | 0.4 | 0.7 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | |
| YALE | | | | | | | | | | | | | 1.1 | | | |
| Grand Total | 0.1 | 5.8 | 6.7 | 10.7 | 12.2 | 11.5 | 7.7 | 6.7 | 5.5 | 5.7 | 6.3 | 5.5 | 2.8 | 0.8 | 0.5 | |



413 vs Non-413 Cost

CUPID as a 413 Project

- US total: \$33,885,417
- US total with Contingency: \$41,314,613
- OPC rates are used before CD1 and after early finish to prep for CD4

| Sum of Value | Column Labels | | | | | | | | | | | | | | | | Total_ \$ Total | Contingency |
|--------------|---------------|--------|--------|--------|--------|---------|---------|--------|--------|---------|--------|--------|--------|------|-------|-------|-----------------|-------------|
| Row Labels | Total_ \$ | | | | | | | | | | | | | | | | Total_ \$ Total | Contingency |
| | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | FY33 | FY34 | FY35 | FY36 | FY37 | | |
| US | 28.6 | 784.0 | 1033.7 | 2156.2 | 3199.4 | 8379.5 | 3075.0 | 1843.3 | 3132.1 | 3163.8 | 2212.7 | 2313.2 | 1426.5 | .6 | 751.2 | 385.4 | 33885.4 | 41314.6 |
| OPC | 28.6 | 689.4 | 681.6 | 1276.9 | 17.9 | 10.8 | | | | | | | | | 642.8 | 385.4 | 3733.4 | 4287.1 |
| TECFAB | | 94.6 | 352.2 | 879.3 | 3181.5 | 8368.7 | 3075.0 | 1843.3 | 3132.1 | 3163.8 | 2212.7 | 2313.2 | 1426.5 | .6 | 108.4 | | 30152.1 | 37027.5 |
| IT | 476.4 | 482.0 | 707.4 | 924.3 | 765.5 | 4038.5 | 7416.5 | 426.2 | 6463.7 | 9590.8 | 6233.4 | 276.3 | 181.5 | | | | 37982.4 | 39856.9 |
| FR | 101.1 | 60.0 | 675.1 | 1108.4 | 265.0 | 537.7 | 393.6 | 2.0 | 169.0 | 5.0 | | 198.8 | 31.9 | | | | 3547.6 | 3646.6 |
| Grand Total | 606.1 | 1326.0 | 2416.2 | 4188.9 | 4229.9 | 12955.8 | 10885.1 | 2271.6 | 9764.8 | 12759.5 | 8446.2 | 2788.3 | 1639.9 | .6 | 751.2 | 385.4 | 75415.4 | 84818.1 |

CUPID as a non-413 Project

- US total: \$38,153,235
- US total with Contingency: \$46,381,981
- OPC rates are used for the entire project
- Possible addition of project management if schedule contingency is realized

| Sum of Value | Column Labels | | | | | | | | | | | | | | | | Total_ \$ Total | Contingency |
|--------------|---------------|--------|--------|--------|--------|---------|---------|--------|---------|---------|--------|--------|--------|------|-------|-------|-----------------|-------------|
| Row Labels | Total_ \$ | | | | | | | | | | | | | | | | Total_ \$ Total | Contingency |
| | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | FY33 | FY34 | FY35 | FY36 | FY37 | | |
| US | 28.6 | 786.4 | 1100.1 | 2323.1 | 3711.6 | 9203.1 | 3527.2 | 2150.6 | 3648.9 | 3603.8 | 2554.8 | 2684.6 | 1683.9 | .8 | 760.2 | 385.4 | 38153.2 | 46382.0 |
| OPC | 28.6 | 786.4 | 1100.1 | 2323.1 | 3711.6 | 9203.1 | 3527.2 | 2150.6 | 3648.9 | 3603.8 | 2554.8 | 2684.6 | 1683.9 | .8 | 760.2 | 385.4 | 38153.2 | 46382.0 |
| IT | 476.4 | 482.0 | 686.8 | 957.1 | 964.6 | 3979.5 | 7411.8 | 444.5 | 6463.7 | 9582.7 | 6241.5 | 276.3 | 181.5 | | | | 38148.4 | 40022.9 |
| FR | 101.1 | 60.0 | 675.1 | 1108.4 | 716.0 | 846.0 | 74.4 | | 4.0 | 7.0 | | 147.5 | 83.1 | | | | 3822.6 | 3905.1 |
| Grand Total | 606.1 | 1328.4 | 2462.0 | 4388.6 | 5392.2 | 14028.5 | 11013.4 | 2595.1 | 10116.7 | 13193.5 | 8796.2 | 3108.5 | 1948.6 | .8 | 760.2 | 385.4 | 80124.2 | 90310.0 |

Questions

