

23 JANUARY 2019

APS All-Hands Meeting

APS UPGRADE UPDATE

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PROJECT MANAGER, APS UPGRADE

PRESS RELEASE | ARGONNE NATIONAL LABORATORY

DOE approves technical plan and cost estimate to upgrade Argonne facility; Project will create X-rays that illuminate the atomic scale, in 3D

DECEMBER 14, 2018

Upgrade to Advanced Photon Source will open new frontiers in science and help solve pressing problems across industries.

The U.S. Department of Energy (DOE) has approved the technical scope, cost estimate and plan of work for an upgrade of the Advanced Photon Source (APS), a major storage-ring X-ray source at DOE's Argonne National Laboratory, Argonne announced on December 14, 2018.



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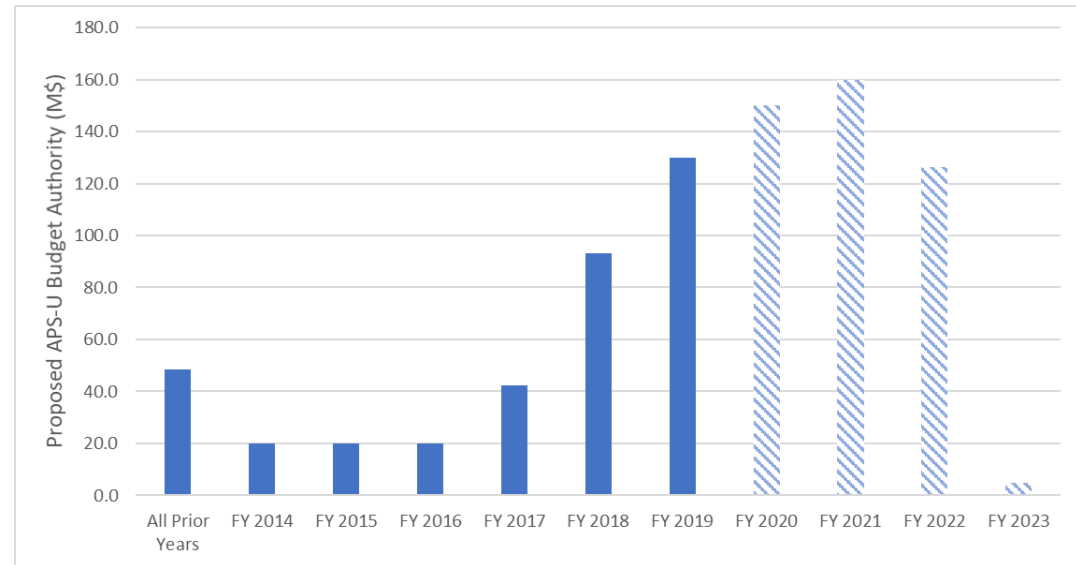
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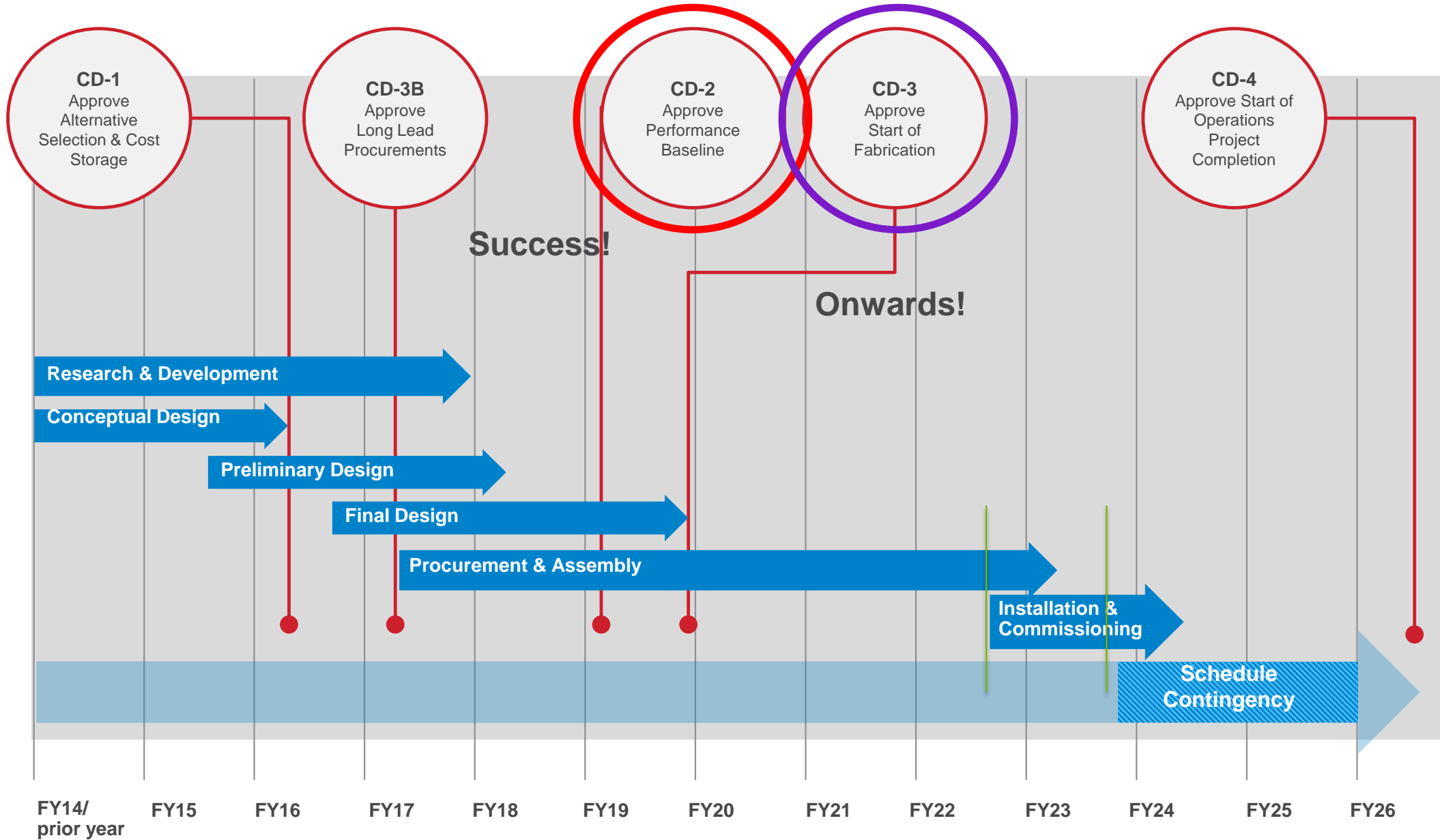
<https://www.anl.gov/article/doe-approves-technical-plan-and-cost-estimate-to-upgrade-argonne-facility-project-will-create-xrays>

- Total Project Cost \$815M to more fully enhance the scientific capabilities of the facility after the APS-U is complete
- Key Performance Parameters modified to reflect the change in TPC
- FY19 budget \$130M; FY20 and beyond funding will be determined by budget negotiations
- Support for the APS-U is strong



Key Performance Parameter	Thresholds (Performance Deliverable)	Objectives
Storage Ring Energy	> 5.7 GeV, with systems installed for 6 GeV operation	6 GeV
Beam Current	≥ 25 mA in top-up with systems installed for 200 mA operation	200 mA
Horizontal Emittance	< 130 pm-rad at 25 mA	< 42 pm-rad at 200 mA
Brightness ¹ @ 20 keV	> 1 x 10 ²⁰	> 1 x 10 ²²
Brightness ¹ @ 60 keV	> 1 x 10 ¹⁹	> 1 x 10 ²¹
APS-U Beamlines Transitioned to Operations	7	≥ 9

¹ photons/sec/0.1% BW/mm²/mrad²



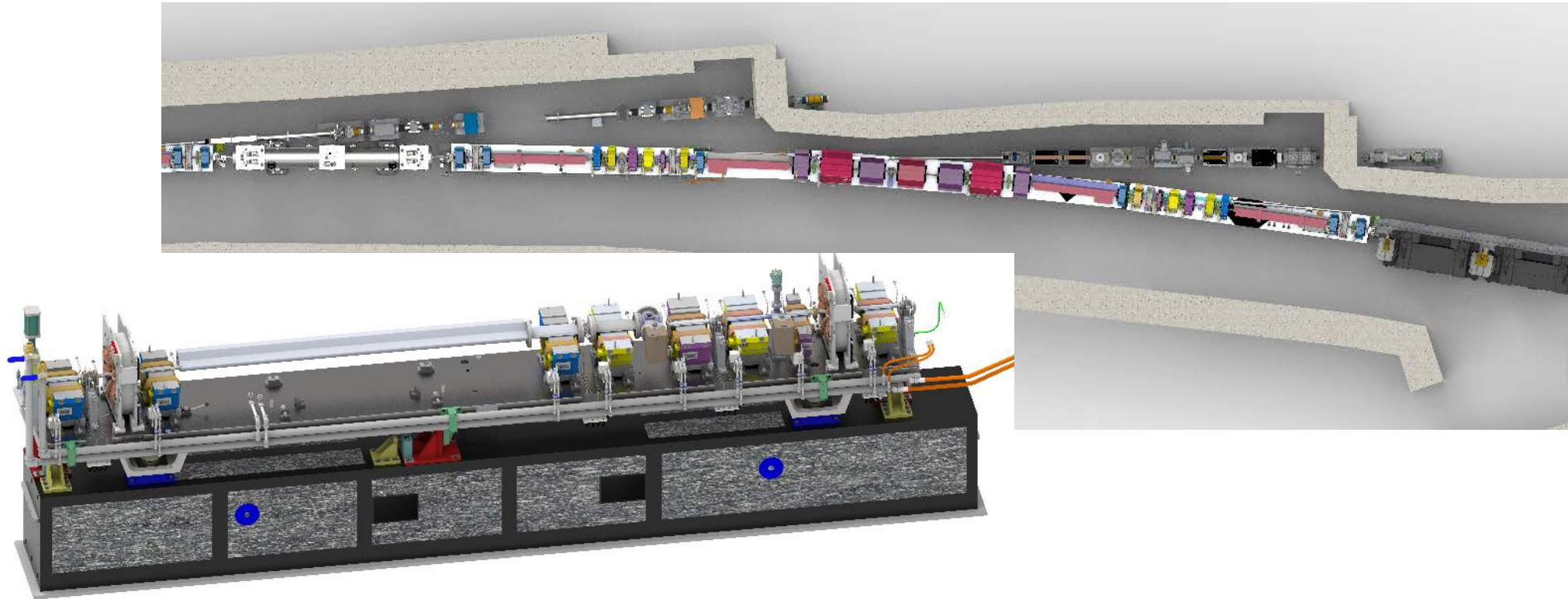
LLP Summary

U.U2.03.04 - Injector			\$112K
PAR 12th Harmonic Amplifier			\$112K
U.U2.04.02 - Global Beamline Support	\$355K	\$719K	\$887K
Optics, Stability Components	\$355K	\$719K	\$887K
U.U2.04.04 - Beamlines		\$3,086K	\$2,703K
ASL Hutch Procurement		\$2,339K	
ASL Beamline Critical Components		\$747K	\$2,271K
ASL Beamline Critical Components – Vaccum components, Diagnostics, Support Tables			\$388K
20-ID Beamline components			\$44K
U.U2.05.02 - Front Ends		\$3,443K	\$1,240K
High heat load front end components (all FE GlidCop)		\$1,086K	\$382K
Canted front end components (all FE GlidCop)		\$684K	\$156K
X-ray Beam Position Monitor Components (GlidCop)		\$816K	
FE Equipment Protection Systems & Pneumatics		\$617K	
ASL CUFE Photon and Shielding Components			\$222K
ASL CUFE Vacuum and support hardware			\$276K
ASL CUFE Diagnostics Components		\$240K	\$204K
U.U2.05.03 - Insertion Devices		\$1,847K	\$5,144K
Magnets for new Devices		\$1,581K	\$1,754K
Poles for new Devices			\$1,472K
Existing Undulator Mechanical Structures			\$461K
Insertion Device Vacuum Chamber for inline			\$826K
Insertion Device Vacuum Chamber Support System			\$297K
Insertion Device Vacuum Chamber for Canted		\$266K	\$334K
Grand Total	\$3,583K	\$31,710K	\$37,158K
Contingency @10% existing contracts, 35% on estimates	\$358K	\$3,171K	\$13,005K
Grant Total Including Contingency	\$3,941K	\$34,881K	\$50,164K

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- FY17, FY18: Actuals, 10% Contingency. FY19: Estimates, 35% Contingency. Current total including contingency \$89.5M
- Concurrence received December 13 2018.

Technical Integration



- Detailed integration of the whole critical in defining each components
- 2/3rds of storage ring magnets are on order (1321 total needed)
- Remainder will be on order this year

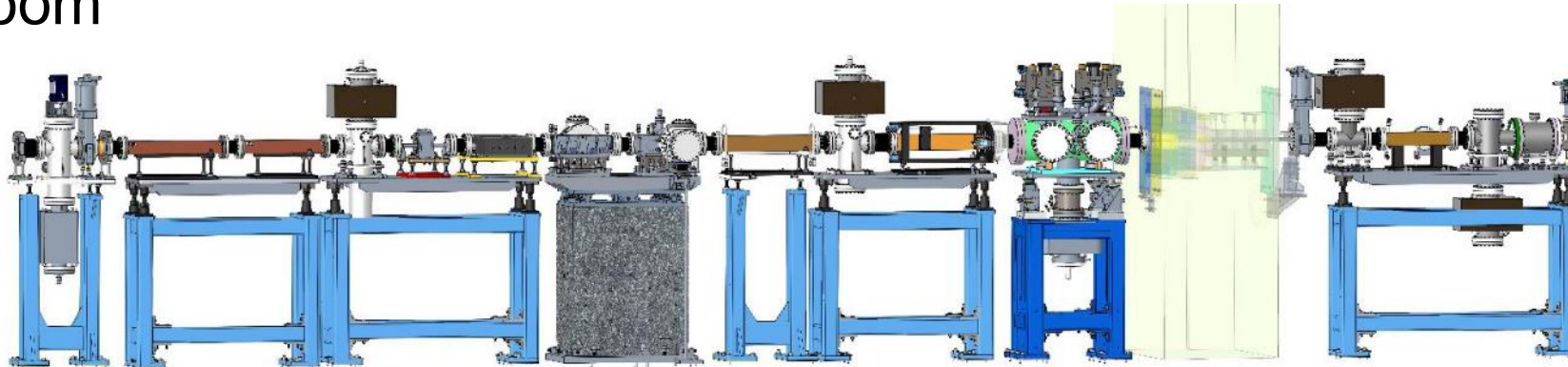


First 10 Q1 in house! Next 20 Q1, 32 Q2 are en route!



First APS Upgrade Front End Installed in S28

- Completed in September 2018
- Prototyped more efficient QA and inspection to be used for APS Upgrade
 - Many components processed using vendor-supplied measurements for dimensional, fiducial, hydrostatic, vacuum leak check, and residual gas analysis tests, eliminating need for in-house measurements
 - Final vacuum string test performed in the clean room



From here to there



The Mont Blanc from my old office in Bat. 30 at CERN (sorry for the fuzzy photo)

Accomplishing the APS-U can seem overwhelming

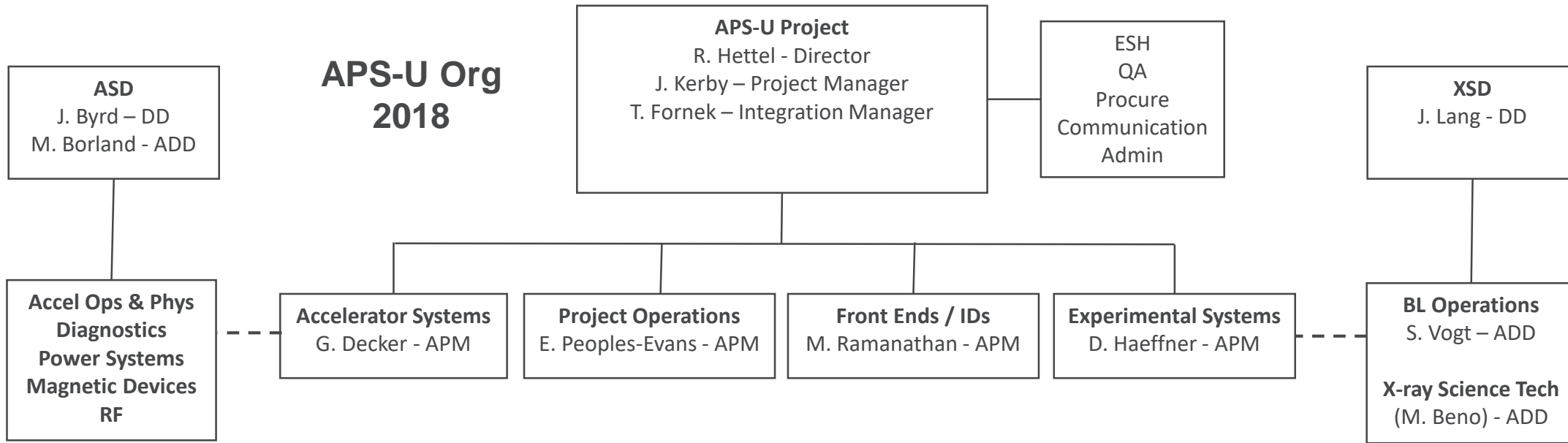
- It is a change— we are (re-) creating a world leading facility!
- We have work to do...with more industrial partners than we are used to...but we can build on our expertise to accomplish this
- By some measures we are 24% done already!
- We strive to align our staff with strengths...continually learn...and build going forward

APS-U Reorganization

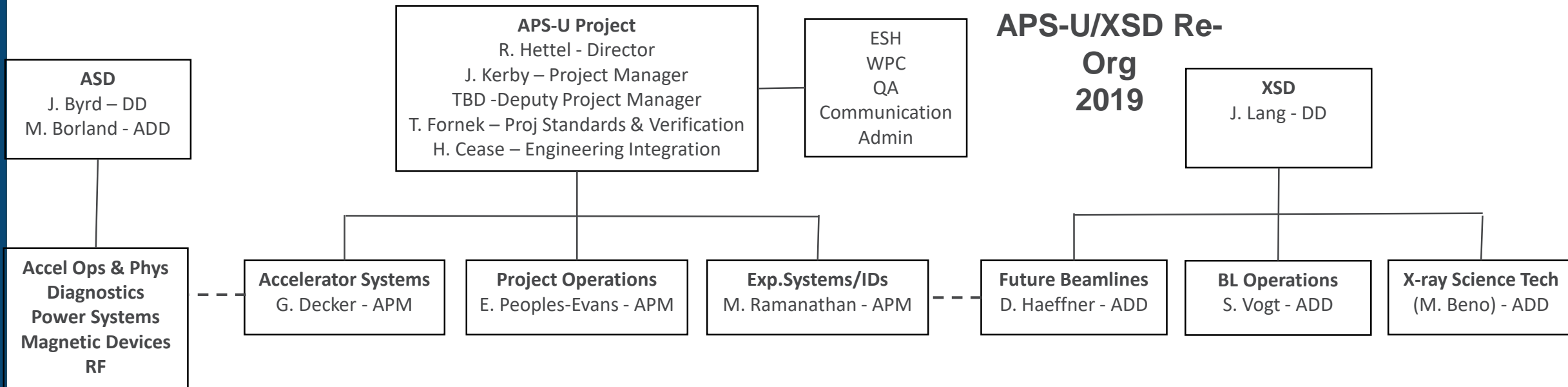
Motivation:

- After CD-2, APS-U project is moving from a design phase to an execution phase, with CD-3 as a near-term goal.
- Reorganization is natural for large projects in order to optimize resources to best match evolving priorities and needs as phases change.
- The APS-U reorganization
 - More directly engages XSD (in a manner similar to ASD) to help define project beamline scope and implementation strategy that involves operating beamlines, scientific staff and users.
 - Ensures focus on the more complete development of the installation plan has to occur before CD-3
 - Strengthens ownership of project execution: project management, detailed engineering, procurement, WPC, QA, pre-assembly, installation, DOE reporting, etc.
- As the dark time and installation work approaches, more closely aligning the APS-U and APS organizations to accomplish that work may be appropriate

APS-U Org 2018



APS-U/XSD Re- Org 2019



- Dean Haeffner becomes XSD ADD for Future Beamlines and continues to coordinate work of XSD beamline science staff on APS-U (and other, future) beamlines.
- Mohan Ramanathan becomes project APM for Experimental Systems, Front End and IDs
- John Quintana will work with APS-U Experimental Systems APM and XSD ADD for Future Beamlines to achieve beamline scope.
- Herman Cease leads Engineering Integration and will be a project-wide engineering resource to ensure components and system integration leading to installation
- Rob Connatser will focus on Installation Planning.
- Tom Fornek will lead Project Standards and Verification.
- Betsy Dunn will lead Work Planning and Control, and additionally be the Technical Point of Contact for the long beamline building.
- Diane Wilkinson will move to full time eTraveler support.
- APS-U administrative effort will be supported by Jade Thomas and Ruta Dowiarz, who are working with Diane during the transition.

Safety Moment!

- Everyone is expected to work safely.
- Asking for a safety 'Pause' is always acceptable.
- Everyone's input will help ensure a safe, complete job.
- Lessons learned can always be found and fed back into the system



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It happens

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Safety PAUSE

PAUSE
before you start

ASSESS
possible hazards

UNDERSTAND
how to proceed safely

SHARE
your plan with others

EXECUTE
the activity safely



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Thank You

- ...for your continued efforts
- ...for the success we have had so far
- ...for the success we will have
- ...for when we pick each other up when we stumble
- ...for working to make the APS/APS-U the best hard x-ray facility, enabling the best science, for years to come.

Only 21 Shopping days to February 14th!



Users office has the next shipment of scarves! – all proceeds to the Spectrum Club