

NSLS-II Update

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UEC Town Hall meeting March 11th 2016



Outline

- Recent incidents at NSLS-II
- Accelerator operations
- Beamline operations
- Beamline Construction activities
- Strategic Planning process

Recent Events

- We have had three recent events at NSLS-II in the past 6 weeks.
- In each case, thankfully, the hazards were low and no-one has been injured.
- However, they are deeply concerning to me.
- The events demonstrate that we have a systemic problem with configuration management and work planning and control
- This is not acceptable in a facility striving for operational excellence

NSLS-II Safety Concerns

- Although we are very busy and have milestones and goals, we cannot let the rush to get things done compromise our discipline to safe practices and proper procedures.
- We cannot place engineered controls on everything and must depend on procedures, rules, and administrative controls.
- Careful work planning and control is essential for safe, effective performance (construction, installation, commissioning, beam operations, experimental operations)
- General need for vigilance across all parts of the organization. We cannot become complacent.
- When procedures seem burdensome or unnecessary, raise the issue with the author or your supervisor. Follow the procedure and at the same time work to make needed changes.

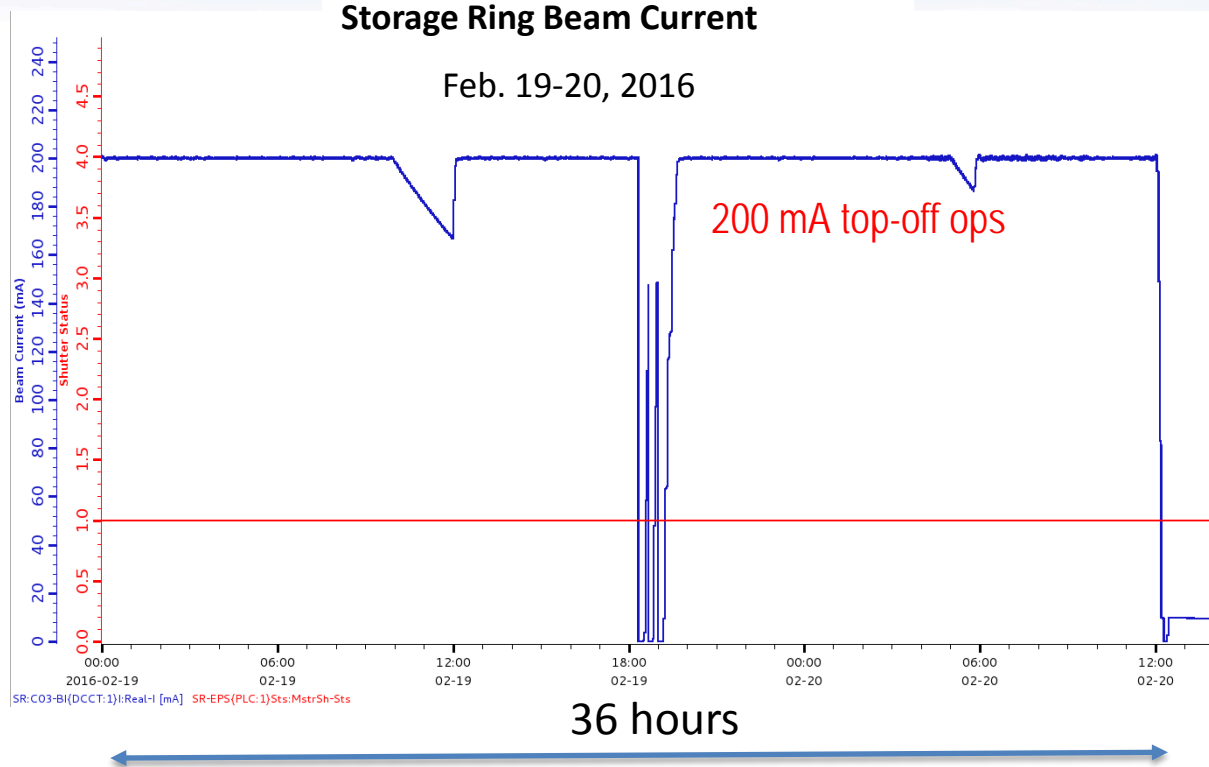
Cannot overemphasize the need for diligence

Headlines

- We must keep our “head in the game” in everything we do
- We must follow our procedures as written or challenge them; ignoring them is not an option
- Communication between all parties is vital
- We all have a vital role in keeping each other safe
- Input, suggestions and feedback is encouraged.
- If you see something that concerns you – speak out!

Accelerator Operations

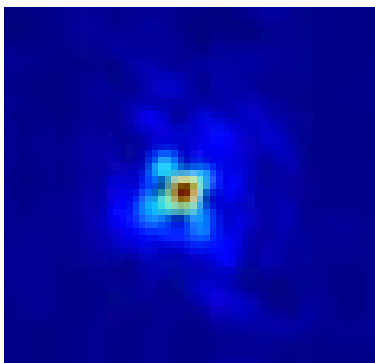
- 2nd Cavity installed and commissioned.
- Established beamline operations at 200 mA top-off, but reliability not good.
- Backed off and are ramping up slowly. Currently at 170 mA
- Successfully stored 375 mA with ID gaps open



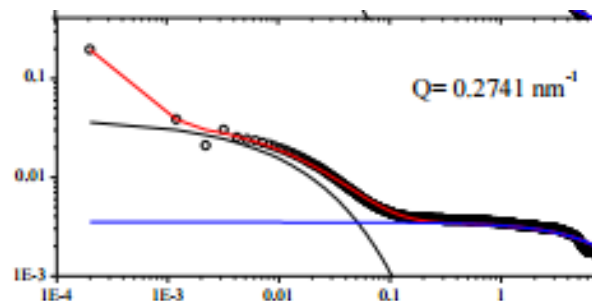
FY16 Goal is 250 mA routine top-off operations

NSLS-II Beamline Operations

- 5 project beamlines in General User operations,
- CHX and IXS in science commissioning
- Science commissioning ongoing in parallel with GU operations
- 137 unique users in first run in FY16
- Goal is 450 users in FY16



HXN: Ptycography
reconstructed ZP
focus of 35 nm



CHX: Nanoparticle dynamics in
water glycerol mix

NSLS-II GU Proposal Statistics

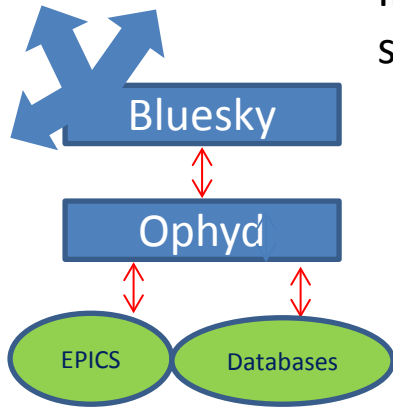
Panel	Chair	Beamline / Program	Proposals to Review (2016-1)	Ave Score* (2015-3, 2016-1)	Proposals to Review (2016-2)
Nanoscale Studies	Larson	HXN	4	2.03 ± 0.60	11
Spectral Microscopy	Sutton	SRX, ALS-IR, HP-IR	17	2.15 ± 0.49	33
Inelastic Excitation	Durbin	IXS	6	1.51 ± 0.49	5
Scattering & Coherence	Wang	CHX, CSX-1	13	1.80 ± 0.34	23
Spectroscopy	McNulty	ISS, CSX-2, SSRL, PU-CFN	25	1.92 ± 0.53	27
Structural Science	Chupas	XPD	20	2.01 ± 0.39	24
Structural Biology	Wasserman	LIX, FMX, AMX	NA	NA	35
TOTAL			85		158

*includes NSLS-II beamline proposals only (not ALS, SSRL, or CFN)

Data Acquisition & Data Management

Major release of DAQ software went smoothly.

Installed on all beamlines, this is the interface the users see. It talks to the scan engine, which talks to EPICS



Even though this is a major upgrade with potentially very disruptive consequences, the transition went smoothly. All beamlines are taking data with added functionality to scans.

- Better and more flexible interactions for users
- Drastic reduction in code to maintain
- Improved stability in the long run

Better protocols for backing up the data and metadata

- Better monitoring of beamline storage health, early problem detection
- Automatic daily backup of the databases

Collaborations

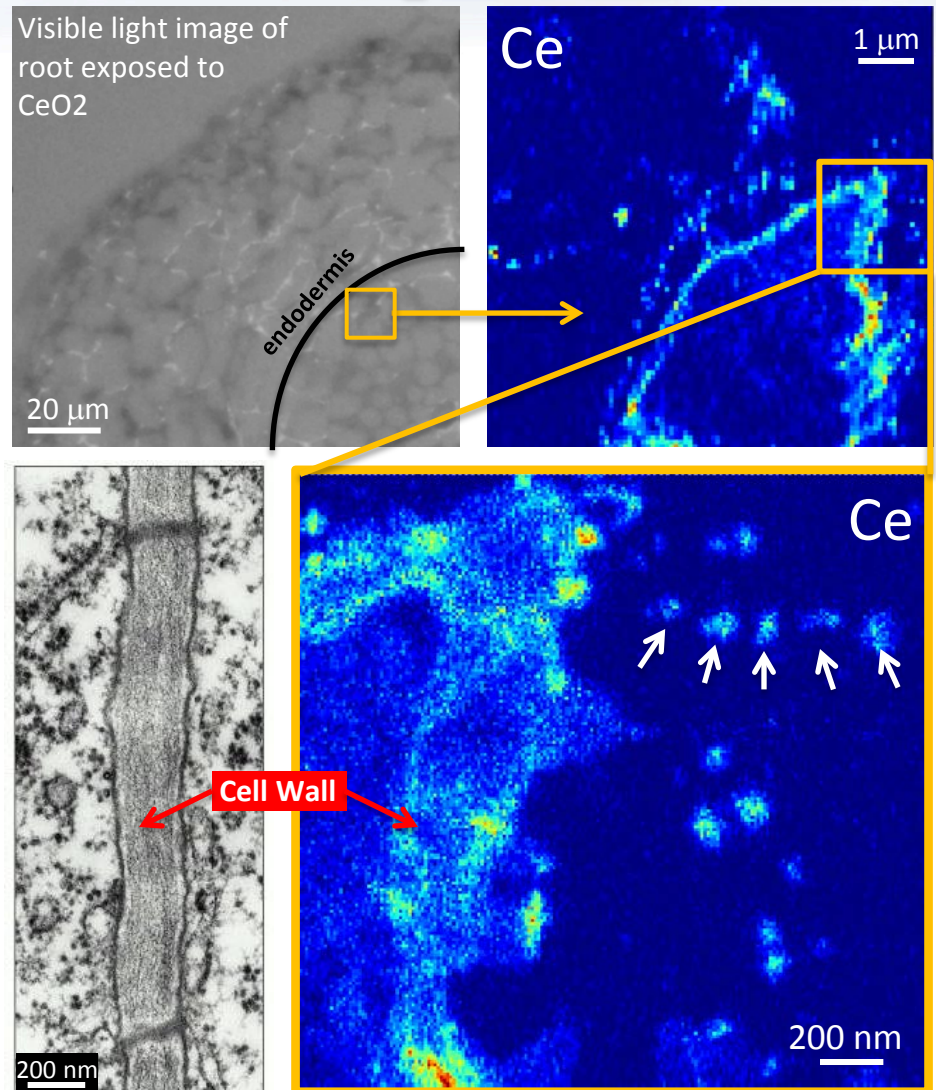
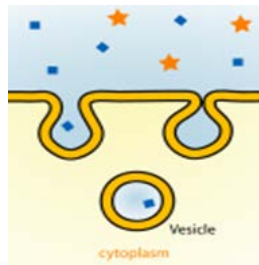
The Center for Advanced Mathematics for Energy Research Applications **CAMERA**

- Member of the DAMA group spent a week at LBL interacting with the CAMERA team on SHARP/ptychography and on the GISAXS software.
- As a result a new branch is available on the CAMERA github repository for our contribution to the code (<https://github.com/camera-sharp/sharp-NSLS2>)

HXN : ECOTOXICITY OF DIESEL FUEL NANOCATALYST- CeO_2

- Nanoparticle cerium oxide (CeO_2) is diesel fuel additive used in EU to decrease air pollution and increase fuel efficiency
- Little is known about impact of CeO_2 on human health and environment or potential for transfer into food web
- Hard X-ray Nanoprobe (HXN) beamline at NSLS-II used to elucidate mechanism of CeO_2 uptake and transport in cells of higher plants
- World-leading resolution (15 nm)
- Very high sensitivity
70 parts per billion

Tappero, Unrine, et al. (in prep)



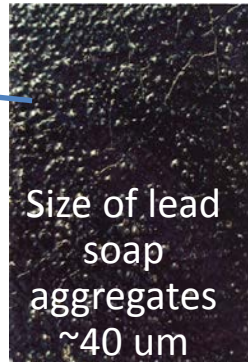
Elemental Segregation and Speciation in Lead Soap Deterioration of Oil Paintings

Silvia Centeno (Met Museum)

Goal of the experiment: to understand lead soap formation mechanisms, and how it can be arrested and prevented

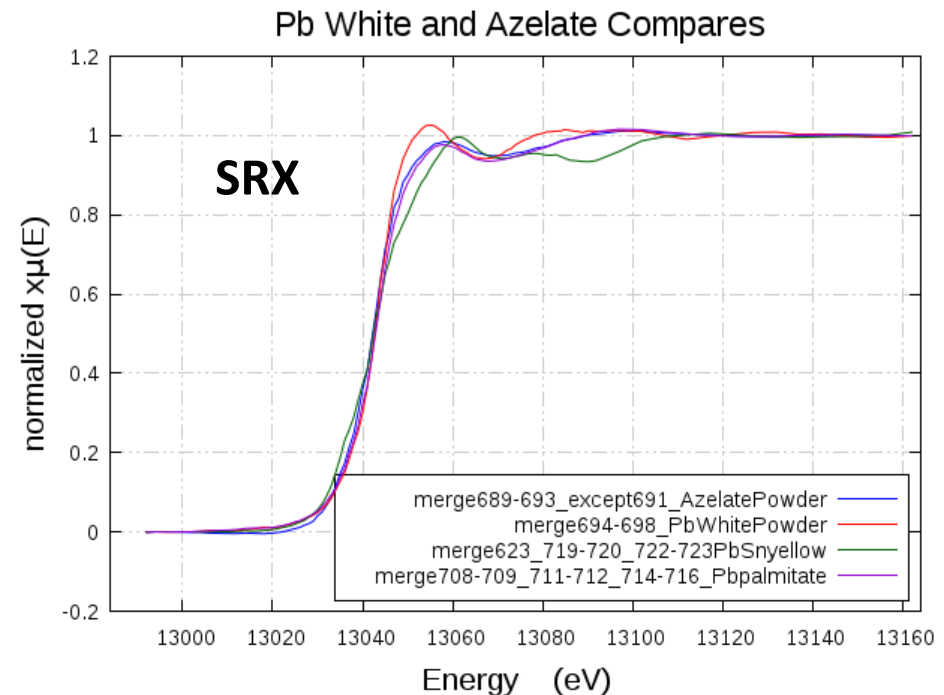


“Madame Pierre Gautreau”,
John Singer Sargent, 1883-84.
Oil on canvas, 208.6 x 109.9 cm
The Metropolitan Museum of Art,
Arthur Hoppock Hearn Fund, 1916



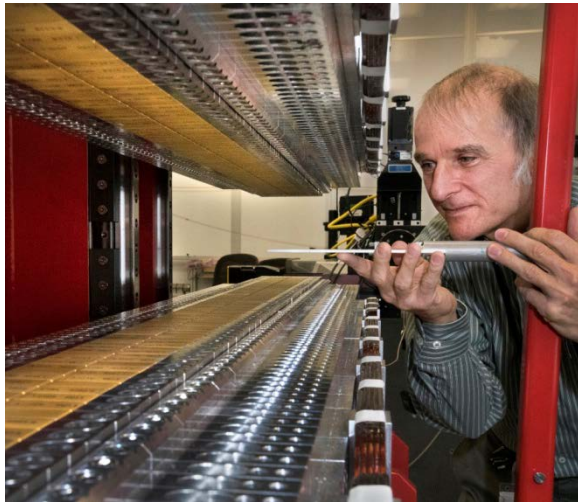
Surface texture of rounded protrusions resulting from the formation of lead soaps in the ground layer as it aged

Initial studies using (XANES) at SRX show that lead pigments and lead soaps can be distinguished from each other and opens the opportunity to examine soap formation in cross sections using XANES imaging

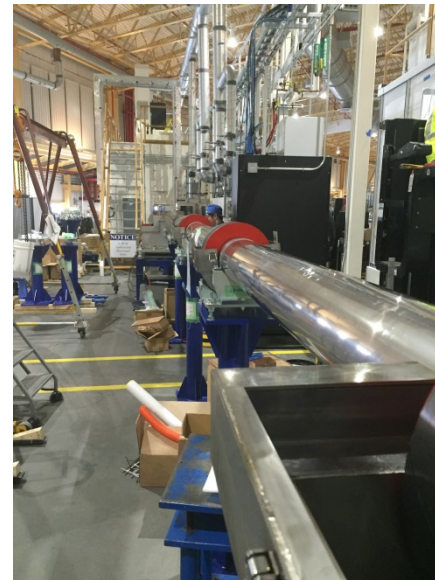


NSLS-II Beamline Construction

- ABBIX: 3 beamlines: first light at LIX (Nov 2015) , AMX/FMX (March 2016) on track for project completion (June 2016).
- NEXT: 5 beamlines. On track to meet early project completion (Jan 2017)
- Partners: 5 beamlines: All on track. First light at XFP summer 2016.
- BDN: TES and CMS to complete in FY16

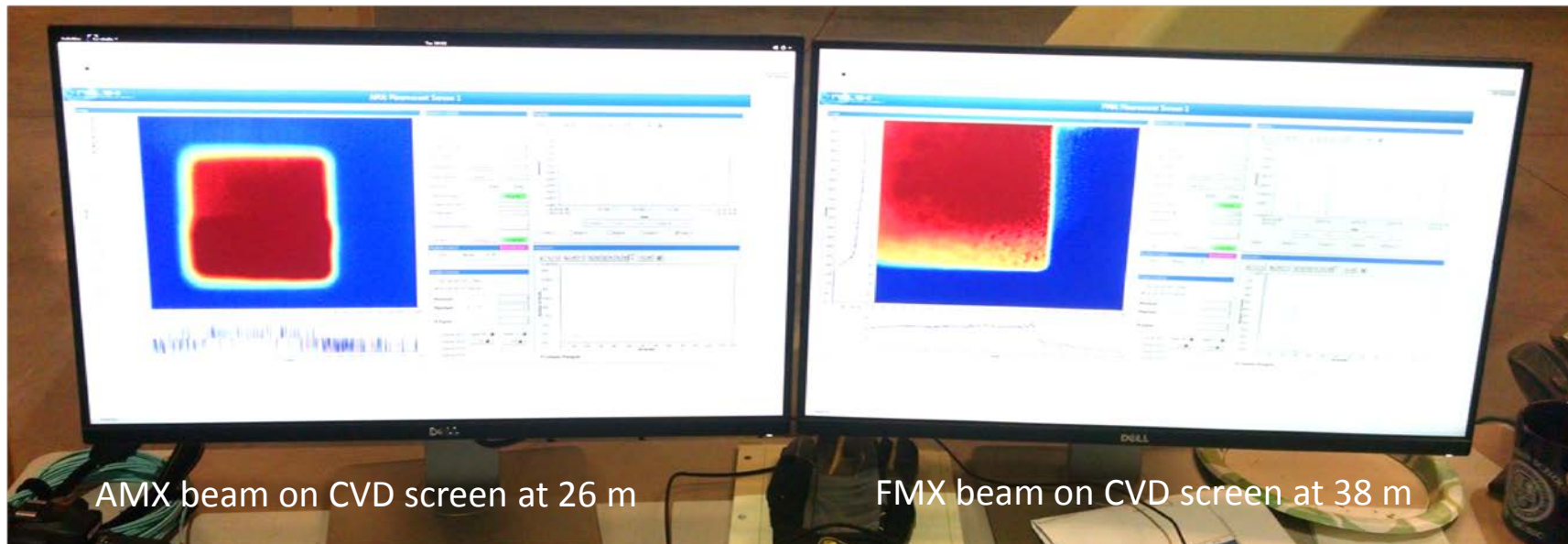


ESM undulator



ISS Photon
Delivery System

First Light at AMX and FMX



- First light observed shortly after **9 PM on March 8, 2016**
- Direct white beam observed simultaneously on CVD diamond screens installed upstream of the double crystal monochromators of the beamlines
- Ring current 1.6 mA, undulator gaps 6.4 mm

NEXT Project Major Milestones, Schedule

5 beamlines: ISR, ISS, ESM, SMI and SIX

Major Milestones

- CD-0 (Mission Need)
- CD-1 (Alternative Selection)
- CD-3A (Long Lead Procurement)
- CD-2 (Performance Baseline)
- CD-3 (Start Construction)
- Internal Early Project Completion
- CD-4 (Project Completion)

Actual: May 27, 2010

Actual: Dec. 19, 2011

Actual: Oct. 9, 2013

Actual: Oct. 9, 2013

Actual: July 7, 2014

Planned: Sept. 30, 2016

Planned: Sept. 29, 2017



SMI white beam cpts

- Project is on schedule (SPI=0.96) and improving cost performance (CPI=0.95).
- Work is proceeding apace. Averaging \$2.5M a month of work.
- Issues now are delivery of certain critical path items and growth in overall cost

Beamlines Developed by NSLS-II (BDN)

7 beamlines: CMS, TES, QAS, XFM, FIS/MET, FXI, XPD-2

- Funded from NSLS-II operations. Managed w/o cost contingency. Funding directly affects schedule.
- Under CR we stopped construction of FIS/MET, QAS, XFM, XPD-2
- Construction continued on FXI, CMS and TES.
- With FY16 budget in place we restarted FIS/MET, QAS, XFM, XPD-2
- With favorable funding QAS, XPD-2 will finish in FY17, the rest in FY18
- CMS, TES on schedule for completion date: Sept 2016

NSLS-II Partner Beamlines (NPB)

1. NYX (NYSBC)
 - Final Design Review (Feb 2016).
 - Schedule and budget both tight for completion in Oct 2016
2. XFP (Case Western Reserve)
 - XAS partner approved to add to science mission of footprinting
 - On schedule for completion in Aug 2016
3. SST-1/SST-2 and BMM (NIST)
 - Work was proceeding apace
 - Budget issues largely resolved
 - Completion data summer 2017
4. HEX (NYS)
 - Very early stages of conceptual design
 - Awaiting confirmation of NYS money

Updated IRR Schedule in Next Few Months

Beamline IRR	IRR Scheduled Date	Expected First Light
AMX/FMX (PDS)	Complete, March 4, 2016	March 8, 2016
ISS (PDS)	March 24, 2016	Apr-May 2016
XFP (ID/FE and PDS)	June 27, 2016	August 2016
ESM (ID/FE and PDS)	July 2016	August 2016
ISR (PDS)	July 2016	August 2016
TES (ID/FE and PDS)	August 2016	September 2016
CMS (ID/FE and PDS)	September 2016	October 2016
NYX (PDS)	October 2016	Nov 2016
SMI (PDS)	October 2016	Nov 2016
SIX (ID/FE, PDS)	October 2016	Nov 2016
BMM (PDS)	March 2017	April 2017
SST1&2 (PDS)	April 2017	May 2017
FXI (PDS)	September 2018	September 2018

Beamline Development Proposals (BDPs)

- 11 Preproposals received covering a wide range of techniques
- Management down selected and combined to request 6 BDPs
- Worked with the community to develop these proposals
- These were reviewed externally (Feb 2016)
- The results of these reviews will be presented to the SAC (March 24th 2016)
- Expect to continue to work with the proposal teams to develop stronger proposals, identify funding opportunities and develop selected beamlines.

Summary

- Accelerator performing well, goal is 250 mA in this cycle.
- Beamlines are in GU program. Science results coming out.
- ABBIX beamlines taken first light
- NEXT on schedule for completion in 2016.
- Budget issues for this year are resolved, BDN restarted
- Focus in the coming cycle will be in ramping up the number of users and ensuring they have a good experience at NSLS-II.