

EARTH & ENVIRONMENTAL SCIENCES WORKSHOP

NSLS transition to NSLS-II and the
grand vision for Earth and
Environmental Sciences in the Light
Sources Directorate

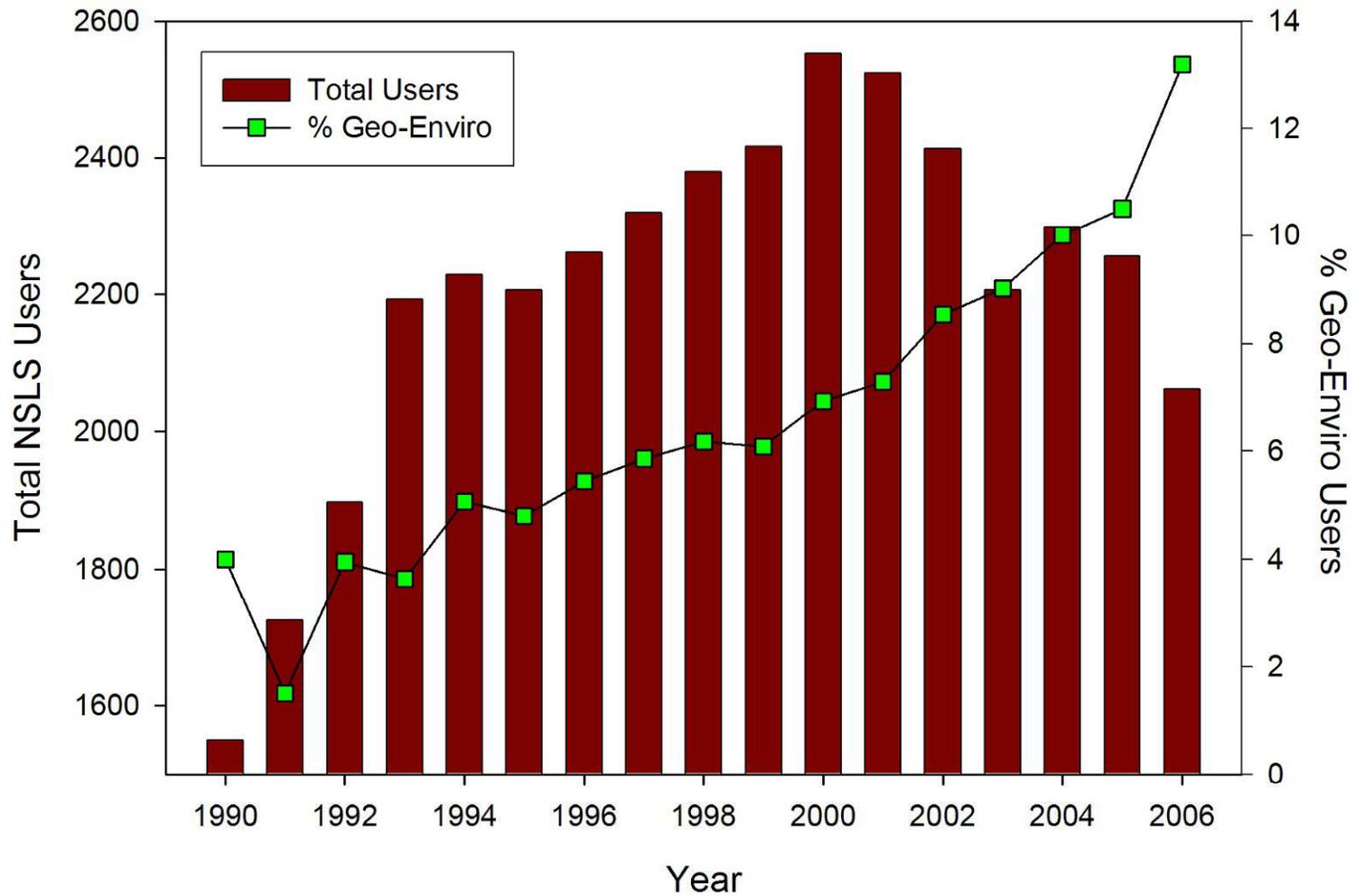
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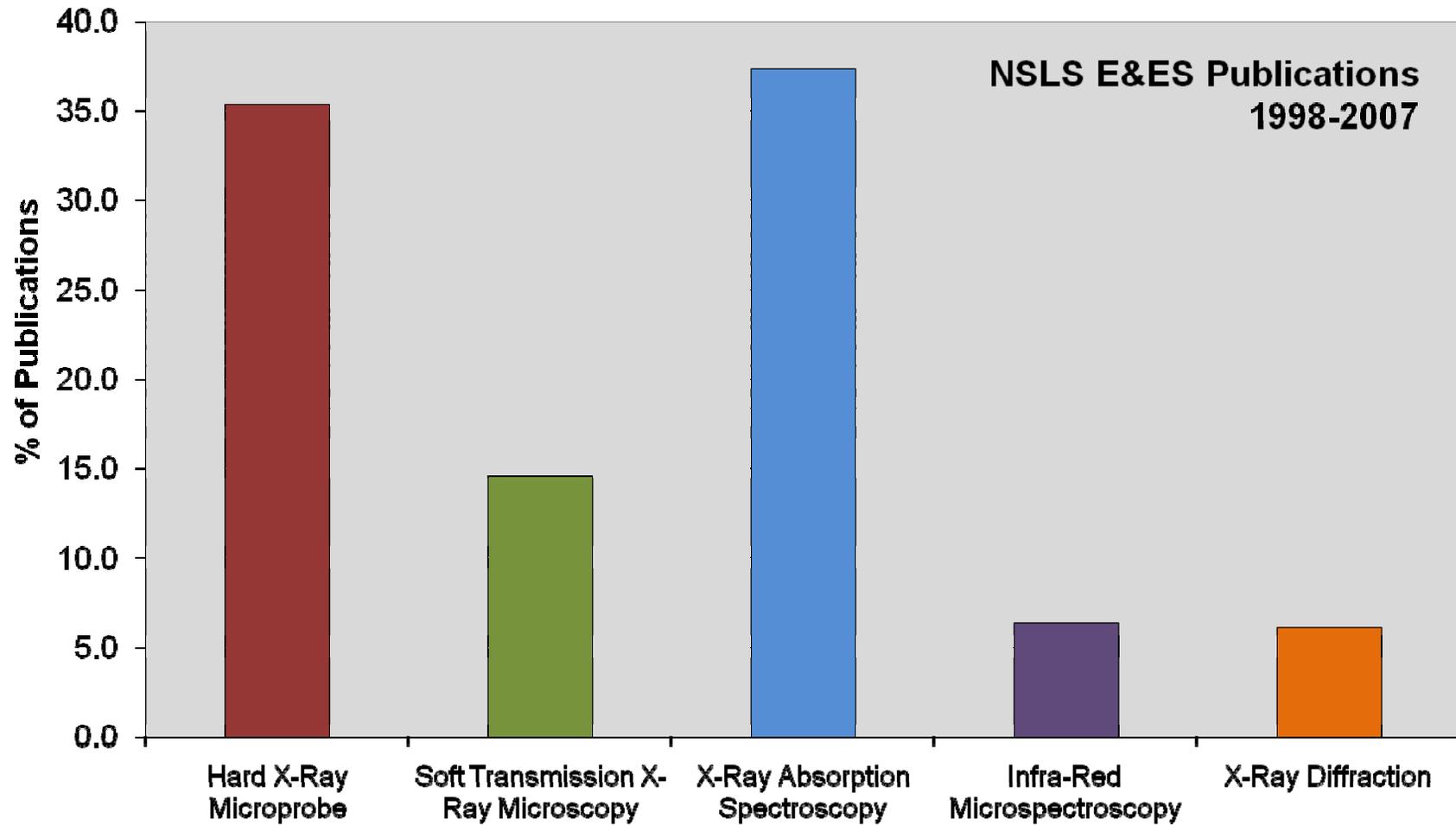
Goals of Scientific Strategic Planning Workshops

- 1. Short-term planning for the growth and expansion of current NSLS programs**
 - For world-class science today
 - For the transition to NSLS-II
- 2. Discuss the vision of earth & environmental sciences for NSLS-II**
 - What beamlines and facilities will be needed?
 - How will the impact on the user community during the transition be minimized?

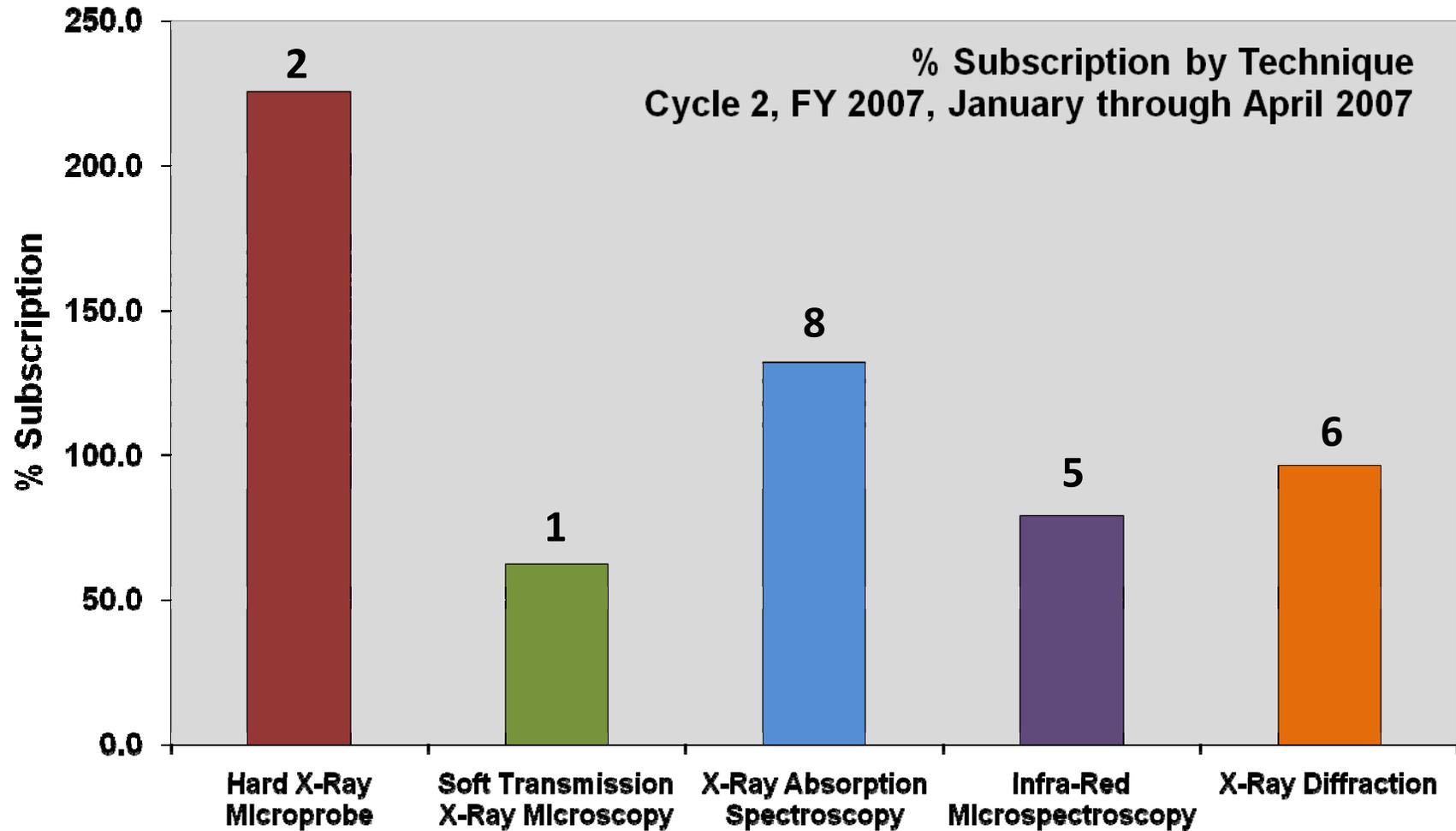
A Rapid Growth



NSLS Programs Today



NSLS Programs Today



Programs Funded for E&ES at NSLS

Beamline	Technique	Facility Beamline or PRT	Organization
U2A	Infrared spectroscopy / imaging	FB	COMPRES
X1A	Soft x-ray spectromicroscopy (STXM)	PRT	EnviroSuite/CEMS
X11A/B	Hard x-ray spectroscopy	PRT	EnviroSuite/CEMS
X15B	Tender x-ray spectroscopy	PRT	EnviroSuite/CEMS
X17B2	Hard x-ray diffraction	FB	COMPRES
X17B3	Hard x-ray diffraction	FB	COMPRES
X17C	Hard x-ray diffraction	FB	COMPRES
X26A	XRF microprobe / XRD	PRT	GSE-CARS
X27A	XRF microprobe	FB	EnviroSuite/CEMS

CEMS: Center for Environmental Molecular Science

COMPRES: Consortium for Materials Properties Research in Earth Sciences

CARS: Consortium for Advanced Radiation Sources

Transition to NSLS-II

Orient the scientific programs toward NSLS-II

- Scientific Strategic Planning Workshops
- Long range white papers to translate the scientific challenges to an overall plan for
 - Beamline upgrades at NSLS
 - New beamlines at NSLS (e.g. X5 insertion device port)
 - New beamline proposals for NSLS-II
- NSLS DOE review (Apr 08) and SAC meeting (May 08)
- Revision of the NSLS 5-Year Plan

Transition to NSLS-II

Transition Research Resources, Consortia, PRTs

- Research Resources and PRTs are responsible for many scientific programs at the NSLS
- Work with research resources (e.g. PXRR, Case Center for Synchrotron Biosciences, COMPRES, Catalysis consortium) on their program renewals
- Work with PRTs on their long term plans and transition plans
- evolution of their scientific programs and their role in operating beamlines

Consortium Example: COMPRES

- Consortium for Materials Properties Research in Earth Sciences (COMPRES), an organization that facilitates the operation of high-pressure beamlines for earth science research
- Five-year, \$11.5 million cooperative agreement funded by NSF
- More than \$4 M for the operation of NSLS beamlines X17B2, X17B3, X17C, and U2A
- Partnership between NSLS and COMPRES
 - Leverage investment: NSLS on beamline, COMPRES on endstations; joint hire between Stony Brook mineral physics institute and NSLS
 - COMPRES played an important role in developing a white paper for high pressure research at NSLS-II and organizing a NSLS-II user workshop breakout session in July 07

Beamline / Endstation Transfer

Rationale

- Ensure significant capacity for NSLS-II at the commencement of operation to accommodate the large number of users from NSLS
- NSLS-II large gap dipoles (for far-IR), soft bends, and three-pole wigglers are world-class sources for many experimental techniques
- Many NSLS beamlines, with proper upgrades funded by DOE and other agencies, will be state-of-the-art for these sources
- Commissioning and use of the upgraded hardware at NSLS prior to transfer to NSLS-II will save valuable commissioning time
- Recommended by Lehman CD-1 review and NSLS-II Experimental Facility Advisory Committee (EFAC)
- Supported by DOE/BES

Beamline / Endstation Transfer

Proposed Mechanism

- A letter of interest (LOI) will be required for transfer of any PRT or facility beamline
- NSLS-II Experimental Facilities Advisory Committee (EFAC) will perform review
- Upon EFAC approval, form Beamline Advisory Team (BAT) and planning for beamline upgrades, including seeking funding

Beamline / Endstation Transfer

Beamline transfer working group (BTWG)

- Established at NSLS and led by S. Hulbert
- Representation from NSLS, NSLS PRTs, NSLS UEC, and NSLS-II
- Scope of work:
 - **Identify** the types of beamlines and endstations which are most suitable to be transferred, and to which type of NSLS-II source (ID, bend, 3PW, IR)
 - **Perform** detailed analysis of the performance of these beamlines/endstations; **determine** necessary upgrades for these beamlines to match NSLS-II sources
 - **Coordinate** major NSLS facility beamline/endstation upgrades
 - **Perform** detailed analysis of cost and schedule for all beamline transfers, after EFAC approval

Possible Distribution of Transitioned Beamlines

Technique	NSLS-II source	# at NSLS-II	# at NSLS (FY2007)
Far-IR spectroscopy	large gap IR	2	2
Mid-IR spectromicroscopy	standard IR	2	2
Soft x-ray MCD	soft bend	1	2
Soft x-ray spectroscopy	soft bend	1	6
Soft x-ray imaging (STXM)	soft bend	1	2
X-ray macromolecular crystallography	3-pole wiggler	3	8
Tender x-ray spectroscopy	soft bend	1	3
X-ray spectroscopy	3-pole wiggler	2	7
X-ray powder diffraction	3-pole wiggler	2	6
X-ray micro-diffraction	3-pole wiggler	1	1
X-ray scattering	3-pole wiggler	2	8
X-ray imaging	3-pole wiggler	2	4
X-ray microprobe	3-pole wiggler	1	3
SAXS	3-pole wiggler	1	3
Very hard x-ray	SCW	2	4
Totals		24	61

Beamline Transition Plan Summary

- ~20 beamlines will be transferred, covering techniques:
 - Far-IR spectroscopy; mid-IR spectromicroscopy; soft, tender, and hard x-ray spectroscopy; MCD; soft and hard x-ray imaging; microprobes, powder diffraction; microdiffraction; scattering; SAXS; macromolecular crystallography; and very hard x-ray scattering.
- Cost includes (no operating costs)
 - New optics required to match NSLS-II source and/or layout (e.g. mirrors, crystals, gratings)
 - Disassembly, moving, and reassembly
 - Front end, First optics enclosure, control systems at NSLS-II
 - Design support
 - Additional hardware (e.g. beampipes, cabling, photon shutters)

Total transition cost = ~\$45M (direct, FY07 dollars)

Grand Vision?

To enable world-class Earth and Environmental Sciences Research today, tomorrow, and 25 (or more!) years from now.

This vision must come from the community

- What techniques are needed?
- What is the anticipated capacity needed?
- What cannot be done today that can be envisioned with NSLS-II?
 - New techniques
 - Creative ways to increase capacity for workhorse techniques
 - New user communities