Argonne NATIONAL LABORATORY

… for a brighter future

U.S. Department of Energy

THE UNIVERSITY OF CHICAGO

Office of Science U.S. DEPARTMENT OF ENERGY

A U.S. Department of Energy laboratory managed by The University of Chicago

Strategic Planning for Beamline Upgrades

George Srajer

APS Monthly Operations Meeting

January 30, 2008

APS Midterm Upgrades

Midterm ⇒ 5 years upgrade plan has two components:

(1) Beamlines upgrades

- detectors
- instrumentation and infrastructure
- software
- optics

(2) X-ray source enhancements

- specialized undulators
- customized beta functions
- higher current (~ 200 mA)
- extended straight sections

Process

In the development phase

- **Coordinators**

  Denny Mills - Beamlines

  Rod Gerig - Accelerator

- **Beamlines upgrades input phase**

  - Originate from individual beamlines

  - Additional input provided by Advisory Committees

  - APS users organizations involved from the start

    ⇒ APSUO Steering Committee

    ⇒ Partner Users Council

    ⇒ Science Interest Groups, Round Tables, etc.

XOR Advisory Committees: 14 Total

Surface/Interface Scattering *(Ron Pindak - Chair)*

Structural Characterization *(Angus Wilkinson - Chair)* ⇐

Microstructure/Mechanical Properties *(Matt Miller - Chair)*

Time-Resolved Spectroscopy and Scattering *(R. Schoenlein - Chair)*

Sector 8 *(Simon Mochrie - Chair)*

Sector 3 *(Brent Fultz - Chair)*

Sector 9 *(Kent Blasie - Chair)*

Sector 30 *(John Hill - Chair)*

Sector 4 *(Dario Arena - Chair)*

Sector 6 *(Alan Goldman - Chair)*

High Energy Wide Angle Scattering-PDF *(Angus Wilkinson-Chair)* ⇐

Small Angle X-Ray Scattering *(David Cookson - Chair)*

Spectroscopy *(Ed Stern - Chair)*

X-Ray Microscopy and Imaging *(Gayle Woloschak)*

Timeline

Rather demanding - all dates in 2008

(1) First draft to be completed by March 30

(2) Preliminary document completed by May 5 $\Rightarrow$ APS Users Meeting

(3) Document refinement from May to October

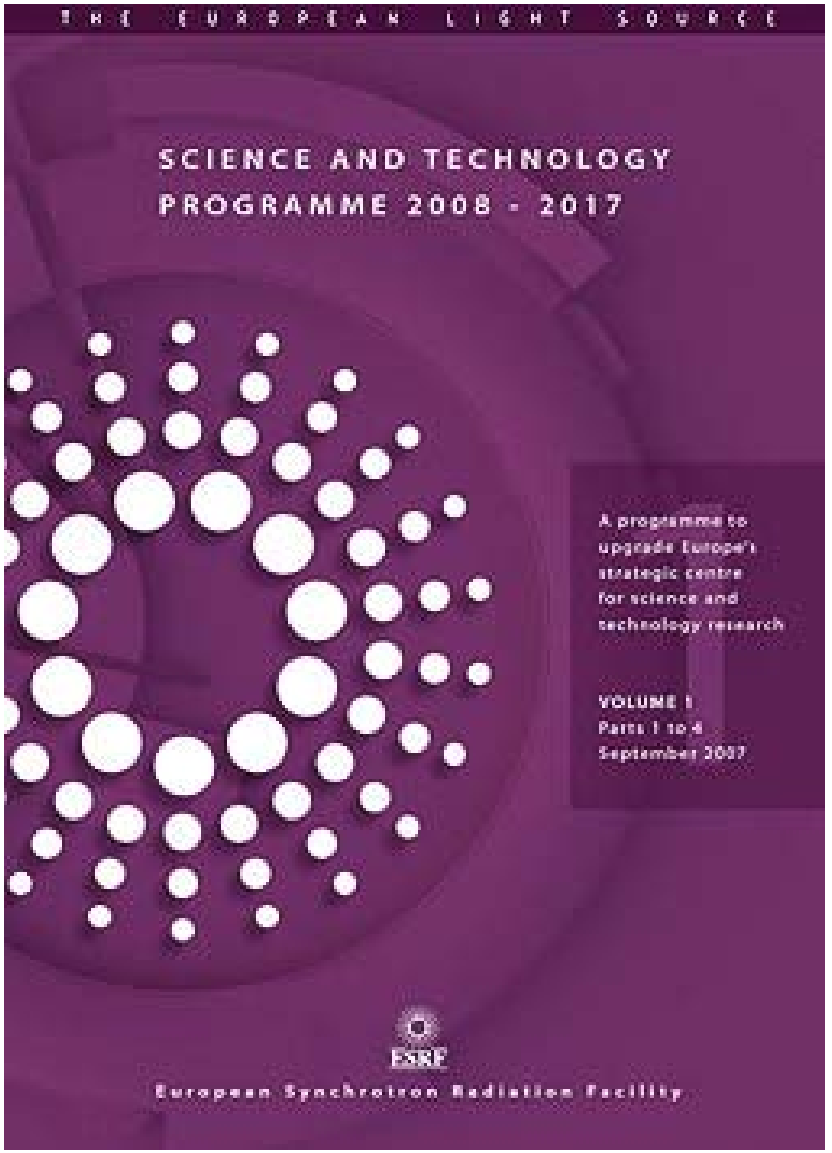
(4) APS Midterm Upgrade Plan unveiled at the October 20-21 Workshop

(5) Midterm and Long term upgrade plans integrated after the Workshop

Justification for Upgrades

Most importantly: Science driven

We can learn from ESRF ⇒



A Possible Guide

- Science
- Added value of the Midterm Upgrade

  - smaller samples, shorter time scales, …
- Key questions
- Expected user communities
- Enabling technology and infrastructure
- Partnerships
- Industry and technology transfer

Science Drivers

There were 23 Workshops and Technical Reports (2002-2007)

Directing Matter and Energy - Five Challenges for Science and the Imagination:

- *How do we control material processes at the level of electrons?*
- *How do we design and perfect atom- and energy- efficient synthesis of revolutionary new forms of matter with tailored properties?*
- *How do remarkable properties of matter emerge from complex correlations of the atomic or electronic constituents and how can we control these properties?*
- *How can we master energy and information on the nanoscale to create new technologies with capabilities rivaling those of living things?*
- *How do we characterize and control matter away—especially very far away—from equilibrium?*

Summary

- Midterm Upgrade plans offer benefits to ALL areas of science at the APS
- Ensures that APS will remain competitive for many years to come