

## **BEAMLINE INSTRUMENTATION GROUP**

### **STRATEGIC PLAN – 9/30/19**

#### **Introduction**

The X-ray Science Division (XSD) at the Advanced Photon Source (APS) develops innovative instrumentation and techniques to enable and perform forefront research using X-rays. The Beamline Instrumentation (BI) Group which is part of the X-ray Science Technologies (XST) section within XSD contributes to this mission by providing beamline engineering design support to existing XSD beamlines as well as future beamlines that will be built or enhanced as part of the APS Upgrade (APS-U) Project. This document describes the BI Group's strategy to carry out this mission in collaboration with the other technical groups within the XST section.

#### **Vision**

The BI Group will work closely and collaboratively with other XST technical groups to carry out the design, development and construction of world-class instruments for current and future APS beamlines, in support of XSD priorities.

#### **Strategy**

The BI Group will continue providing effective technical support to existing XSD beamlines with priority given to efforts that are in-line with the longer-term priorities of the XSD Strategic Plan. That Plan emphasizes beamline improvements and technical developments that take full advantage of the world leading coherence and brightness that the APS-U will provide as well those that utilize the distinguishing high-energy x-ray spectrum of the APS.

1. Provides the highest quality design, calculation, analysis simulation and measurement support in all areas of beamline engineering.
2. Collaborates closely with scientific and technical staff from other XST section groups on beamline development projects, from concept through commissioning.
3. Cultivates a vibrant, energetic and competent in-house staff with expertise in novel research instrumentation, high-precision manipulation systems and quantitative diagnostics.
4. Assists beamline personnel with performance optimization of their experimental systems.
5. Stays apprised of world-leading instrumentation engineering developments.
6. Pursues application-driven R&D in partnerships with the scientific staff.

#### **Implementation**

1. Set BI Group priorities for beamline work in accordance with XSD strategic plan.
2. Support the APS-U Project as it develops and enhances beamlines.
3. Assign a Liaison Engineer to each Beamline Operations Group to serve as the primary BI Group contact. The Liaison Engineers work with the Group Leaders of their assigned Groups to determine the relative priorities of tasks within a given Group. The Liaison Engineer attempts to balance

their efforts such that an equitable division of support is provided to each of the Groups they support.

4. Establish external sources for design work to augment in-house capabilities.
5. Establish close ties with specific designers in the AES-DD Group.
6. Maintain strong ties to AES-MED Group and other APS engineers to benefit from their experience and resources.
7. Establish clear requirements and specifications prior to and as part of the design process.
8. Serve as a project managers for BI Group XSD projects.

### **Five-year Goals**

The BI Group's goals over the next five years are directed at making beamline improvements and technical developments such that XSD beamlines will be poised to take advantage of the upgraded APS source.

1. Work closely with vendors to improve the overall stability of beamline components such as monochromators, mirrors and slit assemblies to preserve the high brightness.
2. In partnership with the Optics group, develop optics and windows to preserve the coherence of the upgraded APS source.
3. In partnership with the Beamline Controls group to develop vibrationally stable, rapid scanning, nano-positioning capable end stations to exploit the upgraded source.

### **Goals and Action Plan for FY2020**

1. Continue assisting APS-U in the design and construction of the APS-U Instrumentation Development, Evaluation & Analysis (IDEA) Beamline at 28-ID.
2. Continue assisting APS-U in the design and construction of the ASL beamline at 25-ID. This will free up 20-ID for future development as the HEXM beamline.
3. Complete the canting of 2-ID to enable fully independent operation of the D and E stations.
4. Continue support of the RAVEN Project.
5. Continue to support the HT-HEDM Project at 6-ID-D.
6. Continue developing and begin executing the final designs for both the APS-U feature and enhanced beamlines.
7. Continue to support the procurement and installation of robotic manipulator for 7-ID-C SNOM detector.
8. Design and install components to upgrade the Long Trace Profiler.
9. Continue to address on-going obsolescence issues at the beamlines through the XSD multi-year plan to replace key components. This plan includes procurement of two cryo-coolers systems for 20-ID/25-ID and 32-ID in FY20.
10. Continue development of a synergistic strategy document with other XST section technical groups that incorporates all aspects of beamline optics, detectors, instrumentation, controls, and computing.

## **BI Group SWOT Analysis**

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"><li>• Group members have strong technical skills and are highly motivated.</li><li>• Group members have established good working relationship with beamline staff.</li><li>• Group has a good mix of education and experience level.</li></ul>	<ul style="list-style-type: none"><li>• Staffing level and demands of APS-U will limit the number of OPS projects and tasks that the Group can take on.</li><li>• Support for mechanical automation tasks is currently placed with outside contractors.</li><li>• Some technical skills are concentrated in key personnel.</li></ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"><li>• APS-U feature and enhanced beamlines will offer cutting edge design opportunities.</li><li>• Mentoring within the Group to transfer specialized knowledge.</li><li>• Greater collaboration with XST team.</li></ul>	<ul style="list-style-type: none"><li>• Competition for scarce resources.</li><li>• Disconnect with APS-U efforts.</li><li>• Stringent design requirements for APS-U beamlines.</li></ul>