Neutron Nexus Guidelines

The Neutron Sciences Directorate (NScD) will develop a series of "Neutron Nexus" sites that form a strategic partnership between NScD and several universities. This collaboration aims to grow the user community and build greater scientific impact. The Neutron Nexus will facilitate effective collaborations and educate the community about neutron scattering to enable users to leverage cutting-edge neutron scattering technology effectively in their research. While each Nexus site may have different scientific needs, this document will serve as a set of guiding principles to ensure the successful creation and implementation of the program.

Purpose of the Neutron Nexus

The Neutron Nexus is an intentional and sustained initiative to foster personal relationships, educational opportunities, in-person visits, and other outreach opportunities between NScD and "Key Universities" as well as surrounding regional universities, community colleges, and technical colleges. A Key University is a strategically selected R1 University that will play a pivotal role in neutron scattering outreach to the surrounding regional universities.

Goals and Objectives

Goal 1: Lower the barriers to access neutron scattering and create a sustained outreach effort at a Nexus site by providing increased awareness, educational resources, and support from proposal submission to publication.

Objective 1: Foster an understanding of how neutron scattering is beneficial in the research of those who have not used the technique before. This can occur through various activities such as introducing neutron scattering into a course by an NScD guest lecturer, proposal writing webinars, science themed workshops on targeted topics, and the co-development of other educational resources.

Objective 2: Provide current users with opportunities to learn about data reduction and analysis to ensure successful publication from an experiment. This can be supported through data analysis workshops, NScD staff office hours, and development of how-to videos or pamphlets to make available on neutrons.ornl.gov.

Goal 2: Foster collaborative relationships 1) between ORNL staff and Nexus faculty, 2) between Key Universities and regional colleges, and 3) between researchers at different Nexus sites.

Objective 1: Identify areas of common interests and complementary strengths between the above groups and strengthen them by establishing new research directions and developments, eventually leading to collaborative proposals.

Objective 2: Explore opportunities for cross collaborative visits or positions. Examples include site visits between the groups, co-supervision of postdocs or graduate students, joint faculty positions, adjunct faculty positions for regional faculty at key university, undergraduate and graduate interns at ORNL, etc.

Goal 3: Enhance workforce development opportunities to create a pipeline of long-term neutron scattering users and provide opportunities for students and postdocs to learn about National Lab career options.

Objective 1: Provide undergraduate, graduate, and postdoctoral researchers with opportunities such as internships, site visits, speaking invitations, workshop opportunities, and networking events to learn more about careers at a National Lab, in particular with neutron scattering.

Objective 2: Develop educational materials and implement them at both the undergraduate and graduate level to provide an awareness of how neutron scattering can benefit society and help solve certain scientific challenges. The material can be delivered by a local neutron scattering expert or an ORNL staff scientist.

Expected commitments of ORNL and Universities

ORNL/NScD

Recruit advocates: NScD will engage with the key university and regional schools to collaborate with departments, understand their research, and demonstrate the benefits of neutron scattering.

Targeted communication: NScD will tailor education and outreach to each department's specific needs.

Support from proposal to publication: NScD will provide resources, training, and personalized feedback on proposals and data analysis of users within the NEXUS.

Other: Funds may be available, but are not guaranteed, for joint faculty appointments, shared postdocs, workshop sponsorship, student internship opportunities, and travel for collaboration or outreach purposes (not for experiments).

Key Universities

These suggestions can be adapted based on the university's needs and resources.

Recruit Advocates: The key university will help identify researchers who could benefit from using neutron scattering and/or form collaborations with NScD scientists

Engage with regional schools: The key university will reach out to faculty or departments at regional schools to collaborate and/or participate in educational opportunities in neutron scattering.

Educational Integration: The university will integrate neutron scattering at the appropriate level into undergraduate and graduate courses. This could include incorporating neutron scattering concepts into lectures, asking NScD staff to guest lecture in a course, and finding various ways to showcase real-world applications of neutron scattering to enhance understanding in students.

Collaboration in Funding Applications: The university will be open to partnering with NScD to apply for funding, with a specific focus on incorporating neutron scattering into research proposals

Both NScD and Key Universities

Co-mentoring students and interns: Researchers will be open to co-mentoring students, postdocs, and/or interns to foster a collaborative learning environment.

Sustained Efforts: Both ORNL and Nexus sites will prioritize efforts that will ensure continuity and support for ongoing projects and outreach.

Collaboration: Both ORNL and the Nexus sites will organize and host in-person and/or virtual meetings and workshops.

<u>Benefits of the Neutron Nexus</u>

To Universities

Workforce development: Undergraduate, graduate, and postdocs learn about and could eventually find positions as ORNL Staff or University faculty

Funding opportunities: Collaborations will naturally lead to joint proposals, particularly those which call out user facilities and universities working together.

Collaborations: National Lab collaborations with universities lead to innovative applications in neutron scattering and broaden the scientific scope of the technique. This

synergy leads to new techniques that can be used to study new systems, leading to high impact publications and long-standing, productive working relationships.

Sustainability: Historically, there have been single-event engagements between ORNL and universities via site visits and workshops, but the Nexus intends to maintain sustained collaboration efforts in both directions.

Increased research impact: The Nexus will facilitate effective interactions, enabling researchers to leverage cutting-edge neutron scatting technology and analysis expertise.

To ORNL

Increased user base: The Nexus will increase the number of researchers who use the facility, keeping the neutron scattering community strong as we lean into the development of the Second Target Station.

Diverse science: The Nexus collaborations will identify and cultivate non-traditional scientific applications for neutron scattering.

New technology: Collaborations between NScD and Universities will help increase the applications for neutron scattering and result in new sample environment conditions and software resources via creative interactions between researchers that push the boundaries of existing capabilities.

Workforce development: Through sustained interactions between NScD and Universities, a professional pipeline of highly skilled scientists, researchers, and technicians will be developed.

Metrics to measure success

To hold NScD and the Nexus sites accountable, periodic reviews will take place to determine strengths and weaknesses in the established collaboration to guide a productive path forward. Metrics can include, but are not limited to:

- Number of SNS/HFIR users from key institution and regional schools
- Joint publications and impact
- Internships and sabbaticals of Nexus researchers at ORNL
- Student participation in Nexus program (beyond users, examples include workshop participants)
- Collaborative proposals submitted
- Participation in educational activities

Flexibility and Tailored Outcomes

The ideas presented in this document are a guide that speaks to the intent of a Neutron Nexus collaboration. Each Nexus site will look a little different based on needs and research strengths. NScD will work with each Nexus group to ensure maximum impact and foster a deeper understanding of and stronger engagement with neutron scattering techniques.