

## CNMS User Group Town Hall meeting, 09/02/2015

Location: Iran Thomas Auditorium, SNS site, ORNL, during the 2015 CNMS User Meeting.

*Meeting was called to order at 15:35 by Nazanin Bassiri-Gharb, UEC Chair with approximately 100 User Meeting attendees present.*

-- See accompanying slides on pp. 3-30 of this document --

- Nazanin began by introducing all the UEC members present at the Town Hall meeting
- She then led a discussion of the UEC roles including issues such as capital equipment purchases
- There was a review, explanation and discussion of the proposal process, proposal history, and active proposals followed by a request for volunteers to review proposals.
- We then went on to review the UEC nominations. The following nominations were received prior to the Town Hall and were presented:

At large: Alex Belianinov-ORNL/CNMS  
Evgheni Strelcov-CNMS  
Kathrin Dörr-Martin-Luther U., Halle  
Ryan Hansen-Kansas State  
Brian Long-U. Tennessee  
Yayoi Takamura-University of California, Davis  
Yang Zhang-U. Illinois (possibly Secretary)  
Milan Buncick- AEGIS Technologies

Vice Chair: Lane Martin-University of CA, Berkeley  
Yayoi Takamura-University of CA, Davis  
Bryan Vogt-University of Akron

Secretary: Yang Zhang- University of Illinois

There were no verbal nominations from the floor but one completed nomination form was submitted during the Town Hall meeting.

- There was a discussion of the CNMS strategic plan and budget review. There was a review of how the CNMS integrates into the ORNL mission and priority areas and a review of new instrumentation as well as anticipated instrument purchases that will be delayed due to delay in FY16 federal budget appropriations.
- Then there was a report out from the five roundtable sessions held earlier during the day on:  
Buried Interface Structures and effects on Properties  
Materials Genome  
Soft Materials  
Operando Characterization  
Scanning probe microscopy
- The results of the student poster competition were announced and awards were presented to:  
Gold: Sanjib Das, University of Tennessee  
Silver: Tyler Cosby, University of Tennessee  
Bronze: Tony Nelson, VA tech

Honorable Mention: Maximillian Heres, University of Tennessee; Gongwang Zhang ,University of Kentucky; Annette Farah, University of Tennessee

- Other business:

There was a proposal to amend the by-laws by replacing "Members of the Executive Committee shall serve out their terms before seeking election to an officer position such as Chair, Vice Chair or Secretary." (first paragraph page 2) with "Before seeking election to the Vice---Chair position, the candidate must serve at least one year as a member of the Executive Committee." These changes were proposed by Milan Buncick, Eric Formo, Molly Kennedy, Bobby Sumpter and Ray Unocic and accordingly will be on the election ballot this fall.

*The Town Hall meeting adjourned at 16:05 for the start of the final Plenary Lecture of the 2015 User Meeting.*

# CNMS TownHall meeting September 2015

Nazanin Bassiri-Gharb

# Agenda

- UEC Chair welcome and introductions
- UEC Roles: Implementation of Roles CNMS user proposal process
- CNMS user proposal process
- Election Nominations
- Strategic Planning, Roundtables Outcomes
- Student Poster Competition
- Other business

# User Executive Committee, etc.

**Chair** – Nazanin Bassiri-Gharb (Georgia Tech)

**Vice-Chair** – Molly Kennedy (Clemson University)

**Secretary** – Milan Buncick (AEgis Technologies Group)

## **At-Large Members:**

Eric Formo (University of Georgia);

Zheng Gai (ORNL/CNMS);

Enrique Gomez (Penn State U.);

Martyn McLachlan (Imperial College, London);

Megan Robertson (University of Houston);

Ray Unocic (ORNL/CNMS);

Rafael Verduzco (Rice University)

**Past Chair, ex officio member** - Vivek Prabhu (NIST)

**CNMS staff (non-members)** – Tony Haynes, Brad Lokitz, Sandy Lowe, Hans Christen

**CNMS staff (non-members)** – Bobby Sumpter, Mina Yoon, Stephen Jesse

# UEC ROLES AND IMPLEMENTATION OF ROLES

# UEC Roles

## CNMS UEC Roles

(identified by UEC, prioritized by CNMS leadership)

### Highest priorities, Tier I

- **Identify issues for users at CNMS and make recommendations for improvement.** Includes reviewing User Satisfaction Survey, Suggestion Box, and conducting other surveys at discretion of UEC and involving non-users as much as possible.
- **Contribute to planning for CNMS future by advising on strategic plan updates** (annually), including capital equipment planning, which is a key part of the strategic plan.
- **Make annual Town Hall meeting into more effective forum for user feedback,** for example by publishing an engaging agenda before the meeting to encourage users to bring ideas and want to attend; show it's important and results in action; consider controversial topics that may boost interest.

# Equipment plans as proposed at Budget Review

## FY15

- PPMS (ordered FY14) **FY14 user survey** FY15
- 3D Lithography (Nanoscribe) **FY14 user survey** FY15
- Gas-cell reaction holder and EDS detector (FEI Titan S TEM/STEM) **FY14 user survey** FY16
  - Atmosphere 200 Gas E-cell System (1atm., 1000°C)
  - EDAX 60 mm<sup>2</sup> EDS detector
  - Gata OneView camera (16 Mpix, 25 fps) – direct-funded from SUFD
- Nion UltraSTEM 100 upgrade FY16
  - Ultra-fast Scientific CMOS camera (4 Mpix, 100 fps) [in-situ; ptychography]
- Atom Probe Tomography upgrade FY16
  - Ion beam sputter/deposition system (for specimen preparation)
- Compute Cluster (Cray CS400; 32 nodes) [from FY16 plan] FY15
- miBot Probes [from FY16 plan] **FY14 user survey** FY15
  - For in-situ biasing experiments in SEM, HIM; simultaneous optical and electrical probing of 2D materials
- Contact Mask Aligner (replacement) FY15

# Equipment plans as proposed at Budget Review

## FY16

- Nanoscale SIMS capabilities (proposed, but postponed)
  - Not yet available
- ~~Computer Cluster~~ (moved to FY15)
- ~~miBot Probes~~ (moved to FY15)

## FY17

- Ultrafast spectroscopy
- PIXcel detector for 4-circle XRD **FY14 user survey**
  - 4-circle XRD currently not critically oversubscribed
- GISAXS Detector **FY14 user survey**
  - Possible change of plans – new instrument rather than upgrade?

Possible additions to the list:

- Dielectric spectroscopy (soft matter)
- Anasys nano-IR
- ...

# UEC Roles

## CNMS UEC Roles

(identified by UEC, prioritized by CNMS leadership)

### Highest priorities, Tier I

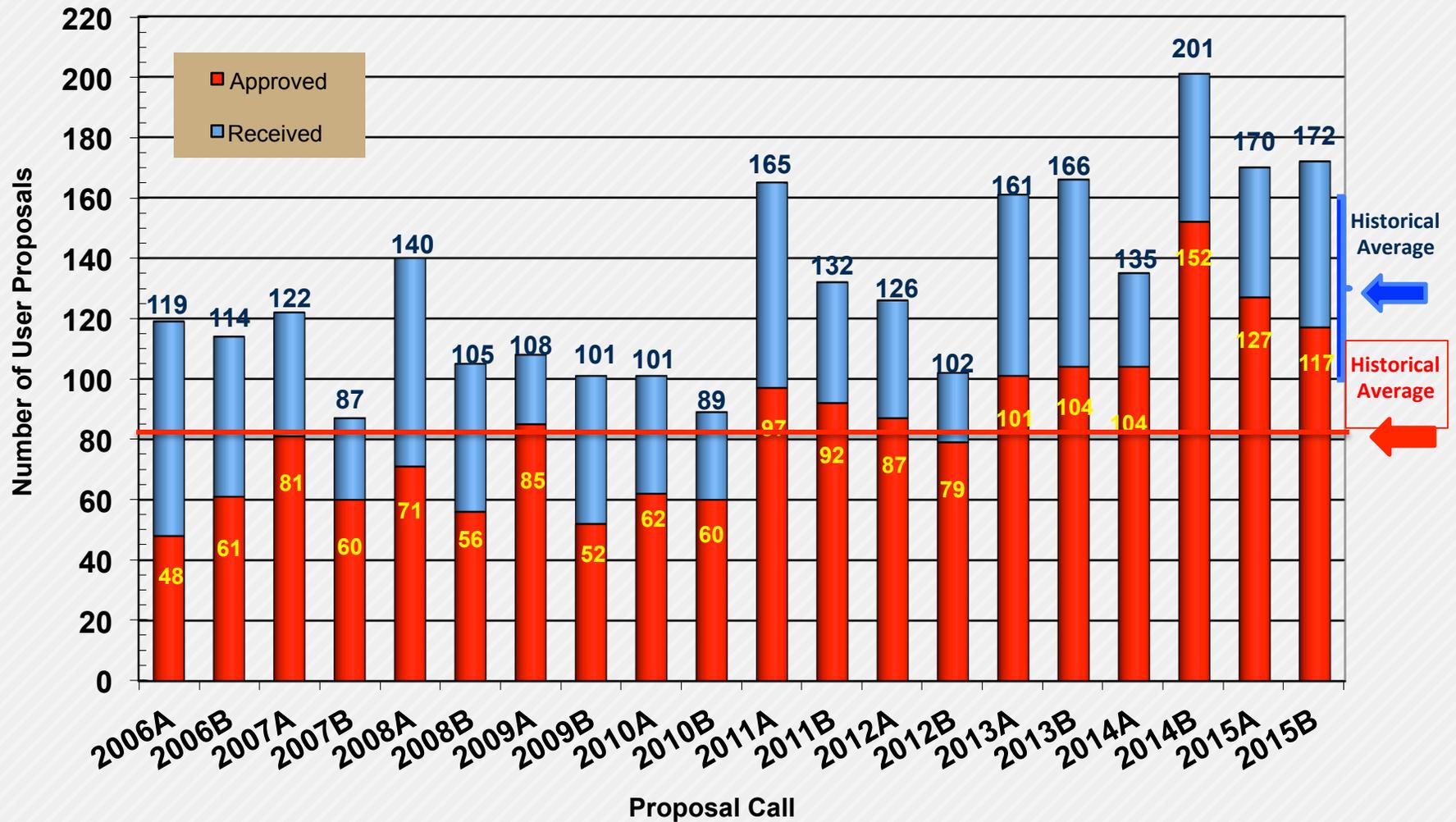
- **Identify issues for users at CNMS and make recommendations for improvement.** Includes reviewing User Satisfaction Survey, Suggestion Box, and conducting other surveys at discretion of UEC and involving non-users as much as possible.
- **Contribute to planning for CNMS future by advising on strategic plan updates** (annually), including capital equipment planning, which is a key part of the strategic plan.
- **Make annual Town Hall meeting into more effective forum for user feedback,** for example by publishing an engaging agenda before the meeting to encourage users to bring ideas and want to attend; show it's important and results in action; consider controversial topics that may boost interest.

# UEC Roles-continued

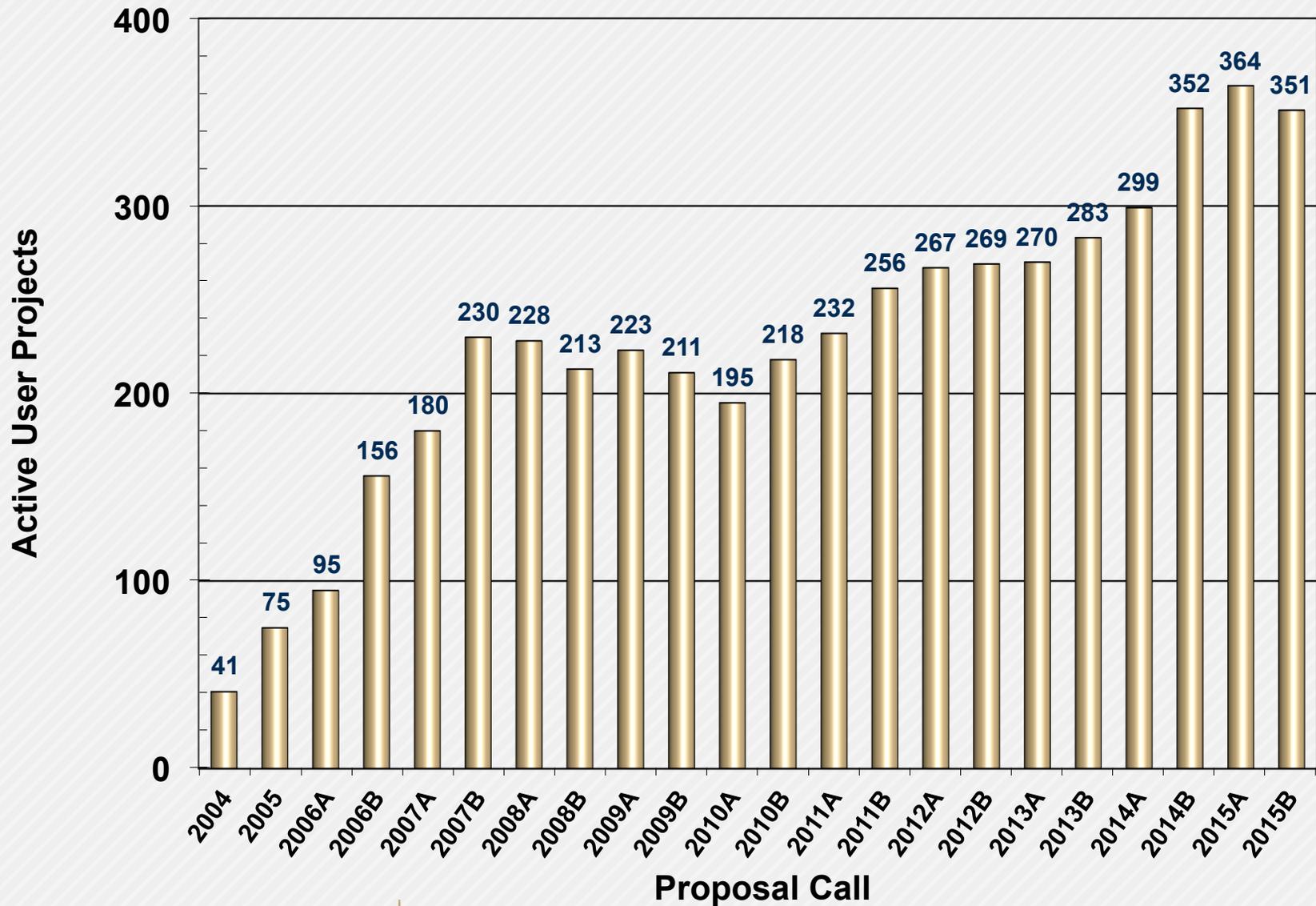
## Additional responsibilities, Tier II

- **Organize technical program for CNMS User meeting** so that it is truly the Users' meeting
- **“Produce” user newsletter:** identify content of most interest to users, including UEC activities that should be reported
- **Recommend proposal reviewers and evaluate the proposal process and results, including success rates and demographics** – to recommend improvements, assure fairness, and identify underrepresented populations of users.
- **Arrange UEC elections, particularly through recruiting** a diverse pool of candidates to represent all user constituencies and ensuring election is open and fair.
- **Represent facility at annual NUFO meeting**

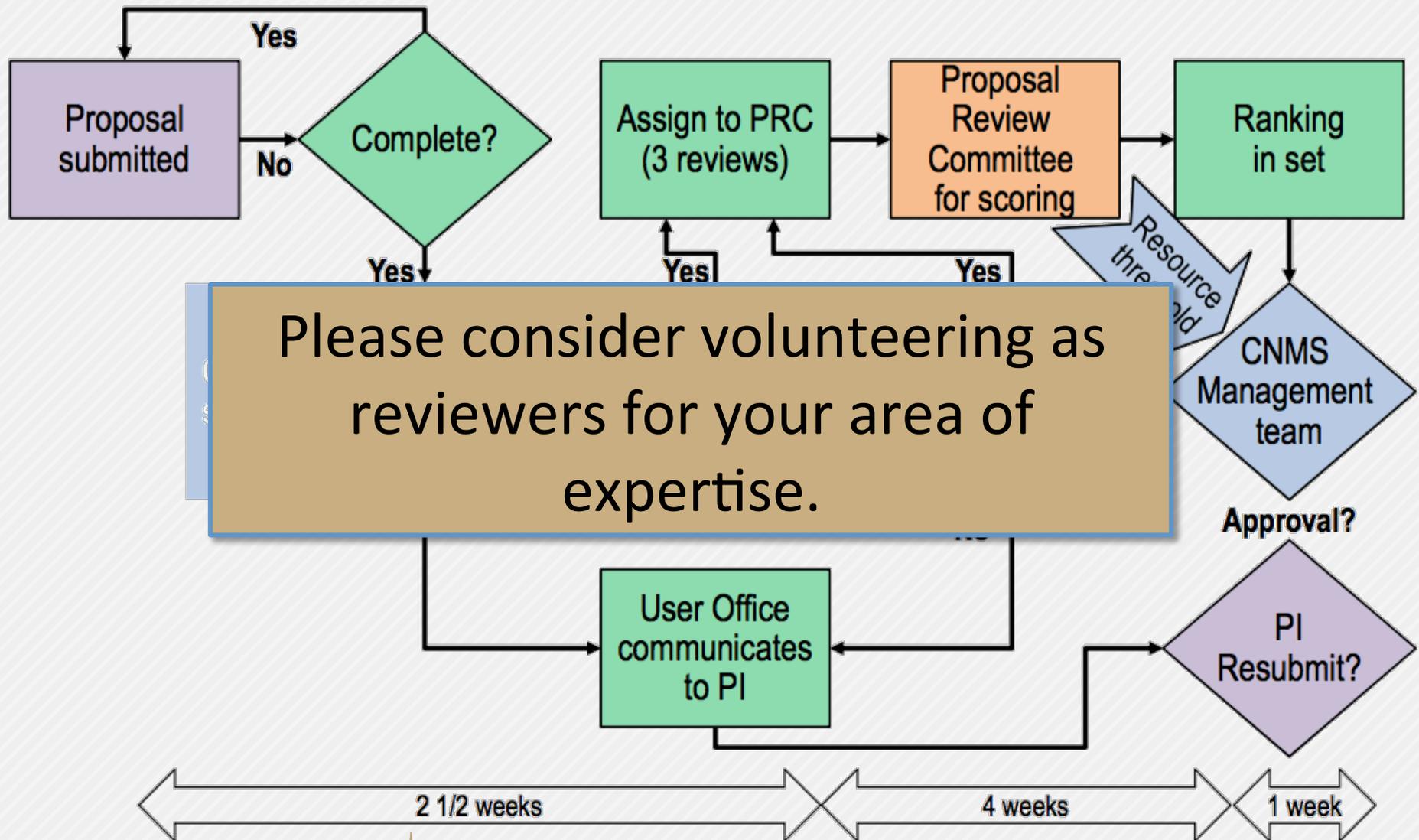
# Proposal submitted and approved



# Current Active Proposals



# How to evaluate CNMS proposals



# UEC Roles-continued

## Additional responsibilities, Tier II

- **Organize technical program for CNMS User meeting** so that it is truly the Users' meeting
- **“Produce” user newsletter:** identify content of most interest to users, including UEC activities that should be reported
- **Recommend proposal reviewers and evaluate the proposal process and results, including success rates and demographics** – to recommend improvements, assure fairness, and identify underrepresented populations of users.
- **Represent facility at annual NUFO meeting.**
- **Arrange UEC elections, particularly through recruiting** a diverse pool of candidates to represent all user constituencies and ensuring election is open and fair.

# UEC ELECTION NOMINATIONS

# 2016 UEC Nominations

## At-Large (\* need to confirm interest)

- Alex Belianinov- ORNL/CNMS
- Evgheni Strelcov-CNMS
- Kathrin Dörr- Martin-Luther U., Halle
- \*Ryan Hansen- Kansas State
- Brian Long- U. Tennessee
- Yayoi Takamura- University of California, Davis
- \*Yang Zhang- U. Illinois (possibly Secretary)
- Milan Buncick, AEGIS Technologies

## Vice Chair

- Lane Martin, University of California, Berkeley
- Yayoi Takamura- University of California, Davis
- Bryan Vogt, University of Akron

## Secretary

- Yang Zhang?

# STRATEGIC PLANNING INPUT

# Strategic Plan and Budget Review

## Discussed in the 2015-2019 Strategic Plan

- Integration into ORNL Missions:
  - Neutron Sciences
  - Materials by Design
  - Imaging
- Priority Areas
  - Studies of ultrafast phenomena at interfaces
  - Fabrication strategies for 3D structures
  - Monochromated, aberration-corrected STEM

## Discussed in the FY2014 Budget Review, will not pursue

- Key instrumentation (not within reach of our operating budget)
  - Next-generation STEM (\$4-5M)
  - Atom-probe tomography (\$4-6M)
  - Enhanced scanning probe capabilities (4-probe; low-T STM) (\$2-3M)

# Roundtable and workshop attendees

Roundtable Topic	# expressing interest	Room
Materials Genome	93	Auditorium PM
Buried Interfaces	93	Auditorium AM
Soft Materials	68	C-156 AM+PM
Operando characterization	75	C-152 A
Scanning Probe Data	36	C-152 PM
Soft Matter Scattering Workshop	70	Tuesday Auditorium
IR Workshop	30	Tuesday C-156

Overall attendees: 210-220 range

Overall goal of creating direct input from the users to the CNMS  
Leadership in creating the Strategic Plan

2015

# Buried Interfaces and Effects on Properties

## Emerging Research Opportunities

- Ability to fabricate interfaces that have been modeled or 'dreamed' but not observed. Expand the parameter space that we can synthesize.
- Observing 'nanoscale' structure over large areas, i.e., seeing bulk structures with nanoscale resolution and incorporating that information into models.
- Leadership in correlated characterization and increase of accessibility to data sets. (Collection, archiving, etc. of imaging, measurements)
- Ability to fabricate ordered nano-scaled materials that have macro (or larger) dimensions.
- Ability to modelers to test their experiments/ translate the complexity of a model to the 'simplicity' of available experiments/ fabrication techniques.

## Key Resources Available Elsewhere

- Isolated environmental characterization capabilities such as high pressure XPS at Berk.
- Synchrotron
- In situ holders (very slow (scans per second) and can not track multiple channels).

## Key Resources Available at CNMS

- Proximity to SNS facilities and CNMS has the ability to make samples needed for hard and matter neutron studies (also characterization at both centers).
- Diversity of fabrication techniques to focus on material classes/ defects-PLD, PVD, laser deposition, etc.
- In situ and operando characterization tools currently here (such as atom probe tomography, insitu STEM, TEM)
- etc.

## Resource Needs for CNMS Users

- Need #1: Combinatorial fabrication capabilities (merging of current fabrication capabilities) to enable high throughput experimentation.
- Need #2: Advanced controlled environment characterization ( e.g. high temperature, high pressure in XPS or TEM)
- Need #3: Increased resolution (time, space, etc.) for current characterization techniques.
- Need #4: Controlling scale up/ throughput of samples (going from 1 to 20 samples) for reliability/validation
- **Better logistics for modeling. Long term collaborations for modeling for length and time scale. (time scale of modeling is longer than user proposal grant timeframe of year)**
- **Matching of focus of users to create cluster science? (Staff job)?**
- **Need staff to understand prior platforms, current platforms and additional platforms.**

2015

# Materials Genome – Materials by Design

## Emerging Research Opportunities

- Big data management, digital handling, automation/standardization of protocols
- Data validation, avoid duplication, scientific workflow
- Materials in an extreme condition

## Key Resources Available Elsewhere

- Materials project
- NIST databases of properties
- European, light sources

## Key Resources Available at CNMS

- Microscopy, PLD (synthesis capabilities), HPC
- Theory, experiment synthesis and characterization, computation available in one place
- SNS/CNMS combination

## Resource Needs for CNMS Users

- Data management & handling
- Standardization of data structure

2015

# Elucidating Materials Functionality with Operando Characterization

## Emerging Research Opportunities

- Studying dynamic behavior of complex systems in real time
- In situ liquid-solid-gas nanofabrication.
- Data analytics

## Key Resources Available Elsewhere

- TOF-SIMS-AFM (ORNL)
- Monochromated Aberration Corrected STEM
- EM for the Nano-Bio interface

## Key Resources Available at CNMS

- Combination of specialized in situ TEM holders combined with high speed ccd camera.
- Only Nanoscience center with an in situ gas reaction system
- He Ion Microscope with in situ holders

## Resource Needs for CNMS Users

- In situ holders that can be utilized across multiple imaging/analysis platforms
- TOF-SIMS-AFM
- Data processing (drift correction), access to advanced data analytics programs
- Analysis of exhaust gases from the in situ gas reaction system

2015

# Scanning Probes

## Emerging Research Opportunities

- More measurement modalities
  - Temperature induced transformations
  - Thermal conductivity
  - Chemical mapping
- Cross-talk/transfer function
- Beyond Cantilevers
- Faster time domain/ higher throughput, dynamics
- Big data crunching

## Key Resources Available Elsewhere

- Stable, high sensitivity force-distance

## Key Resources Available at CNMS

- Multi-spectral measurements
- Wide range of environments

## Resource Needs for CNMS Users

- Cross-platform multiscale measurements
  - in-situ, maintaining environment across platforms
- Interferometry
- Closer coupling between instruments and analysis expertise, data sharing (astronomy, high energy physics as a model)

# 2015 Synthesis of Organic Molecules & Polymers

## Emerging Research Opportunities

- Bio- and renewable polymers – synthetic libraries and monomer availability for non-commercial samples
- Predictive design through theory and computation
- Membranes for gas separation, water purification, and ion transport
- In-situ techniques for response and time-resolved measurements. Controlled environments, humidity

## Key Resources Available Elsewhere

- Positron annihilation lifetime spectroscopy (PALS) (*limited availability*)
- TOF-SIMS for polymer depth-profiling (*limited access*)
- X-ray tomography (*limited resolution, expertise*)

## Key Resources Available at CNMS

- Synthesis of complex polymer architectures – beyond traditional polymers
- Theory and computational materials design
- Microscopy, cryo-TEM, and scanning probes
- Combined CNMS and neutron studies

## Resource Needs for CNMS Users

- Biopolymer synthesis, labeling, characterization
- Controlled atmosphere for characterization (e.g., controlled temperature, solvent, humidity environment)
- Positron annihilation lifetime spectroscopy (PALS)
- X-Ray reflectivity, TOF-SIMS

# STUDENT POSTER COMPETITION

# Student Poster Competition

## **Gold Medal:**

- Sanjib Das (University of Tennessee)

## **Silver Medal:**

- Tyler Cosby (University of Tennessee)

## **Bronze Medal:**

- Tony Nelson (Virginia Tech)

## **Honorable Mention:**

- Maximillian Heres (University of Tennessee)
- Gongwang Zhang (University of Kentucky)
- Annette Farah (University of Tennessee)

# REQUESTS FROM THE FLOOR

## Other Business: Proposed Amendment to By-Laws

Amendment procedure, as stated in the By-Laws:

*A proposed amendment to this charter, bearing the signatures of at least five CNMSUG members, may be introduced at an annual meeting. A two-thirds majority of members voting is required for passage of the amendment.*

- **Replace:**  
"Members of the Executive Committee shall serve out their terms before seeking election to an officer position such as Chair, Vice Chair or Secretary." (first paragraph page 2)
- **With the following:**  
"Before seeking election to the Vice-Chair position, the candidate must serve at least one year as a member of the Executive Committee."

Proposed by Milan Buncick, Eric Formo, Molly Kennedy, Bobby Sumpter, Ray Unocic

# OTHER BUSINESS