



National Nanotechnology  
Coordinated Infrastructure

SH<sub>2</sub>NE

Soft and Hybrid Nanotechnology  
Experimental Resource

NNCI Annual Meeting - Year 1  
January 18, 2017

Vinayak P. Dravid  
Director  
Northwestern University

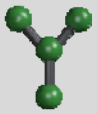
Andrew Cleland  
Co-Director  
University of Chicago

*ILLUMINATE YOUR RESEARCH*

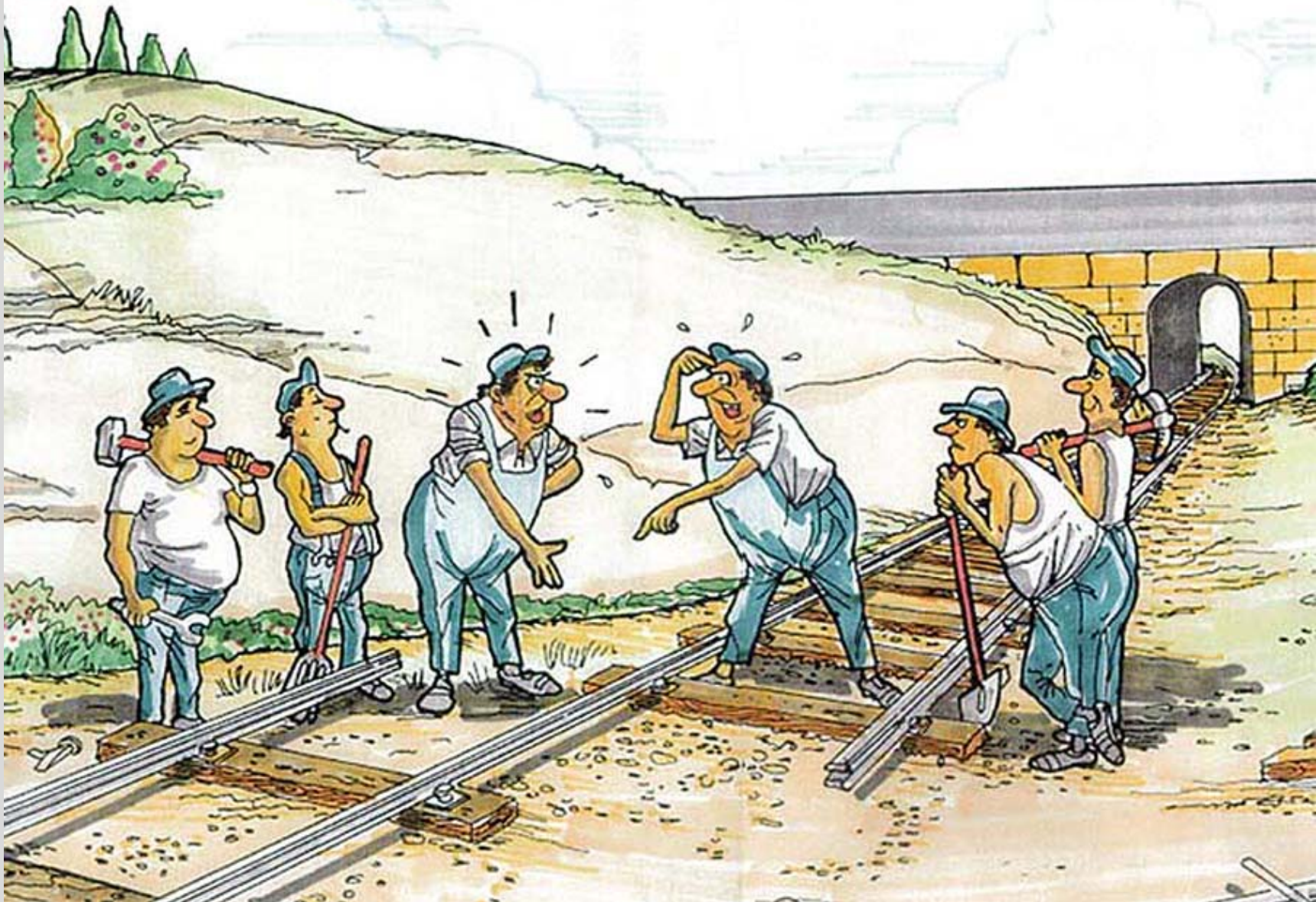
SH<sub>2</sub>NE | Soft and Hybrid Nanotechnology  
Experimental Resource

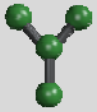


Northwestern  
University

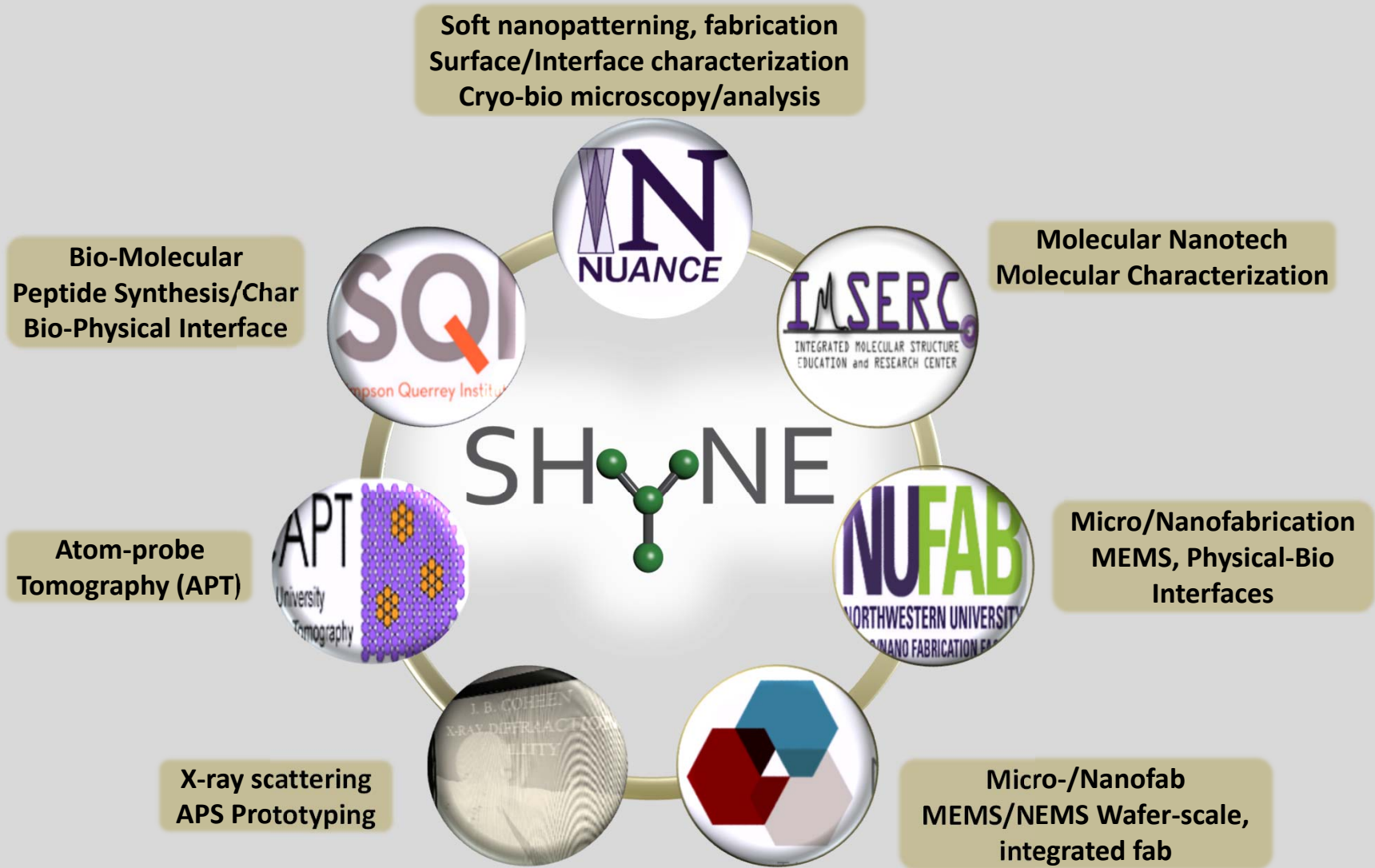


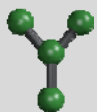
# Team Work





# SH<sub>Y</sub>NE facilities





# SHYNE Advisory Committees

## Internal Steering Committee



Jim Bray  
Director of Corporate  
Engagement



Prof. Sossina Haile  
Materials  
Science/Applied Physics



Prof. Matt Tirrell  
Dean and Founding  
Pritzker Director of the  
Institute for Molecular  
Engineering



Prof. Peter Voorhees  
Materials Science, CHiMaD,  
NAISE



Prof. Emily Weiss  
Chemistry, MRSEC  
Industrial Liaison, CBES,  
ANSER

## External Advisory Committee



Dr. Francesca Casadio  
A. W. Mellon Senior Conservation  
Scientist, Art Institute of Chicago



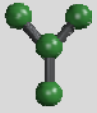
Dr. David Giljohann  
Chief Executive Officer,  
Exicure, Inc.



Dr. Shashi Jasty  
Director, Global Technology  
Development & Licensing at  
MilliporeSigma



Dr. Andreas Roelofs  
Director, Nano Design Works,  
Argonne National Laboratory



# SHyNE Corporate Outreach

## On-site Presentations:

Baxter, Cabot Microelectronics, Engis, Shure, Exicure

## SHyNE Tours/Meetings:

Abbott Laboratories, Shure, Hydranautics, Bioenergy Corp,  
Nano Gas Technologies, IIT, UIC, Hospira (Pfizer)

## Professional Conferences:

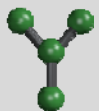
M3S Meeting at NU – 3/25/2016

IFT2016 - Institute of Food Technologists, July 16-19, 2016

- 1200+ organizations

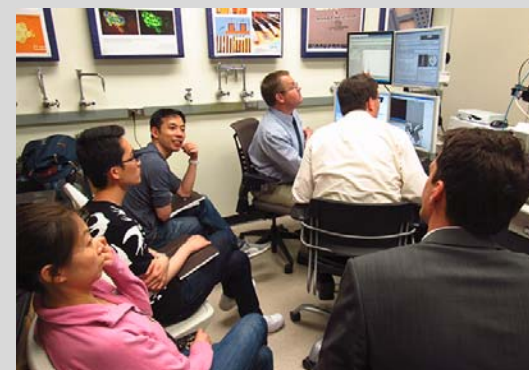
PittConn – March 5-9, 2017

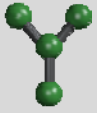




# SHYNE Vendor Relations

- Gemini Nano VP FESEM Workshop, **Zeiss & Bruker**, January 17-20, 2017
- **Middleton Spectral Vision and Bruker AXIS**, November 1, 2016
- Raman/AFM-Raman/TERS Workshop - **HORIBA Scientific** and **AIST-NT**  
September 27, 2016
- Multi-Scale Materials Science: From 3D to 4D with X-Ray Microscopy - **Zeiss**, August 19, 2016
- High Performance SEM - **Hitachi High Technologies, America**; June 21, 2016

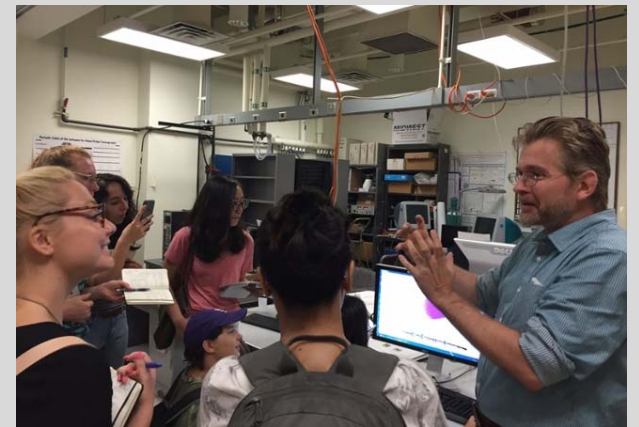
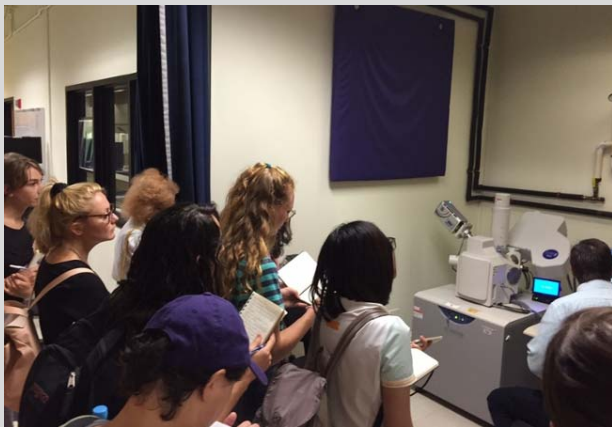


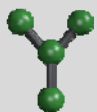


# SHyNE NanoJournalism



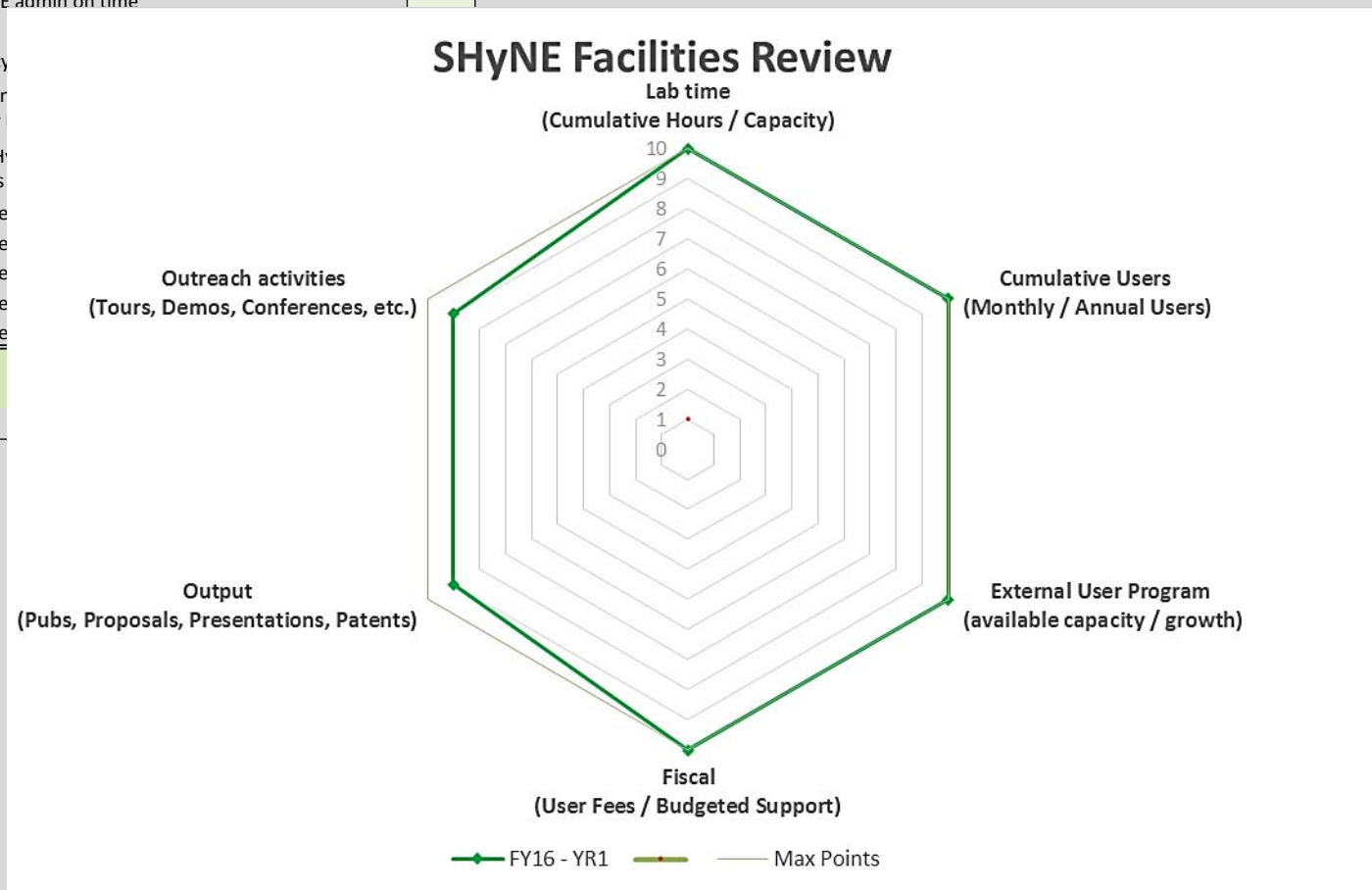
- Prof. Abigail Foerstner - Medill Science Journalism
  - Faculty advisor of NanoJournalism Program
  - Highlight top journal articles acknowledging SHyNE Resource
  - Host science writing workshop for researchers
- Puja Bhattacharjee, 2017 NanoJournalism Intern
  - Developing in-depth pieces for national audience
  - Covering cross-facility projects
  - Shadowing a facility manager for a day



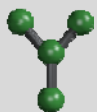


# SHyNE Metrics

FY16 - YR1		Points	Lab time (Cumulative Hours / Capacity)	Cumulative Users (Monthly / Annual Users)	External User Program (available capacity / growth)	Fiscal (User Fees / Budgeted Support)	Output (Pubs, Proposals, Presentations, Patents)	Outreach activities (Tours, Demos, Conferences, etc.)
Tracking the metric: Facility maintains a system for reporting		1	1	1	1	1	1	1
Reporting the metric: Facility reports to SHyNE admin on time		1	1	1	1	1	1	1
Reporting the metric: Facility ensures accuracy								1
Actively Promoting the r Facility markets to User								1
Communicating with SH Facility actively engages								1
Growth over previous re								
Growth over previous re								
Growth over previous re								
Growth over previous re								
Growth over previous re								5
								10
								10







# SHyNE External User Nuggets

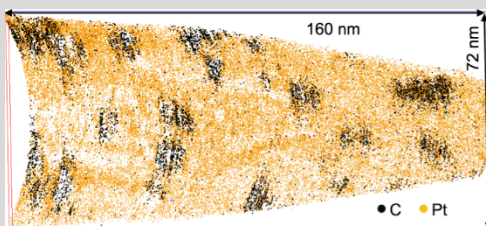
- Novel therapeutics and diagnostics using spherical nucleic acids
- Developing targeted anti-inflammatory (psoriasis) and oncology drugs
- **MALDI** was used to characterize oligonucleotides before attachment to nanoparticles.



- Suppliers of office products
- Investigated the use of nanoparticles in dry erase board coatings in their new Quartet Fusion Nano-Clean™ products
- **FIB/SEM** was used to cross-section coatings and image the nanoparticle loading/distribution from different suppliers



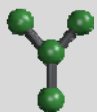
- nm-scale meteoritic nano-diamonds 3D chemically and isotopically ( $^{12}\text{C}$ ,  $^{13}\text{C}$ ) imaged by APT (CAMECA LEAP 4000X Si)



- Sample prep by FIB/SEM at NUANCE/EPIC
- Collaboration with the **Field Museum, Chicago**, and **Washington University in St. Louis**
- Preliminary results published in: *Heck, P.R., Stadermann, F.J., Isheim, D. et al., Meteoritics and Planetary Science 49 (2014) 453*



- Chicagoland medical device start-up
- Referral from SHyNE
- Sought a specific metrology capability at the PNF
- Toured PNF, evaluated tool suite and process support
- Now piloting entire production process at the PNF



# SHyNE Outreach & Output

## Outreach

Events hosted: **81**

Participants: **2758**

### **NU & UC Partners:**

- MRSEC, MSE, ME, FSM, CLP
- WCAS Physics & Astronomy
- Ctr. for Innovation in Global Health Technologies
- Provost Office, Daughters & Sons to Work Day
- UChicago Libraries
- Applied Physics prgm.
- IME Development
- Ctr. for Water Research
- NU-ACCESS
- OR, INVO, CLN

## Publications & Proposals

**Publications Acknowledging SHyNE: 56**

**Total facilities Publications: 500+**

**Grant Proposals submitted: 38**

NIH: 18	DOD: 1
NSF: 9	DOE: 2
ONR: 2	AFOSR: 3
Other: 2	AFRL: 1

## **Corporate Researchers Hosted**

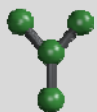
Abbott, AbbVie, Alcorix, Dow, GeniSys, Hospira, Hydro-Nautics, Impossible Objects, MicroEngineered Metals, etc.

## **Vendor Workshops Hosted**

Leica - CryoSEM	Zeiss – Xray microscopy
Horiba - Raman	Hitachi – HR SEM
Bruker - AFM	Raith – Advanced FIB
GeniSys - BEAMER	
Tera-Print – Beam Pen Lithography	

## **Education, Govt, Non-Profit Orgs**

DePaul University	NIST, DoD, Air Force
Univ. Lagos (Nigeria)	Art Professionals, San Fran.
Univ. Ibadan (Nigeria)	NU-TAU
Northeastern Illinois Univ.	Ill. Science & Tech. Coalition
Salem Christian School	Ill. Space Grant Consortium
North Central College	Soc. Hispanic Professional Engineers
Glenbrook South HS	
Tel Aviv Univ.	
Univ. Panamericana	



# SHyNE Annual Update

## Monthly Users

Cumulative Users – **1378**

*Internal – 1174*

*External – 204 (15%)*

Average Monthly Users – **663**

*Internal – 611*

*External – 52 (8%)*

## Cumulative / New Users Trained

Cumulative New Users Trained – **631**

*Internal – 491*

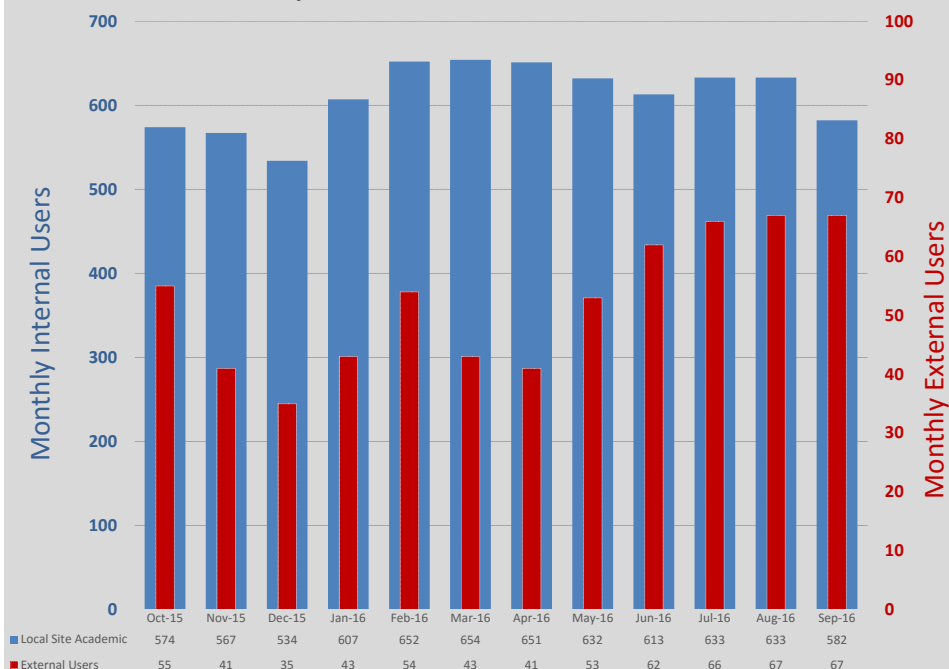
*External – 140 (22%)*

Average Monthly New Users Trained – **53**

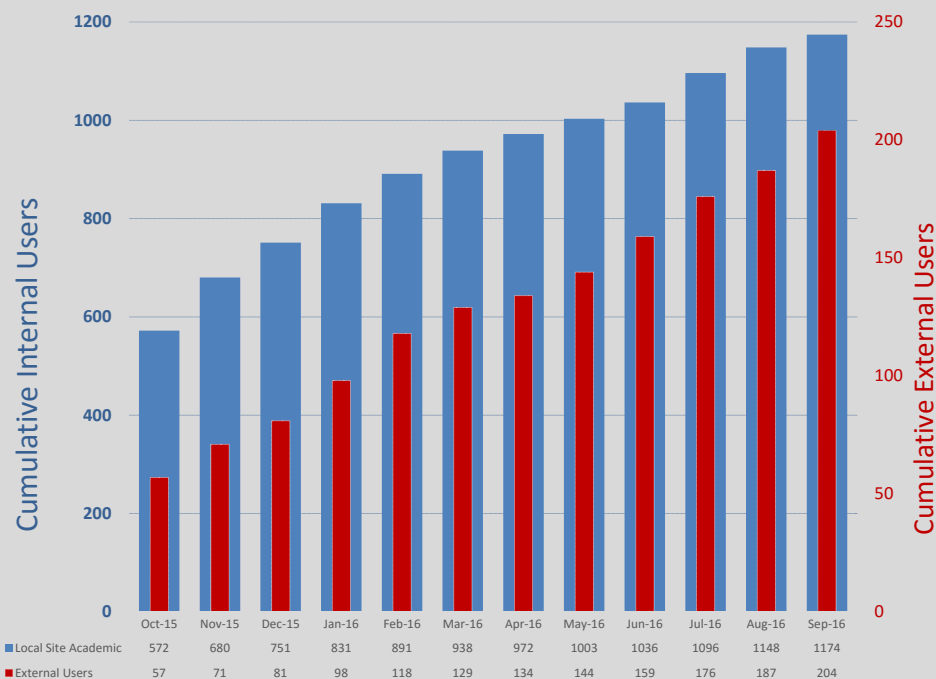
*Internal – 41*

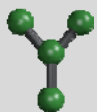
*External – 12 (22%)*

SHyNE Facilities (10-1-2015 thru 9-30-2016)



SHyNE Facilities (10-1-2015 thru 9-30-2016)





# SHyNE Annual Update

## Lab Time

Cumulative Hours – **144,764**

Internal – 135,602

External – 9,162 (6%)

Average Monthly Hours – **12,064**

Internal – 11,300

External – 763 (6%)

## Revenue

Cumulative Revenue – **\$3.4M**

Internal – \$3.0M

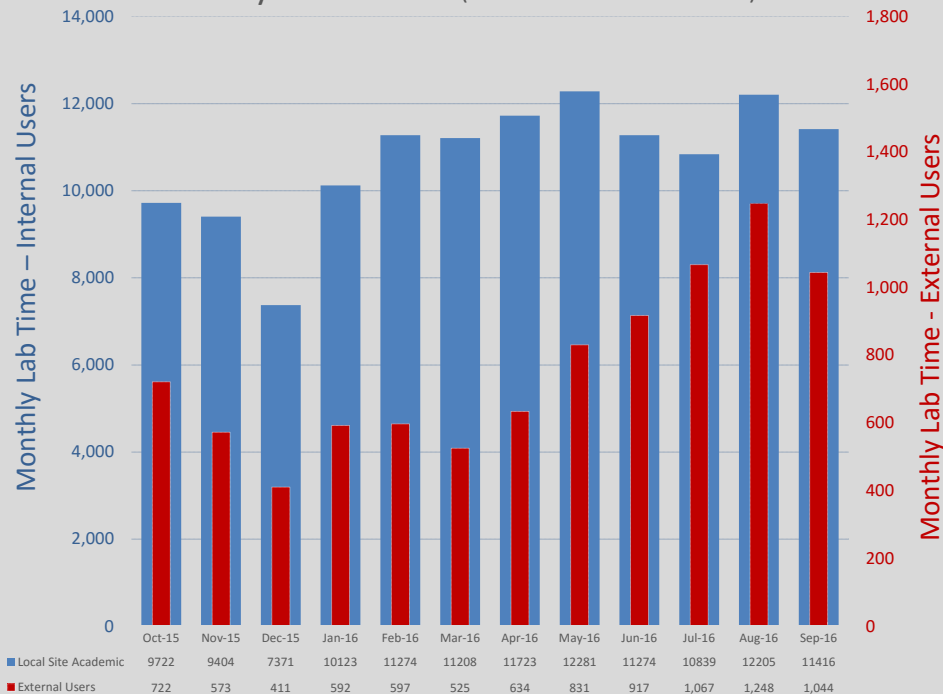
External – \$400k (13%)

Average Monthly Revenue – **\$284k**

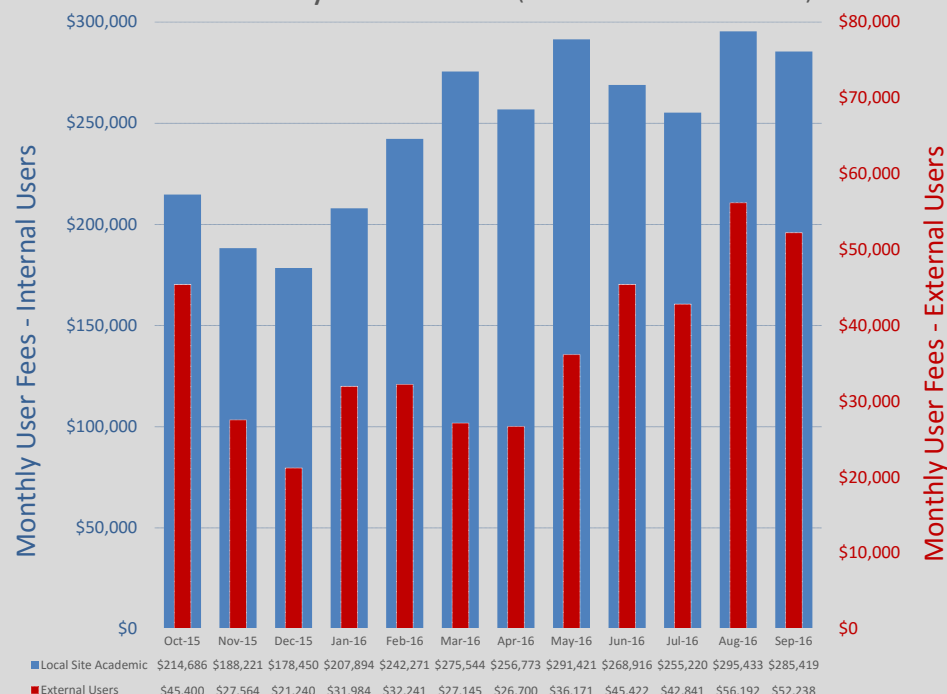
Internal – \$247k

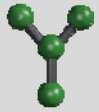
External – \$37k (13%)

SHyNE Facilities (10-1-2015 thru 9-30-2016)



SHyNE Facilities (10-1-2015 thru 9-30-2016)





# SH<sub>Y</sub>NE Annual Update

- 1) Major new External Users:
  - a. Abbott, Baxter, Hospira (Pfizer), Shure, et al.
- 2) 2016 NSF Grantees Conference host
- 3) SHyNE Introduction Video production
- 4) Nano-Journalism Program
- 5) Facilities-focused REU Program
- 6) Institute of Food Technologists Conference