San Diego Nanotechnology Infrastructure (SDNI)

Overview:

Located in San Diego, CA, SDNI supports cutting edge academic and industrial research, STEM education, and diversity and inclusion.

Our Mission:

- Continuously expand user base and build technical strengths in *Nano/Meso/Metamaterials, NanoBioMedicine, NanoPhotonics, and NanoMagnetics*.
- Support and enable transformative research in top priority areas for the nation and NSF. We will particularly enable and advance *convergence research of significant societal impact*.
- Become a major force in building the *nation's economy* by training the work force, seeding innovations, and helping the industry develop and commercialize nanotechnology products.
- Strengthen K-12 (especially high-school) and community college *STEM education* and *promote diversity*. Make a *"scalable education program"* for the state of California and the nation.

National Nanotechnology Coordinated Infrastructure

NSF

sdni
San Diego Nanotechnology Infrastructure

I

San Diego Nanotechnology Infrastructure (SDNI)

Covid Pandemic Challenges and Our Responses

Covid Challenge: Impact on <mark>*Site Utilization*</mark>
- Facility occupancy limited 25% (3/20-8/20), no training of new users through August 2020

Our Response:
- Resume user training since Aug. 20. Reach 80% of pre-pandemic level by March 2021.

- Emphasize *remote usage*. Increase remote use by 25% compared to the equivalent time period of Yr 5 (already impacted by the pandemic).

- Pivoting to *direct service work* by SDNI staff. Increased direct service revenues by 20% compared to the equivalent time periods of Yr 4.

- Recovery of overall user revenues to 94% of Yr 4 level.

SDNI User Data: (Comparison with Pre-Pandemic Period)

	Year 4 (first 6 months) ("Pre-Pandemic")	Year 6 (first 6 months)	
Total Users	497	398	
Internal Users	395	294	
External Users	102 (21%)	104 (26%)	
External Academic	8	12	
External Industry	90	90	
External Government	4	4	
External Foreign	0	1	
Total Hours	31,073	29,082	
Internal Hours	25,264	21,577	
External Hours	5,809 (19%)	7,505 (26%)	
Average Monthly Users	294	227	
Average Monthly External Users	46 (16%)	51 (22%)	
Average Monthly Remote Users	50	73	
New Users Trained	84	80	
New External Users Trained	15 (18%)	23 (29%)	

Year 6 (first 6 months):

68	Local Academic Groups
12	Outside US Academic
37	Small Companies
11	Large Companies
4	State/Federal
1	International
133	Total Groups
65	External Groups

National Nanotechnology Coordinated Infrastructure

NSF

sdni
San Diego Nanotechnology Infrastructure

Covid Pandemic Challenges and Our Responses

Covid Challenge: Impacts on Personnel

- Loss of staff: Retirement of senior equipment engineer, resignation of 3 additional engineers (2 PhD level and one experienced BS level; accepting positions in industry)
- Initially unable to rehire because of a UCSD campus wide hiring freeze
- Difficulties in attracting new personnel because of:
  - Competitions from the high tech and bio sectors
  - High cost of housing in the San Diego area and inflation
  - Limited career advancement options for technical staff
- Loss of student interns: Training program for undergraduates (internship/employment) frozen and number of students reduced by ~75%

Our Responses:

- Worked with the EVC to ***receive permission for staff hiring*** (with the support of executive committee and advisors).
- Initiated ***salary adjustment*** and retention programs. Widen search to out of state.
- Resumed the student training program to reestablish the student intern group.
- Improved work environments and ***boosted the morale***.
- Wrote proposals with Southwestern College to develop cleanroom/semiconductor technicians.
- **Outcomes:** successful hiring of 4 staff members (2 equipment engineers, 1 PhD level process engineer, 1 junior staff). Rebuilt undergraduate student staffing and implemented an expanded internship program beyond the pre-pandemic level.

San Diego Nanotechnology Infrastructure (SDNI)

Covid Pandemic Challenges and Our Responses

Covid Challenge: Impacts on <mark>User Projects and Safety</mark>
- Risk of missing critical deadlines for external and internal users
- User safety concerns and user protection

Our Responses:
- Implemented effective and enforceable health and safety measures in compliance with the CDC, State of California, and university Covid-19 guidelines resulting in approved increase in occupancy limits. UCSD maintains 0.1% Covid positive rate.
- Mitigated project delays by helping external users to transfer from on-site usage to **remote service provisions** by our staff.
- Resumed training of new users after building multiple remote instruction tools.
  - Examples:
    - Newly installed Transmission Electron Microscope: Staff can directly interact with users and control microscope from their office/home, providing opportunity to be deeply involved in users' research, assist TEM users with equipment issues even during off-hours/weekends.
    - Multiple training videos for initial facility access/safety orientations and for tool training
- **Outcomes: *Improved user satisfaction and user-staff relations.*** Obtained a safe, efficient, supportive, and friendly work environment during the pandemic.

San Diego Nanotechnology Infrastructure (SDNI)

Covid Pandemic Challenges and Our Responses

Covid Challenge: Cancellation of <mark>*Outreach/Education Programs*</mark>
- Cancellation of 2020 REU program and RET programs
- Delay in the annual outreach/education symposium

Our Responses:
- Implement the first **8-week remote REU program** to include 9 REU students from 5 states across 3 time zones. 60% REU students are URM.

- The remote REU program includes 6 weeks of daily nanotechnology lectures given by Prof. Mike Sailor (UCSD chemistry professor and director of the NSF MRSEC), AI short course and training sessions, graduate school application seminars, entrepreneurship seminar series, and hands-on labs (send lab materials to student residence for research projects supervised by 3 professor mentors and 3 PhD student mentors: (projects on blood clotting, 2D materials, nanoparticle drug delivery), and weekly social hours (with snack boxes).

- RET program was replaced by **online Nanotechnology summer institute**, which is a one-week program with 22 science teachers attending. All teachers develop nanoscience curriculum and will deliver the materials to their classes and a follow-up program was established for long term assessment.

- In September 2020 and 2021, we organized 2 **on-line outreach/education symposiums**, including science teachers, 7 NNCI sites, NNI and state officials, other stake holders.

San Diego Nanotechnology Infrastructure (SDNI)

Outlook

- Many of the remote solution implemented during the pandemic will remain in place and help streamline/improve operations.

- Pivoting to remote work very successful.

- Continue to address staffing issues: Increase salaries, on job training/education, explore career advancement paths with the university (e.g. specialist track).

- Expand and formalize student internship program (certificate and stipend).

- Collaborate with community colleges and vocational programs for cleanroom technicians.