Research Community for **Nanotechnology Convergence**

Nanotechnology facilities of the future will play central roles in tackling **WICKED** and **GLOBAL** challenges that require convergence approaches and, in many cases, **facilities may require MAJOR ADAPTATION to facilitate convergence**

The R.C. **GOAL** is to bring together researchers and staff from diverse disciplines and perspectives, facilitate their collaboration, and work toward a common vision and **PUBLIC REPORT for the future design and role of university open-access facilities in SPECIFIC research areas**

The Research Community Topic is **DYNAMIC** and focuses on new convergence research topic annually

Year 6 Topic: **Convergence in Nanotechnology for Food Security**

"GROWING CONVERGENCE RESEARCH"

NSF'S 10 BIG IDEAS

National Nanotechnology Coordinated Infrastructure

NSF

RTNN

sdni San Diego Nanotechnology Infrastructure

KY MULTISCALE

NCI Southwest

Research Community for **Nanotechnology Convergence**

NSF DEFINITION OF CONVERGENCE RESEARCH

1. Research Driven by a Specific and Compelling Problem
2. Deep Integration Across Disciplines

News Release 17-082

NSF issues first Convergence awards, addressing societal challenges through scientific collaboration

A deeper, more intentional approach to accelerating discovery

Growing Convergence Research (GCR)

PROGRAM SOLICITATION
NSF 19-551

National Science Foundation

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

May 08, 2019

February 03, 2020

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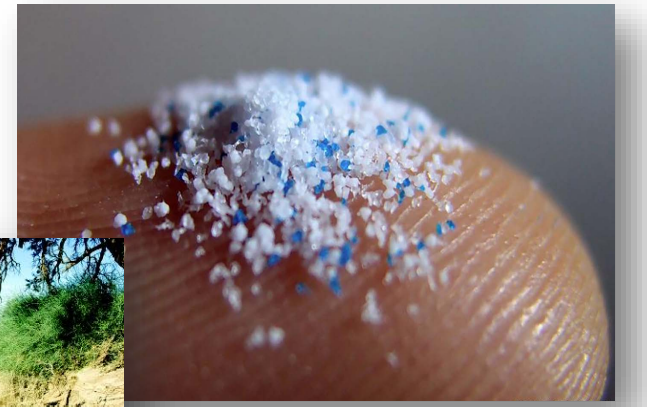
Immediate Opportunities for Convergence Research:

- Micro- and Nanoplastics in the Environment
- Work Beyond Mass Production
- Affordable and Universal Access to Clean Water
- Per- and polyfluoroalkyl substances (PFASs)
- Phosphorus and nitrogen pollution in water resources



Images from https://avadaenvironmental.com/2019/04/18/microplastics/, http://www.waterencyclopedia.com/Da-En/Desert-Hydrology.html, https://www.conserve-energy-future.com/causes-effects-and-solutions-to-eutrophication.php

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Convergence brings together the ***right people*** at the ***right time***, the ***right place***, and on the ***right topic***.

For example, disciplines in ***P/N Pollution*** span 17 orders of magnitude in length scale!

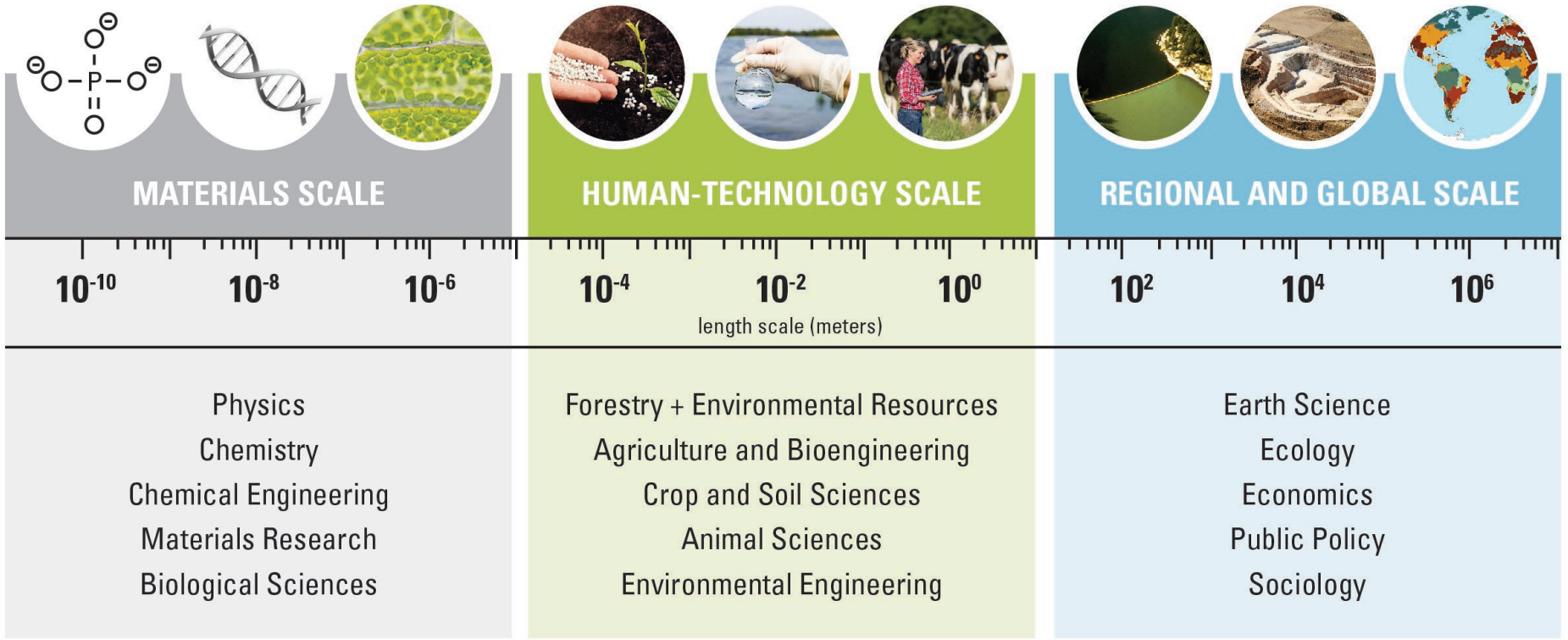

Image is derivative of Jones, Yingling, Reaney, and Westerhoff, https://doi.org/10.1557/mrs.2020.4

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Convergence in Nanotechnology for **FOOD SECURITY**

What is Food Security?

Reliable access to a sufficient quantity of affordable, nutritious food, considering, for example:

- Transportation and Supply Chain
- Geopolitics and Imports/Exports
- Availability of nutrients, water, and sunlight
- Influence of Climate Change and Extreme Weather Events
- Precision Agriculture

This Research Community is ***inclusive*** and will invite engagement from both NNCI and non-NNCI institutions.

Timely announcement of the NSF ERC for the **Internet of Things for Precision Agriculture (IoT4Ag)**, lead: UPenn

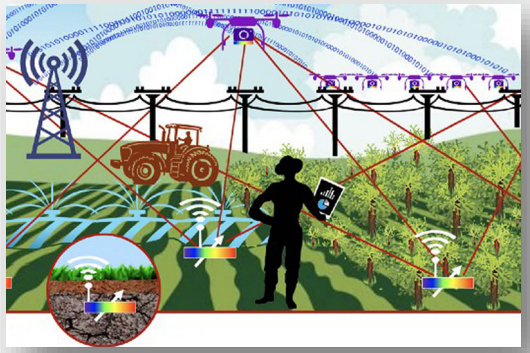

Image from https://medium.com/penn-engineering/penn-purdue-uc-merced-and-uf-partner-on-new-26m-nsf-engineering-research-center-for-the-29a788a5e762

Convergence in Nanotechnology for **FOOD SECURITY**

Rethinking necessary nanotechnology infrastructure to support Food Systems/Security research

CEINT

Example:

Center for Environmental Implications of Nanotechnology (CEINT), located at Duke University

30 “mesocosm” stations

Year-long experiments

Pulse & chronic inputs

Nano- Ag, CeO_2, Cu, Au, TiO_2, SWCNTs

NPs + conventional contaminants

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Convergence in Nanotechnology for **FOOD SECURITY**

RESEARCH COMMUNITY GOALS:

Develop a common vision and **PUBLIC REPORT on the future role of university open-access facilities for supporting Food Security**

Bring together researchers and staff from diverse disciplines and perspectives, facilitating their collaboration drawing from Science of Team Science approaches

New Plant Sciences Initiative (PSI) building to be home for one-day workshop (completion 2021)

TIMELINE OF ACTIVITIES:

Nov 2020	Announce the Research Community publicly **Open, Online Informational and Planning Meeting** to solicit initial ideas and buy-in from potential participants
Jan - Feb 2021	Host an **Open, Online Informational and Planning Meeting**
Feb - Oct 2021	Periodic **online meetings/seminars**, as appropriate and enabled by volunteers
Oct 2021	Online (or in-person?) **CONSENSUS-BUILDING MEETING** (registered guests only) to work toward a report for the future role of nanotechnology facilities in Food Security research
Oct - Dec 2021	Write **PUBLIC REPORT** on future nanotechnology infrastructure needs for Food Security

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Convergence in Nanotechnology for **FOOD SECURITY**

CALL TO ACTION

- ❑ INTERESTED IN JOINING THE **MAILING LIST**?: Simply email rtnanonetwork@ncsu.edu with the subject “Convergence List”
- ❑ Do you have suggestions for **Nanotechnology Convergence TOPICS for 2022**? Email them to rtnanonetwork@ncsu.edu or jacobjones@ncsu.edu.

  Ideas already floated include **nanomedicine**, **convergence in quantum systems**, and **convergence in the data revolution**.

  Convergence research is *already* ongoing. Our goal is to identify these topics, learn how to contribute to them, and to facilitate them.

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