2016 Nanoscale Science and Engineering Grantees Conference

Welcome to Day 1: *Progress in foundational nanotechnology and infrastructure*

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NSF

Northwestern University

2016 Nanoscale Science and Engineering Grantees Conference

Acknowledgements

Organizing Committee

Vinayak Dravid - Northwestern University
Mike Roco - National Science Foundation
Ben Myers - Northwestern University
Chad Goeser - Northwestern University
Larry Bell - Museum of Science, Boston
Karen Wooley - Texas A&M University
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Mark Tuominen - University of Massachusetts, Amherst
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Eve Hanson - PhD Student, VPD Group
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Cesar Villa - PhD Student, VPD Group
Fernando Castro - PhD Student, VPD Group

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Inspire the Next

RAITH
NANOFABRICATION

2016 Nanoscale Science and Engineering Grantees Conference

Day 1 Overview

Progress in foundational nanotechnology and infrastructure

Northwestern University

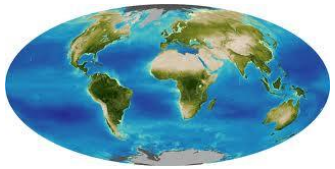
1) Nanotechnology for food-energy-water systems
2) Nano in neuro science and engineering
3) Nanoinformatics and big data in nanotechnology
4) Nano Centers (NNCI, NERCs, new STCs)

NORTHWESTERN UNIVERSITY

Mega-Trends:

Implications for Facility Infrastructure

- **Global:**
  - *Energy, sustainability, health, water, security, globalization/integration....*



- **National:**
  - *Energy, Health, Info., Security.. - within austerity & budget cuts*

- **Regional:**
  - *Budget issues, regional integration/synergy (e.g., ANL, CBC..)*

- **Local: *NU/UChicago***
  - *Interdisciplinary, cross-cutting, "experiential" learning*
  - *Institutional strategic plans*
  - *Innovation & "facilitation" of research, education & outreach*

➔ ***Considerations:*** *Consolidation, compliance, synergy, interdisciplinarity, efficiency, fiscal frugality..*

NORTHWESTERN UNIVERSITY

Emerging Role of Research Institutions

Traditional/Old:

*Generate and Transmit Knowledge through **Research, Teaching, Service***

Emerging paradigm:

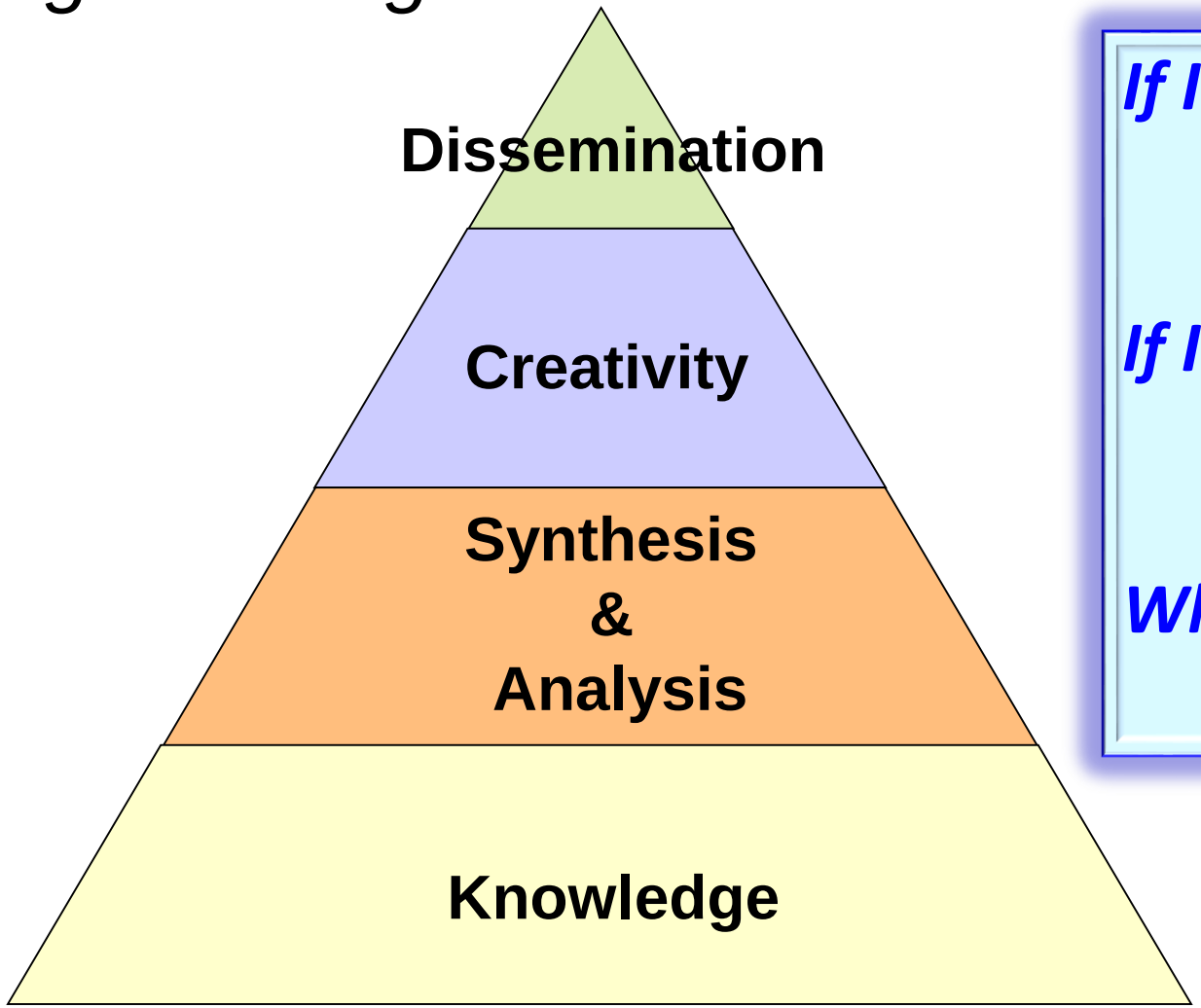
Knowledge → Analysis → Synthesis → Creativity → Dissemination

- ***Regional, national and global engagement***
- ***Coupling (balancing) scholarship with innovation, entrepreneurship & industrial relations***
- ***Sharing of intellectual, physical and facility infrastructure***

Ivory Towers → Global Scholarship + Economic Engine (Local, Regional & National)

Education Taxonomy for 21st Century:

Convergence of global trends



If I hear,
I forget

If I see,
I remember

When I do,
I understand!

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Welcome to Day 2: *Progress in grand challenges and convergence*

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Day 2 Overview

Progress in grand challenges and convergence

Northwestern University

1) BioNanoManufacturing
2) Low energy computing
3) Brain-like cognitive engineering systems
4) Nanotechnology Informal Science Education
5) Nanotechnology and Converging Technologies
6) Education and Societal Aspects

Shifting Research/Educational Paradigm

OLD — ***"Traditional" Research/Education***

- ➔ Continuing and Logically Evolving Themes
- ➔ Continuity of Research Tools and Techniques

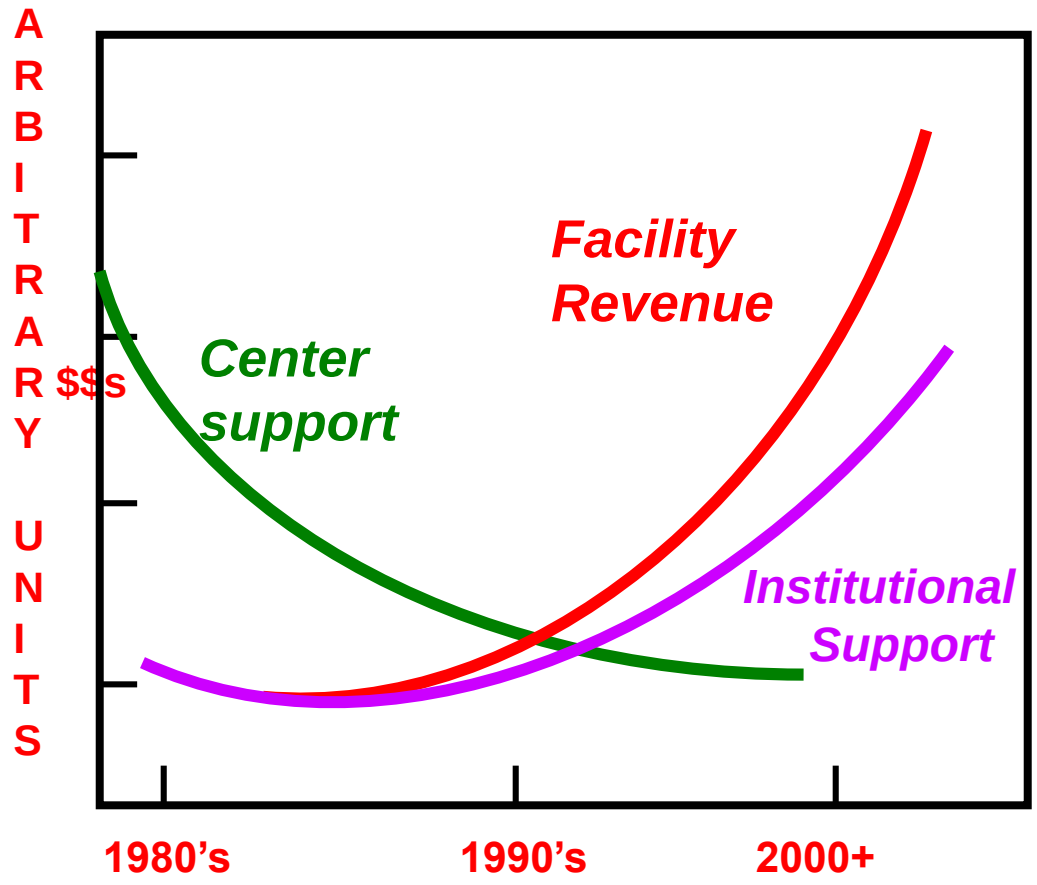
➔ *Role and Room for "Sharing" of Facilities and Tools*

NEW — ***"Emerging" Research/Education & Outreach***

- ➔ Diverse Themes and Nonlinear Evolution
- ➔ Specialized Tools and Unique Techniques
- ➔ Role/use of IT, Social Media…. Global Connectivity

➔ ***"Sharing" and "Multi-User" Format: Difficult yet Essential***

Centers and Facility Support



Need to run facility as a "small business entrepreneurship"

Need Proper "Business Model"

Multitasking:

Beyond research, teaching..

Marketing, Accounting/Finance
Personnel Management
Forecasting, Trouble Shooting
PR, Conflict Management
and more ……..

SOX compliance

NORTHWESTERN UNIVERSITY

SHyNE

Soft and Hybrid Nanotechnology Experimental Resource

Northwestern

INTERNATIONAL INSTITUTE FOR NANOTECHNOLOGY
Northwestern University

THE UNIVERSITY OF CHICAGO | Institute for Molecular Engineering

NU Center for Nanofabrication and Molecular Self-Assembly

Simpson Querrey Institute

Argonne National Laboratory Center for Nanoscale Materials

Pritzker Nanofabrication Facility

Uniting over $800 million in nanotechnology research, education, infrastructure & facilities

Regional Coordination Global Partnerships

Vinayak P. Dravid (PI) – Northwestern
Andrew Cleland (Co-PI) – U Chicago