
Managing Explosive Technologies: The Case for Nanotechnology

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Beakart
PPG

Mead Westvaco
NC State
Rutgers
QinetiQ
Microsoft
Eveready Battery Co
ExxonMobil
Proctor and Gamble
Philip Morris
UOP
Xerox
BOC
Corning
Timken
Specialty Minerals
DSM
Babson
Boeing
Goodyear

NSF
Microsoft
DuPont
Energizer
Sealed Air
Plug Power
Arkema
Lucent Technologies
Elementis Specialties
John Deere
NIST
Toray Industries
Shell
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IMERSYS
ACS



Overview

Objective/Scope

- Nanotechnology is a case study for a NEW PARADIGM in knowledge creation.
- Immense global funding has created a worldwide explosion of basic knowledge and new information.
- Understand management issues created by knowledge explosion due to immense global funding.

Value Proposition

- Provide IRI companies with processes for successful innovation and value creation in the new paradigm.

Key Deliverable's

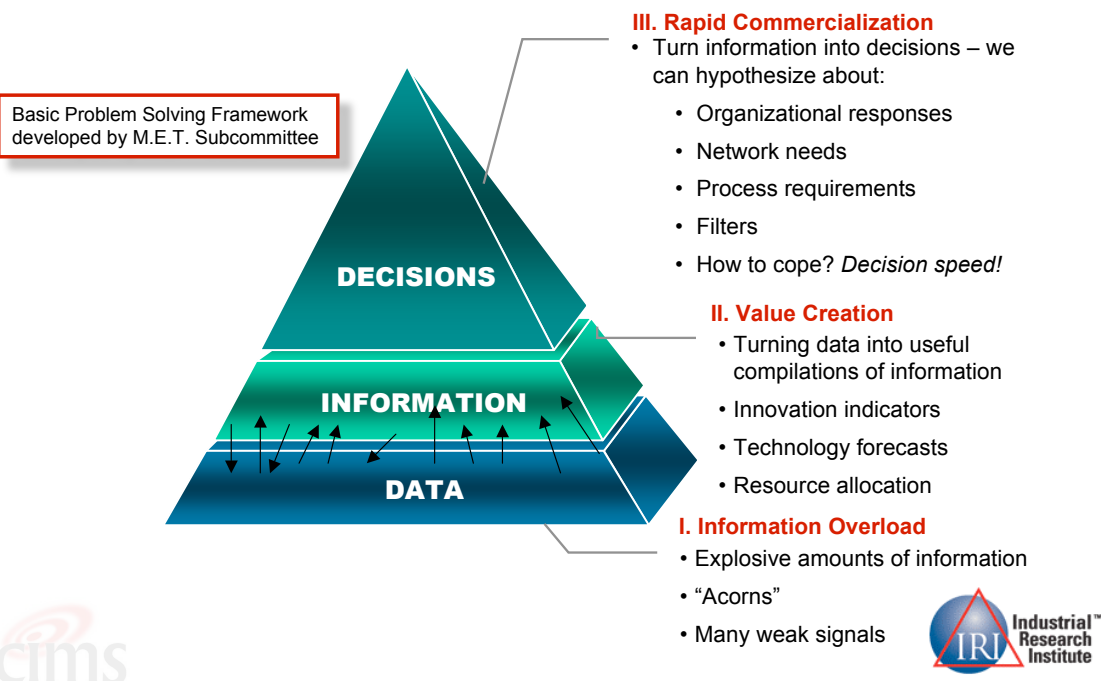
- Publications (RTM), discussions, networks, collaborations
- Management processes, understanding and tools for successful innovation during technology explosion

Dates:

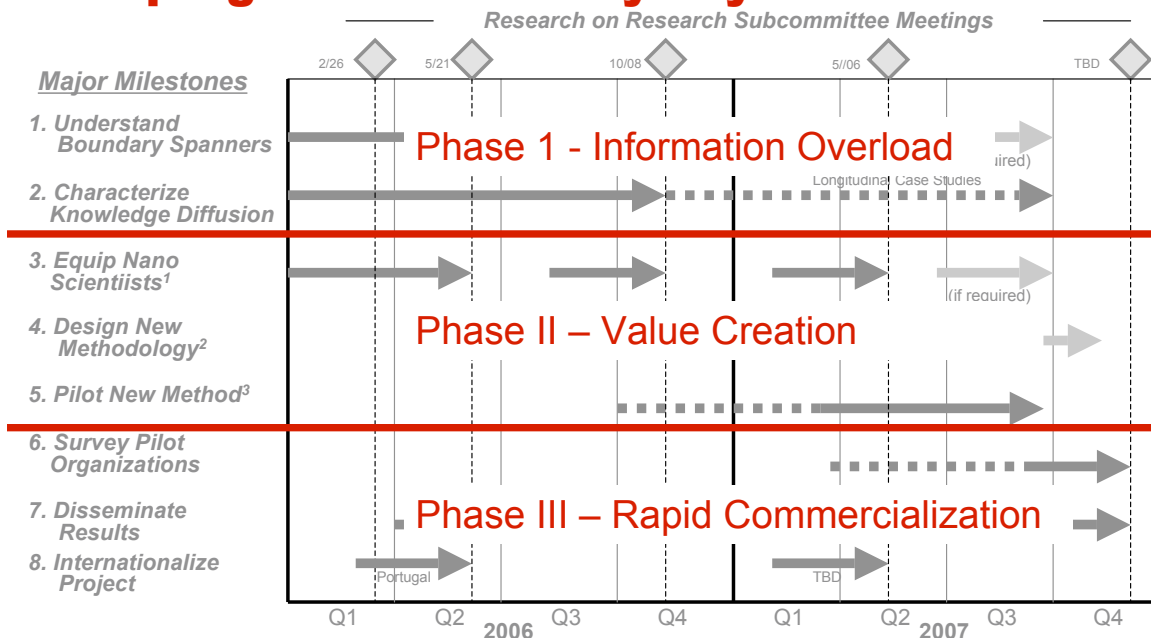
- Team kicked off: 10/03.
- PFI funding: 10/04 - 10/07.



The problem for most companies is deciding if/how to leverage nanotechnology

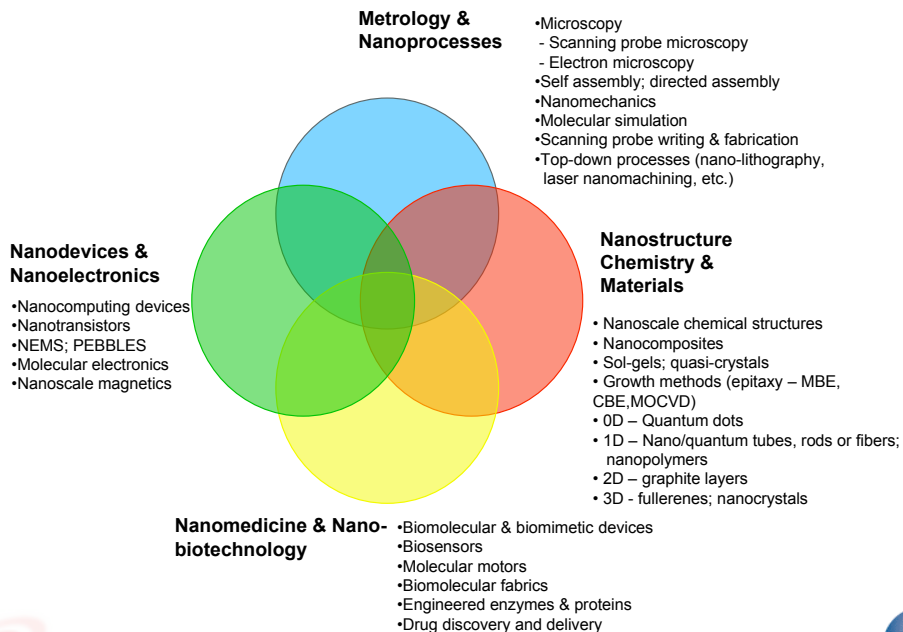


The program is driven by key milestones.

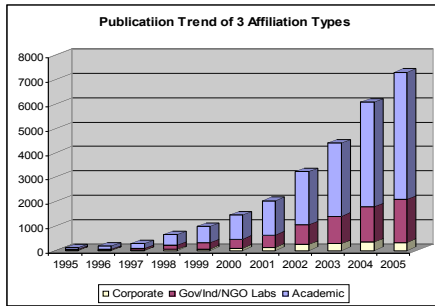


Phase 1 > Information Overload

Nanotechnology Research Foci & Key Concepts



Studying publications in just carbon nanotubes and nanorods reveals some interesting trends



Publications are soaring...

1. Publication interest in this area of technology has doubled every 2-3 years for 10 years.
2. In terms of relative publication counts researchers at labs are keeping pace with academic researchers.
3. Publication of research by corporations is becoming less prevalent when compared to that of Labs and Academics, possibly to protect product ideas.

...and collaboration is strong!

4. Most all of industry's publications are collaborative efforts with other types of affiliations
5. Strong collaborative bonds appear between academics and researchers at other types of laboratories researching CNR/T's.
6. Collaborations between researchers at different types of affiliations could be an indicator of *knowledge diffusion*.

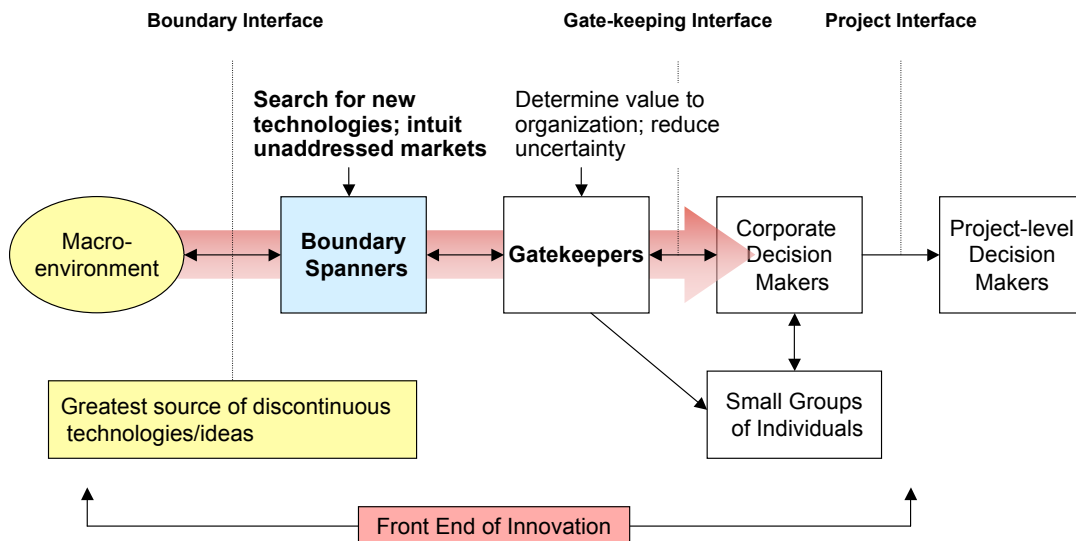
	Academic	Gov/Ind/NGO Labs	Industry
Academic	18,660	4,002	1,094
Gov/Ind/NGO Labs		6,563	322
Industry			1,592



Source: Dr. Alan Porter TPAC, Georgia Tech University



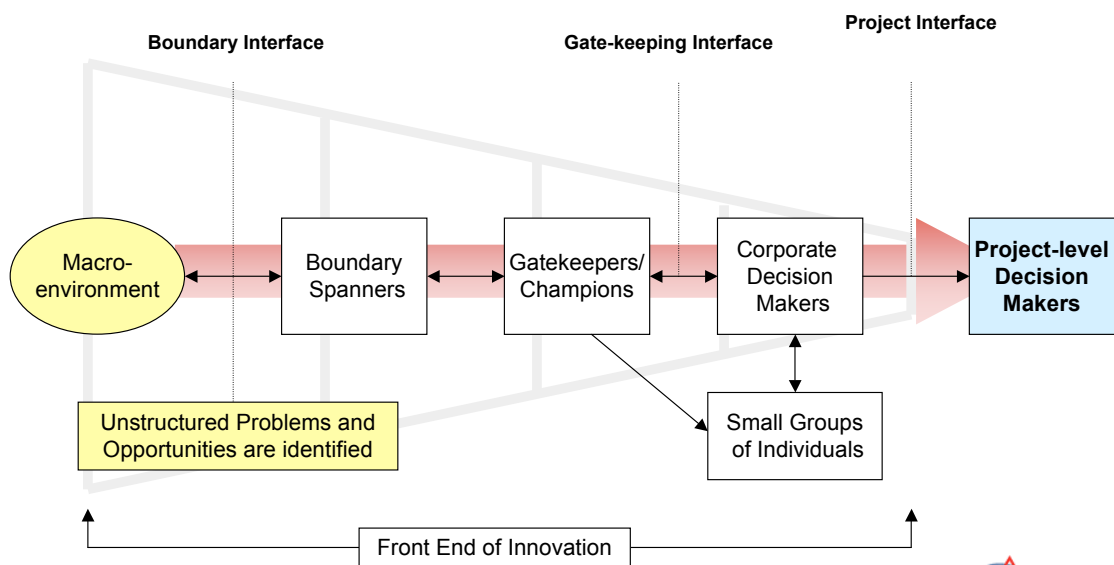
For discontinuous innovation, information flows inward and decision making is individual and fragile



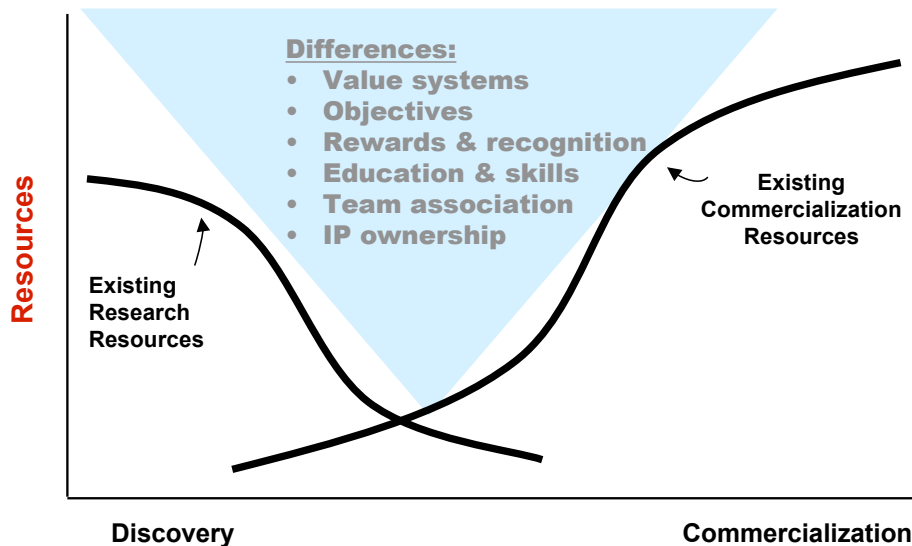
Reid and de Bretani, The Fuzzy Front End of New Product Development for Discontinuous Innovations: A Theoretical Model. JPIM May 2004,



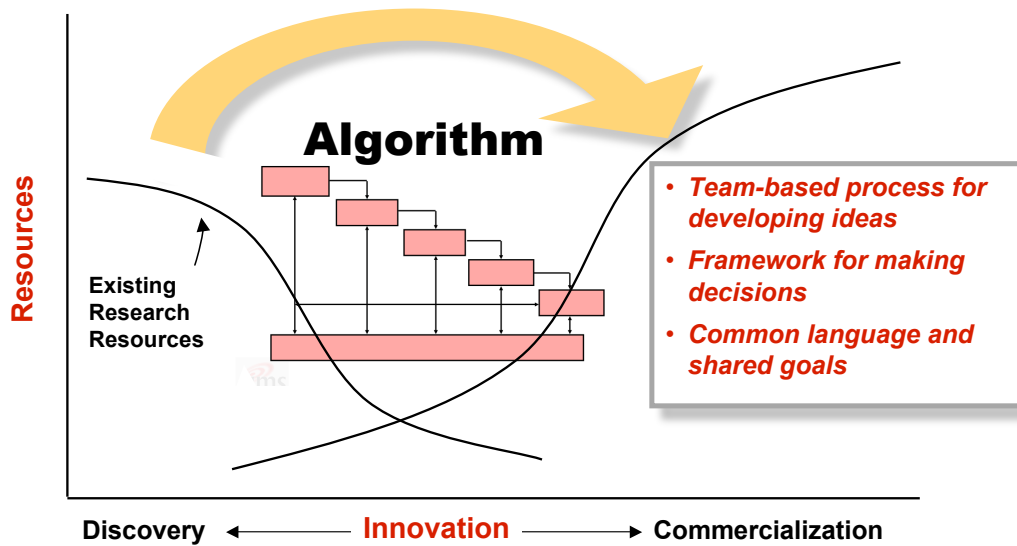
The challenge: formalize and structure the front end of innovation -- while preserving the unique skills and traits so essential to success



A divergence of values, capabilities, and interests characterize a "Valley of Death" for new technology ideas



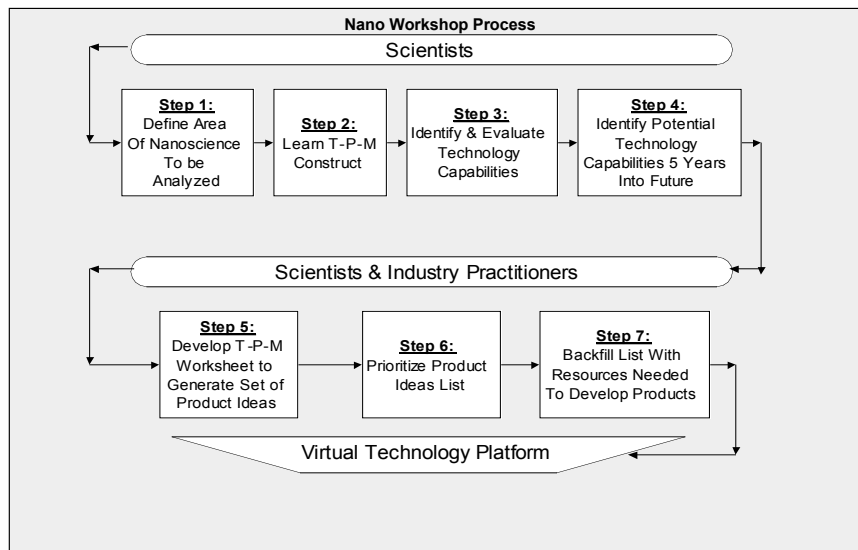
NC State's Hi TEC Algorithm¹ is a validated process for navigating the Valley of Death



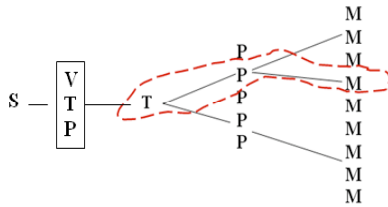
¹Markham, Stephen K., D. L. Baumer, L. Aiman-Smith, A.I. Kingon & M. Zapata III, "An Algorithm for High Technology Engineering and Management Education," *Journal of Engineering Education*, April 2000, pp. 209-218.



The Nano Workshop Process is planned to generate informed and focused dialogue



A VTP provides a market-referenced target and plan for scientists to follow in developing their science



A VTP should:

1. Include a list of key scientific or technological concepts that need to be demonstrated to show that the ideas are feasible i.e. the critical science path.
2. “Fill out” the science by identifying complementary technologies needed to generate the technology capabilities and any key partners or other independent players – scientists, companies, National Science Centers or NGO’s - who can assist in achieving the technology capabilities.

VTPs force teams to be rigorous in the evaluation of a science; developing a set of technology capabilities that connect to specific customer needs.



Key Deliverables to Date

Publications, discussions, networks, collaborations

- Background data collection from companies in small groups – built the case for the research program and grant.
- Perspectives Article I, May 2004
- Briefing to NSEC, Sept 2004
- Collaboration agreement between IRI and NNI, Dec 2004
- Perspectives Article II, May 2005
- Workshop SIS (Nanotechnology interfaces) at IRI meeting in May 2005
- Perspectives Article III – May 2006
 - “Social networks key to harnessing nanoscience knowledge explosion”

Processes, understanding and tools for successful innovation

- Jack Solomon, Chem Vision 2020 spoke at ROR workshop
- NSF PFI Grant applied and awarded, project kick-off - Nov 2004 (3 year grant)
- Mike Roco, Director NNI: speaker IRI May 2005
- Nano Workshop Pilot – Penn State, July 2005
- “Early stage involvement in NSF programs” – Brig Moudil (University of FL) – March 2006



Next Steps

Focus on MET Phase II – Value Creation

- Boundary Spanning
- Nano Workshops: Purdue (Jan 2007); Northeastern (Feb 2007); Illinois (tbd)
- “Virtual platforming”
- Developing the TEC Algorithm© for MET
- Culture of Innovation



Thank You

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