

# Industrial Physics Leadership Summit III

*Fueling Future Innovation: Coupling Industry  
and Universities for Physics Research*

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American Center for Physics

College Park, MD



In association with:



American Association of **Physics Teachers**  
Enhancing the understanding and appreciation of physics through teaching

# Industrial Physics Leadership Summit I

16 March 2006, APS March Meeting, Baltimore

- Human resources
  - Physicists' value in industrial research
    - Broad-based knowledge
    - Adaptable
    - Rigorously analytical
    - Creative
    - Strategic thinkers
- Interfacing with academia
  - Communicate workforce needs
  - Stress competitiveness
  - Promote intellectual property policies
- Interfacing with government
- Enhancing the R&D enterprise

**“Physics is an attitude,  
and a way of thinking.”  
Steven Koonin,  
Undersecretary for  
Science, DOE**

# Industrial Physics Leadership Summit II

12 March 2008, APS March Meeting, New Orleans

- Consortia
- Culture gap between industry and university physics departments
  - Strong working relationships with engineering departments, less so with physics departments
  - ***Desire to meet with academic department leadership***
- Connection to federal and state governments
  - Intellectual property in collaborations
  - Lobbying by industry
- Networking
- Industrial participation in physics journals

# What we want to accomplish:

- **Arrive at a set of best practices that strengthen industry-university physics research relationships**
- Build cooperation at the “bleeding edge” of science to advance corporate research
  - fuel the front end of the innovation pipeline
  - assure future competitive success of industry
  - prepare physics students to work in industry
  - prepare physicists to work with industry
- Identify action items
  - how can AIP, APS, and AAPT help?

# Agenda

- 1:15 pm **Fueling Future Innovation – framing the discussion**  
*Fred Pinkerton, General Motors*
- 1:30 pm **Statistics of physicists' employment – where are physics PhDs working?**  
*Rachel Ivie, Statistical Research Center, AIP*
- 1:50 pm **Academic Forum**  
Moderator: *Kate Kirby, APS*  
*Nicholas J. Giordano, Purdue University*  
*Edward Van Keuren, Georgetown University*  
Moderated discussion
- 2:45 pm Break
- 3:05 pm **Government Lab and Industry Forum**  
Moderator: *Robert Doering, Texas Instruments*  
*Jason Boehm, NIST*  
*David Bishop, LGS, Bell Labs Innovations*  
*Richard Sears, Shell and MIT (retired)*  
Moderated discussion
- 4:15 pm **Round Table discussion**  
Moderator: *Fred Pinkerton*
- 5:20 pm Wrap-up and summary
- 5:30 pm Adjourn
- 6:30 pm **Reception and Dinner**  
Keynote address: *Broadening Physics Career Paths: Industry, Education and Policy*  
*Steven Koonin, Undersecretary for Science at DOE*

# THEMES

- Exposing undergraduate and graduate students to broader career possibilities
- Broaden physics curriculum to include “soft skills”
- Cultural divergence between academia and industry, especially timing
- Networking for research
- Intellectual property

# Exposing students to broader career possibilities

- Make students aware of available opportunities at the start of their graduate career.
  - Mention and encourage minors in other areas
  - Projects working with industry
  - Count non-traditional courses toward physics degree
- Graduate advisors should have an ongoing conversation (1-2 times yearly) with their students about career goals and options.
- Encourage seminars by industry researchers, especially alumni.
- Improve faculty advising of undergraduates for non-academic careers.
- Departments track where their students (grad or undergrad) go, especially those who go on to non-academic careers. And then engage them personally.

# Broad physics curriculum including “soft skills”

- Develop “T-shaped” students: deeply skilled in one specialty, with broad knowledge of other areas
- Broaden curricula in graduate programs to include industry knowledge and “soft skills” (seminars could be an option)
  - Entrepreneurship
  - Teamwork
  - Communication to diverse audiences
  - Project management
  - Nature of IP and origin of IP issues
- Internships are integral components of training for industry-bound students.
- Interdisciplinary education.
- Consider both results and behavior based performance measures at universities (industry does both already).
- Modify promotion & tenure of professors to encourage industrial collaborations and interdisciplinary research – models exist (Stanford, Purdue).

# Cultural divergence between academia and industry

- Industrial HR departments
  - Work with them to make physics-accessible jobs recognizable to job searchers (“physics” in job title?)
  - Avoid HR if possible – networking is essential in finding a job, establishing collaborations, etc.
  - Often necessary to work with HR because of legal hiring practices
- Industry should be careful in making long term (PhD thesis research) commitments: don’t promise support if you can’t keep the promise.

- Universities turn money into knowledge; industry turns knowledge into money.
  - Bahram Roughani, Kettering University
- “It is not evil to want to make money; it is not stupid to want to advance human knowledge.”
  - David Bishop, CTO, LSG Innovations

## Networking for research

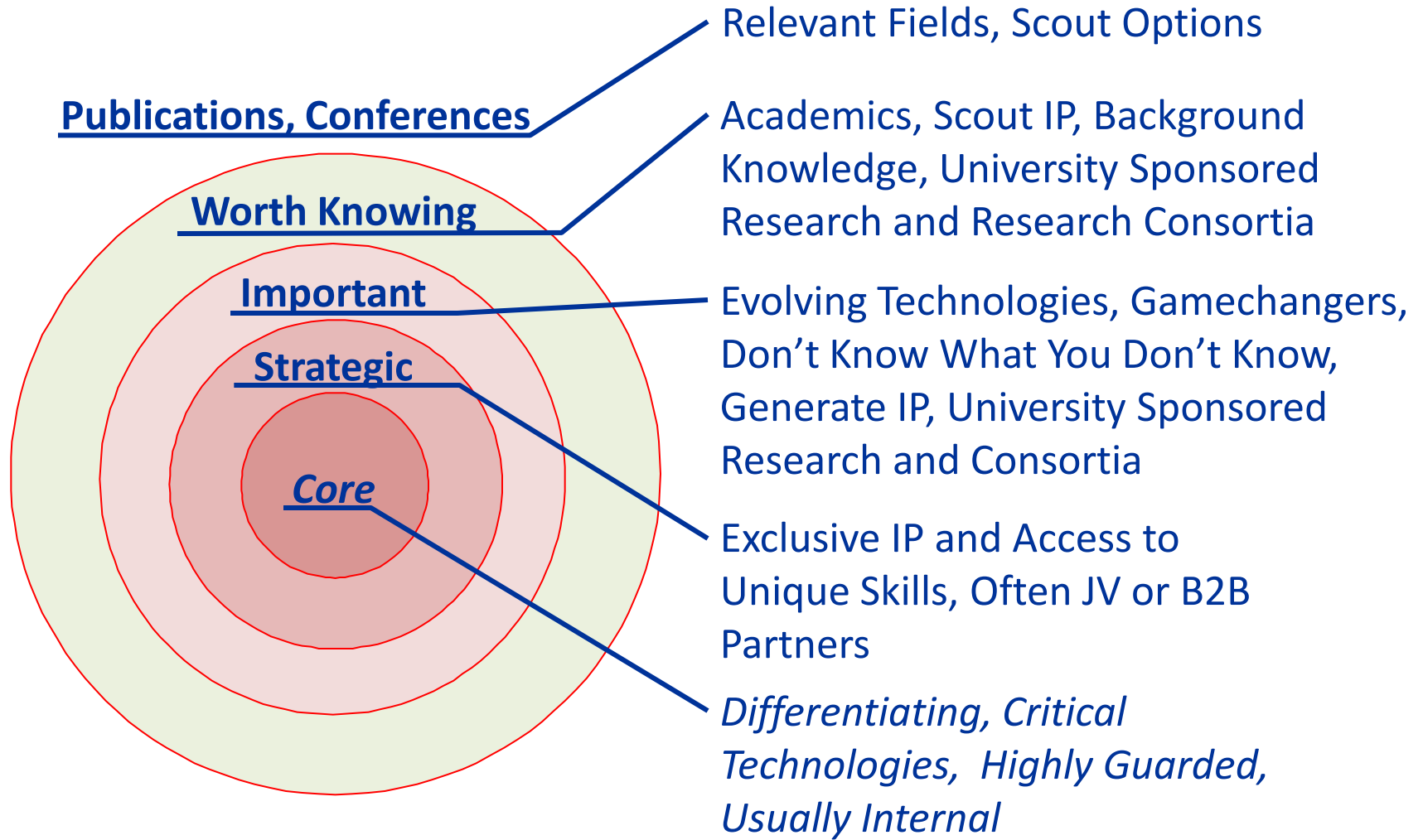
- Develop personal relationships as key to starting and sustaining collaborations.
- Nurture long-term relationships to build a body of knowledge over time.
- Use web-based social media to foster networks between academia and industry
- Consortium-sponsored research

# Intellectual property

- Establish IP agreements prior to entering into research collaborations – let scientists from both side focus on the science.
- Use common, university-wide IP agreements when multiple working relationships are anticipated – avoid the need to negotiate every contract individually
- Chop “core” industrial research problems into (1) non-proprietary pieces that can be tackled by universities/ students, and (2) competitive differentiators that must be kept in-house
- Use professors as consultants for core problems that need to remain internal and proprietary.

# Open Innovation Model

- What -



RASears, 6/10

# Suggestions for Future Progress

- **Disseminate Summit III results**
  - University physics and astronomy chairs
  - AIP Corporate Associates members
  - FIAP members
  - SPS chapter advisors
  - Social networking via LinkedIn “Industrial Physics” group
- Establish a plan for continuing the dialog
- Distribute IP language from standard Semiconductor Research Corp (SRC) contract
- Produce a list of departments that have well-established industrial physics degree programs, with industrial partnerships/collaborations, and strong alumni networks, etc.
- Form an industrial physics network of universities who demonstrate adherence to best practices.
- Establish a network of industrial physicists who would visit departments as seminar speakers.
- Educate industry HR professionals about the value of physics degree holders.