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Research Centers

Human Capital: An Overview of Studies Performed in the U.S

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*BILAT-USA Symposium on Transatlantic EU-US Cooperation on Innovation and
Technology Transfer
Vienna, 22 March 2011*

Goals

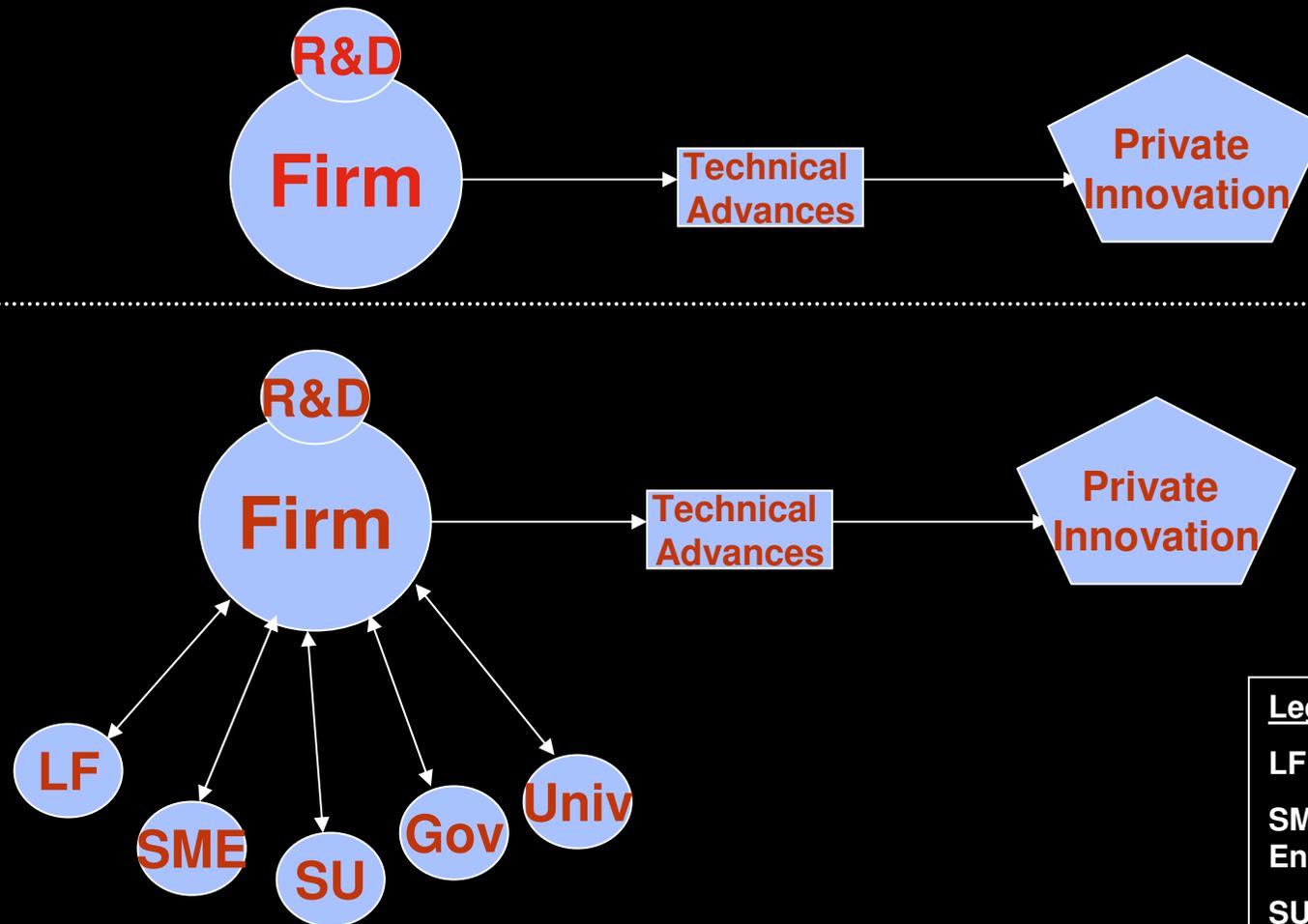


- Highlight the potential importance of human capital (HC) impacts from open innovation
- Provide a brief overview of research on HC impacts
 - Cooperative Research Centers
 - » Students
- Explore their implications for international dimension of open innovation

Traditional vs Open Innovation



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Legend:

LF = Large Firm

SME = Small Med.
Enterprise

SU = Start Ups

Gov = Government

Univ = Universities

Framework: S&T Human Capital



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- Bozeman, B., Deitz, J.S., & Gaughan, M. (2001). Scientific and technical human capital: An alternative model for research evaluation. International Journal of Technology Management, 22, 636 – 655.

“Our approach... gives less attention to the discrete products and immediate outcomes from scientific projects and programs and more attention to scientists’ career trajectories and their sustained ability to contribute and enhance their capabilities.”

Human Capital

- New knowledge and competencies
- Tactic Knowledge

+

Social Capital

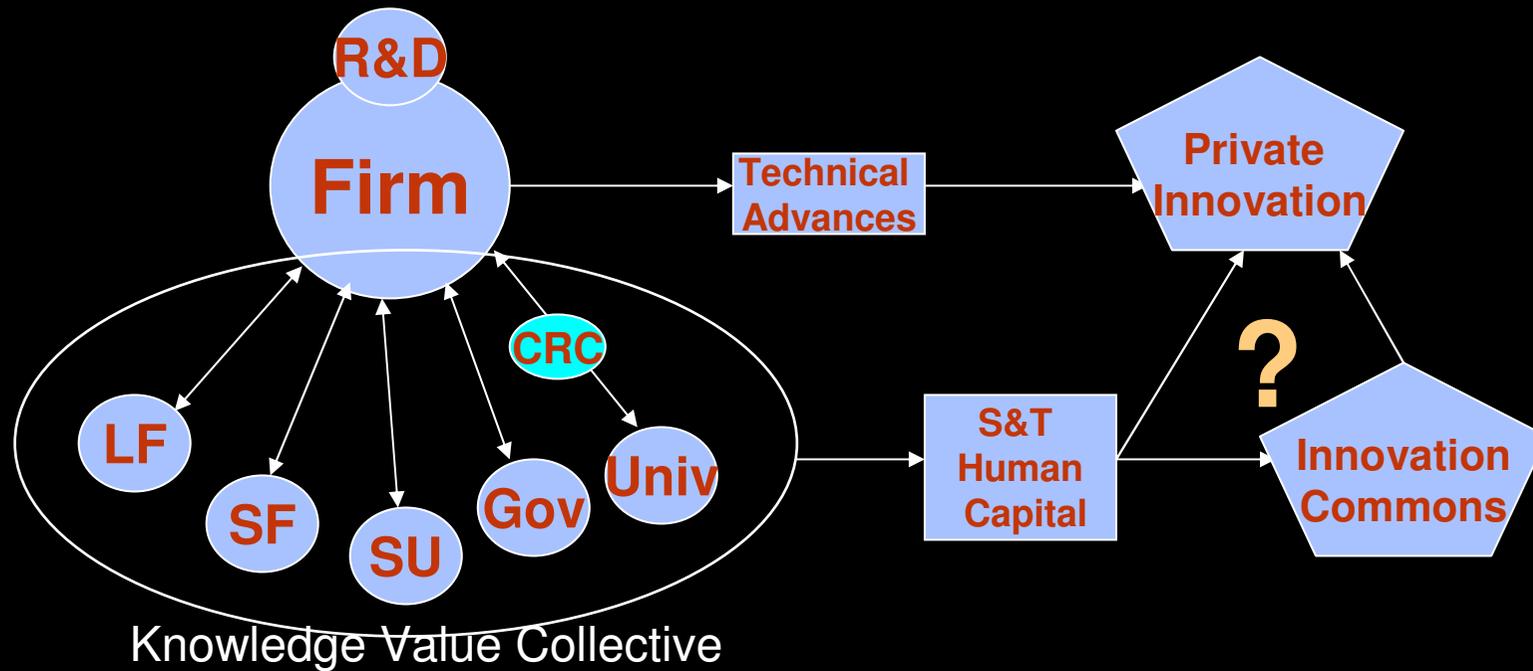
- Direct and indirect ties in a knowledge network

**Capacity
Building**



**Societal
Benefit**

Technological vs. Human Capital Implications



Cooperative Research Centers (CRCs) and Open Innovation



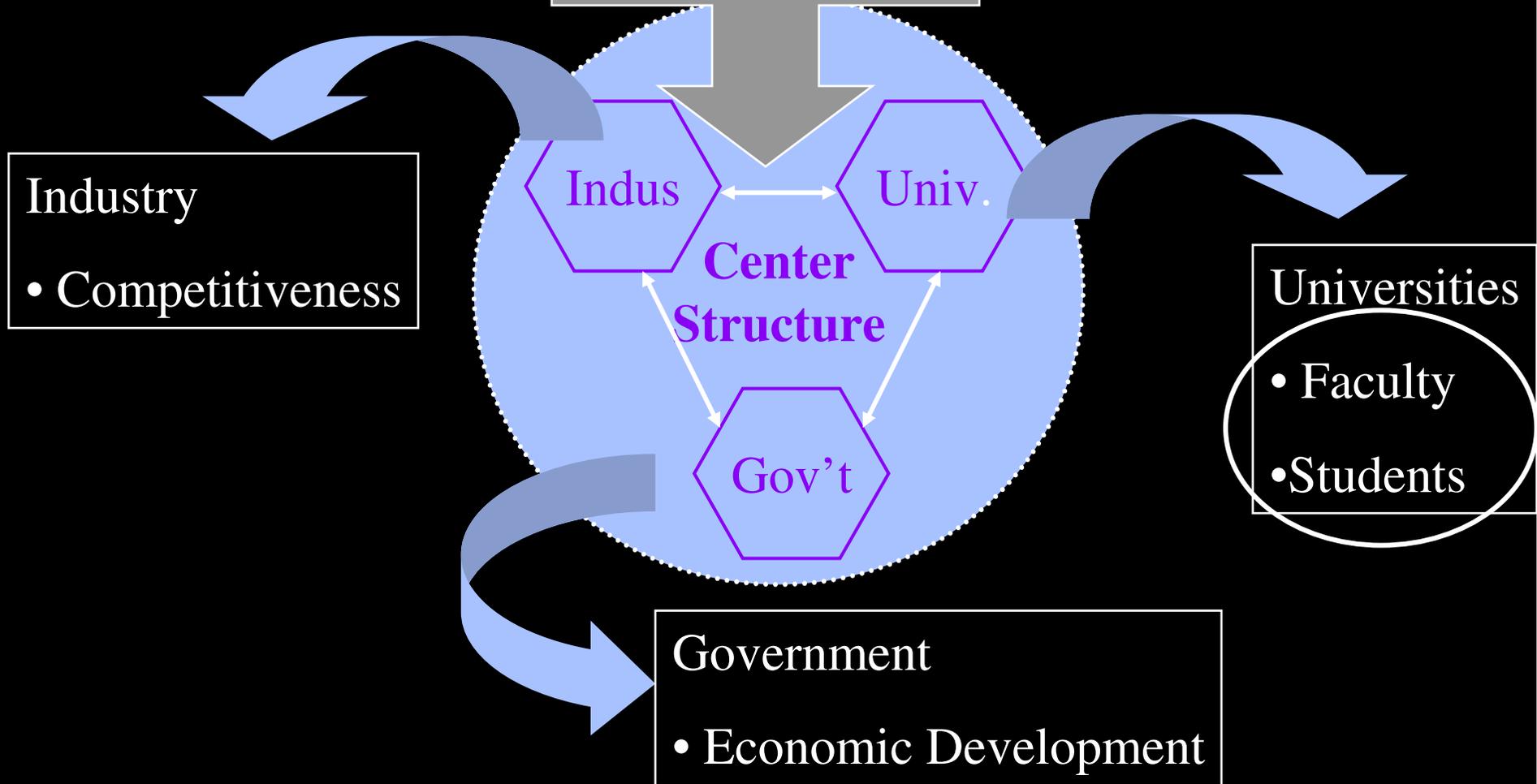
- CRCs: organization or unit designed to foster research-based interactions between public and private sector, stimulate innovation (Boardman & Gray, 2010)
- US Context: Industry/University
 - Pervasive mechanism: 1,200-5,000
 - Educational mission

CRCs Are Core Systems



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Open Innovation
Triple Helix
Collectivization
Multidisciplinary
Team



Context: the IUCRC Program



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- Longest operating CRC in the U.S.
- Modest government support (\$100k-200k/year)
 - Very dependent on industry & entrepreneurial faculty
 - Average center budget: \$1.2 million
 - ~ 50 operating now
- Ad hoc organization within university
 - ~ 10-15 scientists; ~ 20-30 graduate students
- Increasingly multi-university in nature
- Consortial format: multiple firms; collective influence and ownership

Research on CRCs & Human Capital Impact on Students



Small body of research: ~ 5 studies

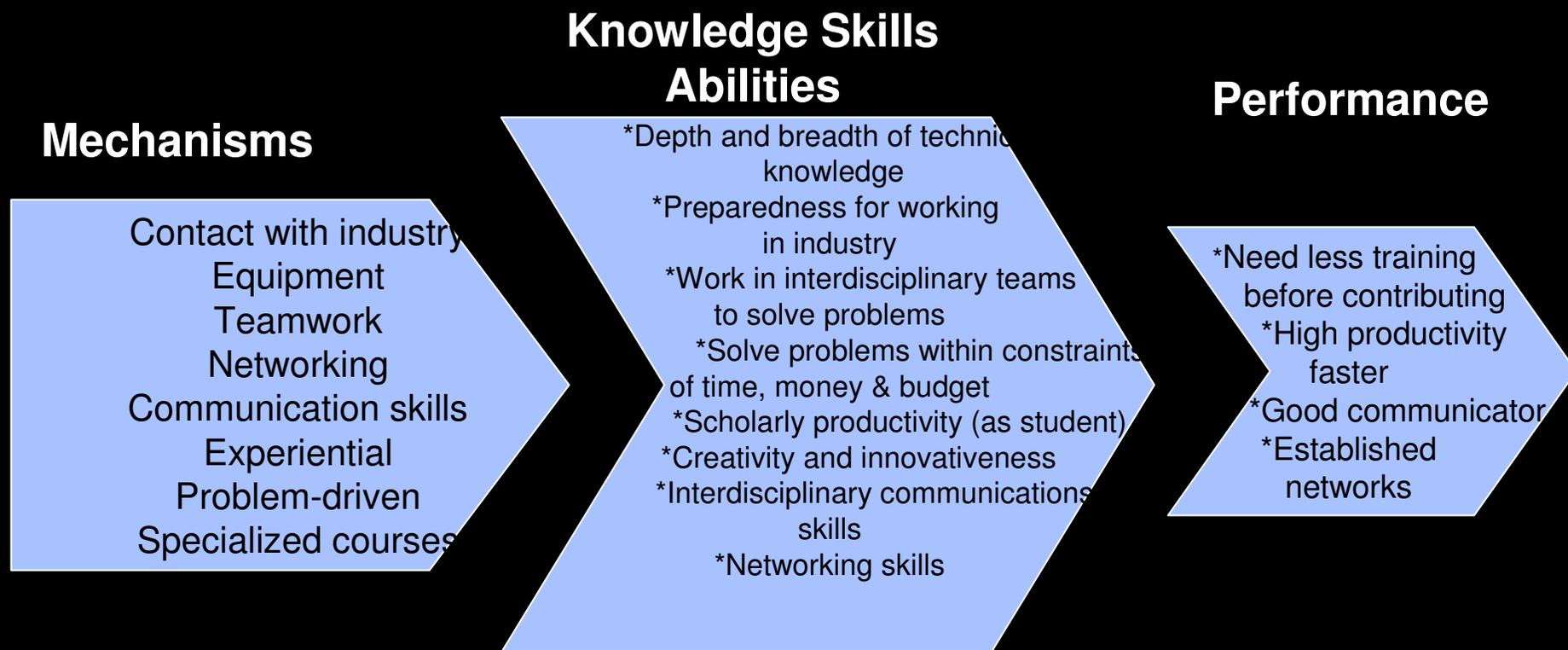
- IUCRC and Engineering Research Centers
- Informants:
 - Alumni & active students
 - Industry supervisors
- Methodology
 - Descriptive → Normative comparison → Comparison Group
- Mostly in the “gray literature”
 - Hard-to-find agency-funded technical reports
- Positive impacts and unintended consequences

Findings



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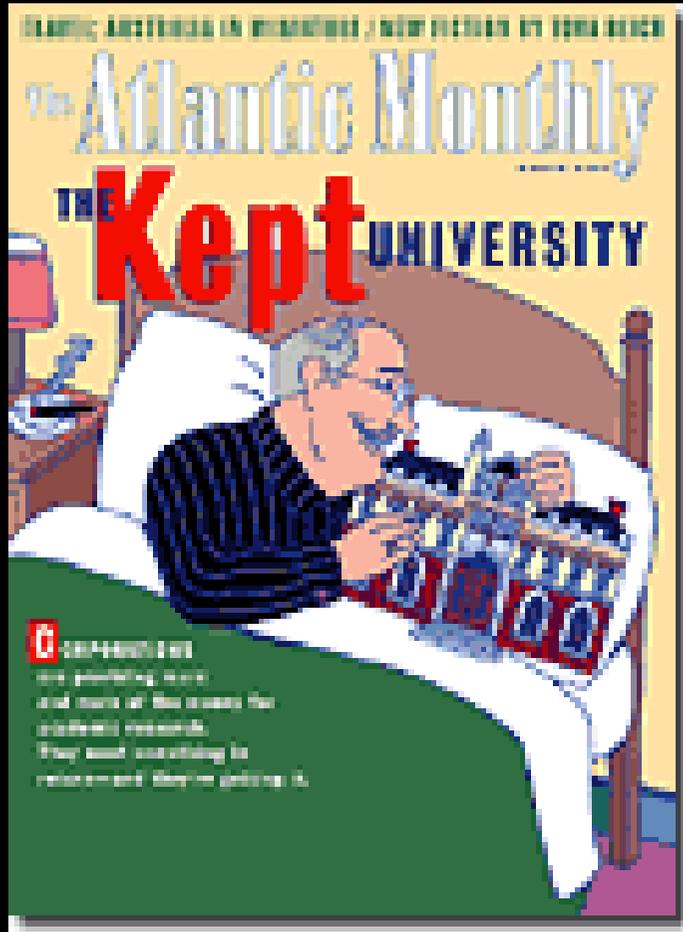
Based on alumni and industry reports...



Unintended Consequences



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- Modest literature
- Faculty-focused
- Student-focused
 - Behrens & Gray (2002): *Res. Policy*
 - No differences in “climate for academic freedom”

Open Innovation Implications



- Convergent and persuasive reports from both alumni and hiring supervisor that CRC experience enhances
 - Human Capital: industrially relevant knowledge, skills and abilities (K.S.A.)
 - Social Capital: existing network ties; skills to develop new network ties
 - Little evidence on unintended consequences
- Economic Impact:
 - Direct Effect: \$50-100k (training & quick start) (SRC)
 - Innovation Commons: ????

Any CRC/HC implications for international collaboration?



- No systematic analysis of CRCs and their international collaboration dimension
- Interesting anecdotes
 - Agency-driven
 - » IUCRC/Questor Centre at Queens University, Belfast
 - Open-innovation driven
 - » Intelligent Maintenance Systems IUCRC at U. Cincinnati



Questor Centre



- Founded in 1989
 - Focused on environmental issues
- Developed via a collaborative partnership with the National Science Foundation's (NSF) Programme for Industry/University Co-operative Research Centres (I/UCRCs)
- Several bi-lateral "tie projects" with U.S. IUCRCs



Current Academic Partners



- Queen's University Belfast (UK) – Lead Partner
- Dublin City University (RoI) – 2005
- Stevens Institute of Technology (US) – 2006
- Dalhousie University (Canada) – Nov 2007
- University of Duisburg Essen (Germany) – Nov 2007
- The Institute for Water Research (Germany) – Nov 2007
- Cranfield University (UK) – May 2008
- AFBI (UK) – May 2010
- Dalian University of Technology (China) – At Negotiation
- Liaoning Petrochemical University (China) – at Negotiation





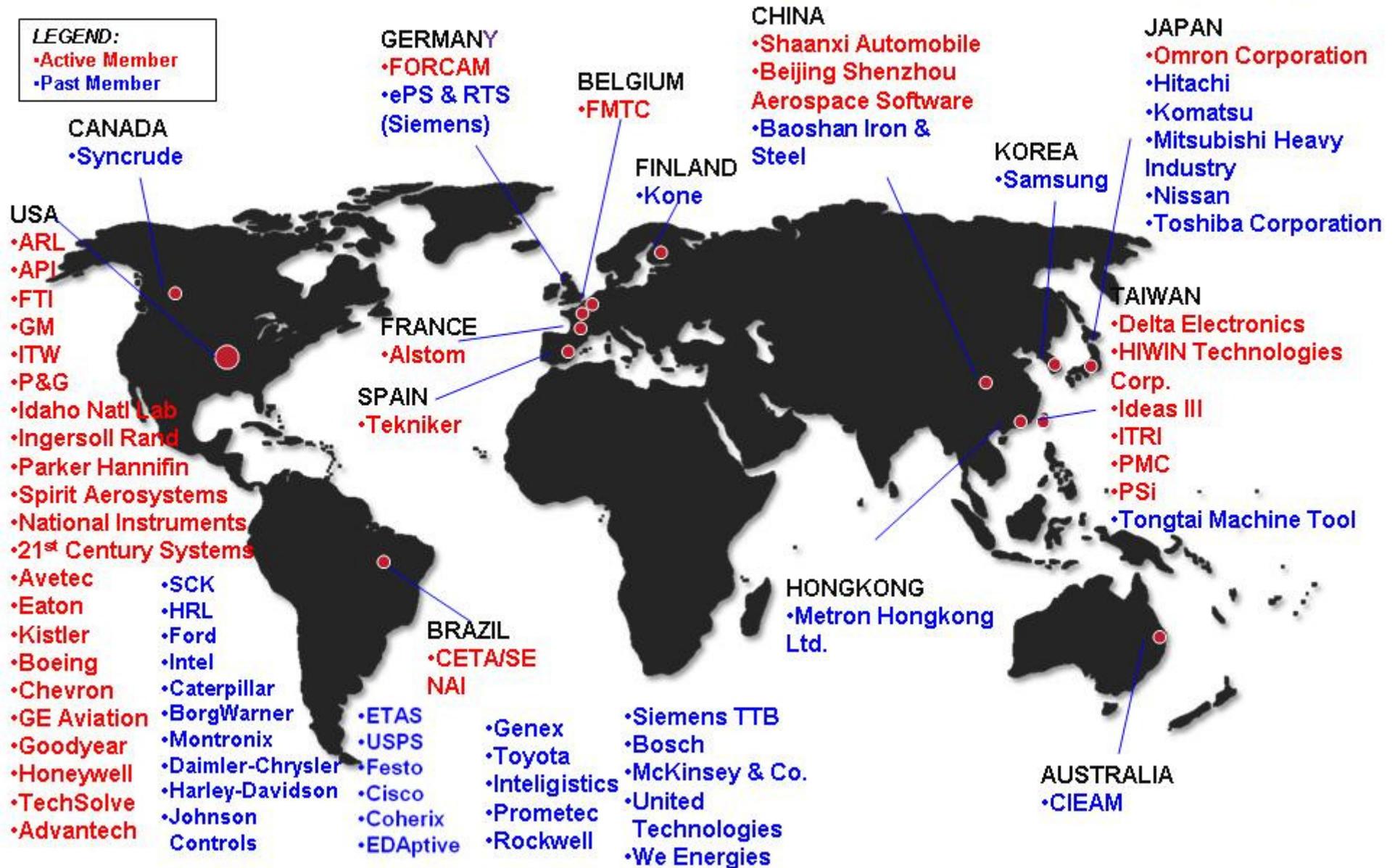
Center for Intelligent Maintenance University of Cincinnati

Mission:

Manufacturing-based center
focused on near-zero breakdown
performance

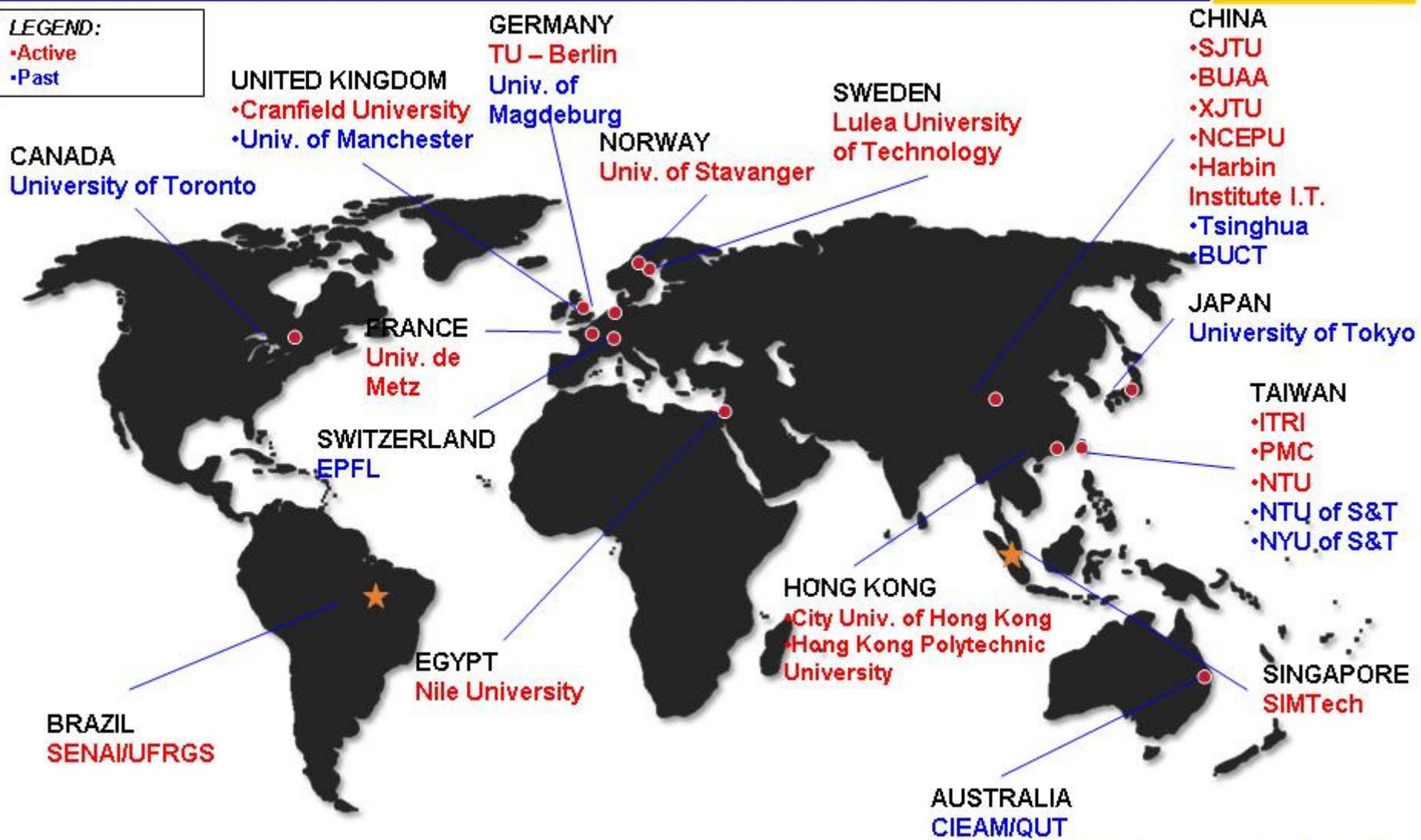
Global Industry Partners (75)

LEGEND:
 •Active Member
 •Past Member



Global Partnerships with Academic & Research Institutions

LEGEND:
•Active
•Past



NSF EAP Award in 2002

Implications



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- There seems to be some evidence that interactions within CRCs may naturally spillover across national boundaries
 - university-industry \leftrightarrow university-university
- Non-U.S. make-up of U.S. graduate student population (>50%) adds another element to this effect
- Need for more research on the international dimension but ...
 - Appears that the “innovation commons” that is benefiting from human capital impact of CRCs is potentially more far reaching than initially considered
- A closing question: Where to we find the “über” faculty needed to create and manage these partnerships?

References



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Questions?



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- Comments or Questions

- Acknowledgement: The authors acknowledge support provided by the National Science Foundation Industry/University Cooperative Research Centers Program (EEC-0631414) in preparing this paper