

# Advanced Cyber Security Center

## ACSC Research Consortium

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Distinguished Professor of Higher Education, Emerging  
Technologies , and Innovation

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University of Massachusetts

Amherst • Boston • Dartmouth • Lowell • Worcester • UMassOnline

# Key elements important to universities

- **Research opportunities**
  - Access large-scale research funding only available to established regional consortia
  - Access to cybersecurity operations/big data via **industry collaboration**
- **Attract top faculty and students**
  - Opportunities to work on cutting-edge cross-disciplinary research in a 'center of excellence' environment
  - Revenue-generating opportunities for student/post-doc consulting groups
  - Experience and knowledge gained from working on real-world, hands-on problems
- **Enhance overall reputation**
  - Position the university as a thought-leader in cyber issues
  - Increase career opportunities for graduates
  - Create fundraising opportunities from donors interested in cyber issues.

# Collaboration

- Collaboration has been difficult in Massachusetts in the past, but it is getting much better.
- MGHPCC represents a major departure in this history.
- Mass Medical Device Development Center (-M2D2) is another example.
- Recently we announced a Joint Venture with Raytheon –
  - RURI –the **R**aytheon **U**Mass**L**owell **R**esearch *I*nstitute
  - \$ 5 million project
- NERVE Center –
  - **N**ew **E**ngland **R**obotics **V**alidation and **E**xperimentation Center
- Cyber Security is the next most likely major opportunity for Collaboration

# Mass Green High Performance Computing Center

- 5 leading research universities, EMC, Cisco and state committed -501(c3) formed
- \$95 M from universities, state, industry, tax credits. (plus ~\$80M equipment)
- Site selected/acquired, tech. requirements identified, planning/design completed
- John Goodhue (former VP at Cisco), appointed as Executive Director
- Several joint proposals submitted –some granted
- Construction is well underway and will be completed by fall.

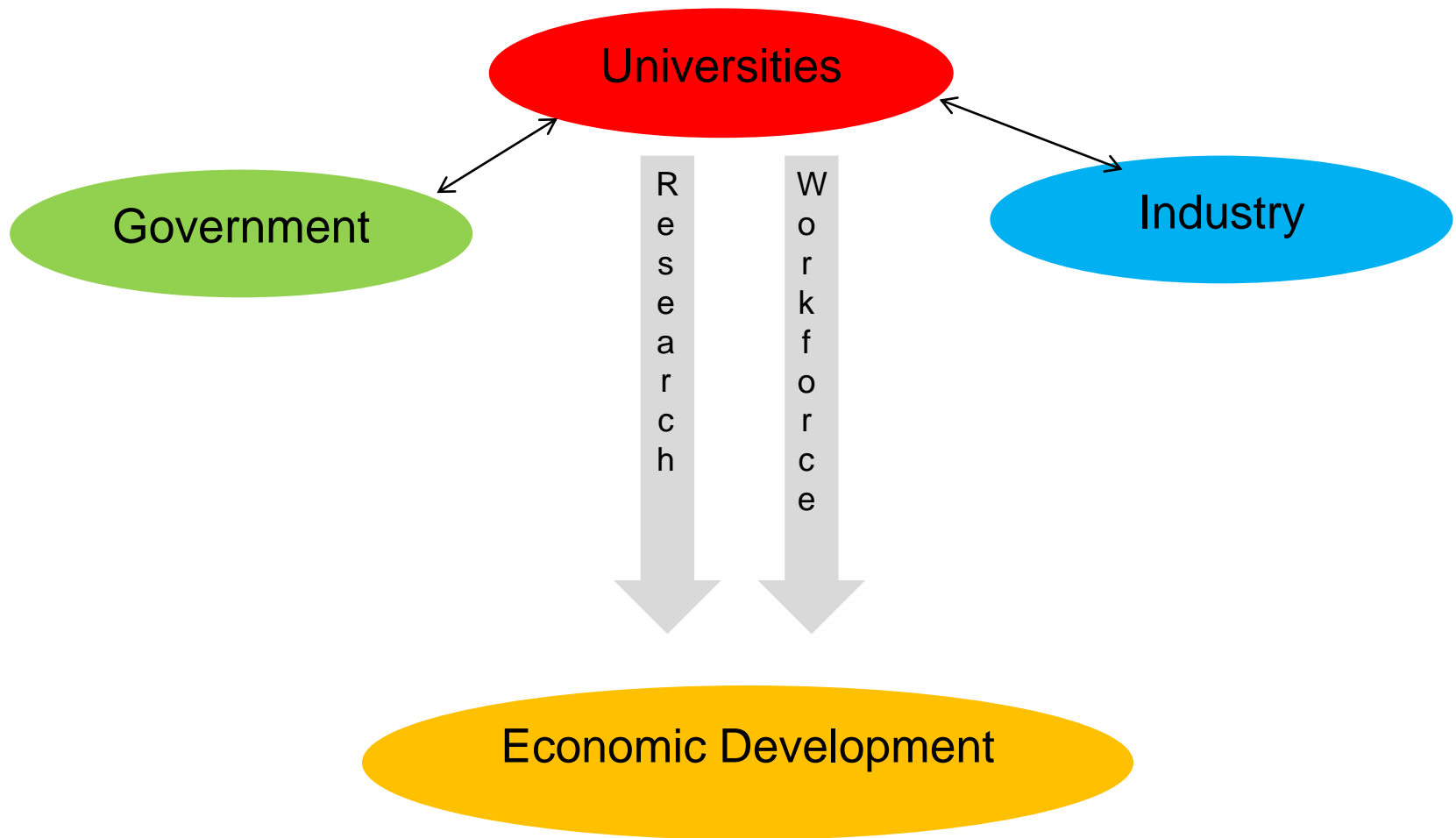


# Promoting a Culture of Collaboration

- UMass Lowell Medical Device Development Center
- \$4M 16K-sq-ft incubator
- Goal is to bridge gap between invention...production.
- Industry-funded 'New Venture' competition for region's device startups
- Full at opening
- Joint Lowell, Medical School



# The Partnership



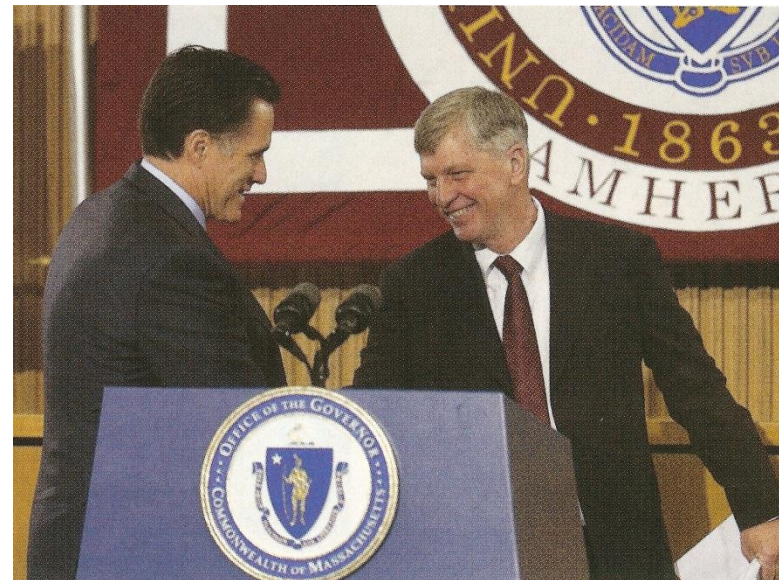
# Government led –industry & academic partners

- Governor Deval Patrick led -→
- Mass Life Science Center
  - (\$ 1 Billion)
- Mass Clean Energy Center
- John Adams Innovation Institute
- Mass Technology Collaborative
- Information Technology Collaborative
  - Mass Green High Performance Com
- Mass Life Science Collaborative
  - Industry-Academic group to advise in MLSCcreation/operation
  - Co-Chairs: Presidents Susan Hockfield (MIT), Jack Wilson (UMass), Drew Faust (Harvard), Henri Termeer (Genzyme)
- Mass Defense Technology Initiative
  - Chair: Jack Wilson –Public&Private Univ. Hanscom, Natick, industry partners



# Technology Transfer

- Formation of the Massachusetts Technology Transfer Center in 2003 by Governor Mitt Romney
- Designed to serve the needs of ALL Massachusetts Universities in partnership with Industry and major research universities that were already well engaged.





# Cyber Centers

- NSA –Nat. Centers of Academic Excellence
  - - Cyber Operations, Research, Education
  - Northeastern University is one of the four centers
- DHS:National Cybersecurity Center (NCSC)
- Carnegie Mellon CyLab:
  - <http://www.cylab.cmu.edu/>
- UMD's Maryland Cybersecurity Center (MIT Lincoln Labs)
- Purdue University
  - <http://www.purdue.edu/discoverypark/cyber/>
- Deloitte Center for Cyber Innovation
  - <http://www.deloitte.com/>

# PreCompetitive Collaborative Centers

- Sematech
- Carnegie Mellon
- M2D2
- MGHPCC
- Massachusetts Tech Transfer Center

# Sematech Partners



Accelerating the next technology revolution.

**SEMATECH consortia members and partners  
make up 50 percent of the worldwide chip market**

[See all of our members and partners](#)



## Over \$500 million in funding from DARPA

### Sematech Partners

4DS  
Advanced Micro  
Devices  
Aixtron  
Altera  
Analog Devices  
Applied Materials  
Applied Seals NA  
ASML  
Atotech  
AZ Electronic  
Materials  
centrotherm  
CNSE  
Core Wafer  
Systems  
Dai Nippon Printing  
DNS Electronics  
Dow Electronic  
Materials

Edwards, Ltd.  
FEI  
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Fujifilm  
GLOBALFOUNDRIES  
Hewlett-Packard  
Hoya  
IBM  
Infineon  
Technologies  
Inpria  
Intel  
Invensas  
JSR Micro  
KLA-Tencor  
Kumho  
Petrochemical  
LSI Corporation  
Macronix  
MATHESON

Micron Technology  
National Institute of  
Standards and  
Technology (NIST)  
NEXX Systems  
Nissan Chemical  
Industries, Ltd.  
NXP  
ON Semiconductor  
Pall Corporation  
Panasonic  
Qualcomm  
Renesas  
Samsung  
Semiconductor  
Industry  
Association  
Shin-Etsu  
SK Hynix  
Soitec

Solid State  
Equipment  
Corporation  
Spansion  
STMicroelectronics  
Sumitomo  
SUSS MicroTec  
Texas Instruments  
Tokyo Electron  
Limited (TEL)  
Tokyo Ohka Kogyo  
Co., Ltd. (TOK)  
TSMC  
Vishay  
Semiconductor  
Winbond

# UMass Role

- Research Growth
- Commercial Ventures - Intellectual Property
- President's S&T fund established 2004
  - to build research enterprise, promote collaboration and enhance the state economy -- \$8 M investment has leveraged \$200 M in new R&D awards
- Creative Economy Fund
- Crossing the chasm –CVIP Tech. Dev. funds
- UMass Medical School Life Sciences Moment Fund
- Incubators
- Great graduates carrying IP into workforce

# Prime The Pump: Cybersecurity Risk Analysis and Investment Optimization

- 1) rigorous models for cybersecurity risk,
- 2) models for costs/benefits of various cybersecurity tech.
- 3) techniques for integrating models into higher level models that account for other risks/risk management expenditures.
- **Dr. Wayne Burleson**, Professor of Electrical and Computer Engineering, College of Engineering
- **Dr. Anna Nagurney**, John F. Smith Memorial Professor of Operations Management, Isenberg School of Management
- **Dr. Mila Getmansky Sherman**, Associate Professor of Finance, Isenberg School of Management
- **Dr. Senay Solak**, Assistant Professor of Operations Management, Isenberg School of Management
- **Mr. Christopher Misra**, Associate Chief Information Officer for Security and Executive Director of Network Systems

# Prime the Pump: A Platform for Data-Intensive Cybersecurity Monitoring

- This project aims to develop a platform that will consume and integrate event stream data, preparing it for rapid real-time analysis and efficient historical analysis of retained event data. The platform will offer data protection and retention control, extensibility, and resilience.
- **Principal Investigators:** Multi-institutional research team from Boston University, University of Massachusetts and The MITRE Corporation
- **Gerome Miklau**, Associate Professor of Computer Science at UMass Amherst: Co-Director, UMass Database and Information Management Lab
- **Yanlei Diao**, Associate Professor of Computer Science at UMass Amherst: Co-Director, UMass Database and Information Management Lab
- **Evimaria Terzi**, Assistant Professor of Computer Science, Boston University, Co-Director, Boston University Data-Management Lab
- *(Consultant)* **Arnon Rosenthal**, Principal Scientist, Department of Cognitive Tools and Data Management, The MITRE Corporation

# Center for Terrorism and Security Studies

- **Expertise / Activities:** emerging terrorist threats, insurgencies, transnational criminal networks and U.S. Special Forces training
  - James J.F. Forest, Ph.D., is an associate professor and director. Senior fellow with the **Joint Special Operations University**, where he conducts research, some of which is classified, on emerging terrorist threats, insurgencies, transnational criminal networks and U.S. Special Forces training. Forest is the former Director of Terrorism Studies at the **United States Military Academy**
  - John Horgan, Professor, Director - Center for Terrorism & Security Studies
    - Books include *The Psychology of Terrorism*, *Walking Away from Terrorism*, *Leaving Terrorism Behind*, and *Terrorism Studies: A Reader*. His latest book *Divided We Stand: The Strategy and Psychology of Ireland's Dissident Terrorists* was published by Oxford University Press in 2013. He is Special Editions Editor of *Terrorism and Political Violence*, Associate Editor of *Dynamics of Asymmetric Conflict*, and sits on the Editorial Boards of several further journals, including *Studies in Conflict and Terrorism* and *Journal of Strategic Security*. Professor Horgan is also a member of the Research Working Group of the FBI's National Center for the Analysis of Violent Crime.
- Mia Mellissa Bloom Professor of Security Studies
  - author of *Dying to Kill: The Allure of Suicide Terror* (NY: Columbia University Press 2005) and *Living Together After Ethnic Killing* edited with Roy Licklider (London: Routledge 2007) and *Bombshell: Women and Terror* (U Penn Press 2011). She is a former term member of the Council on Foreign Relations

# The End?



- No, there is never an end.
- The commitments that we made are certainly a never-ending-story.



# S&T Initiatives Fund

History: Investments to date totaled **\$7.5M**, and have generated additional funding of \$207M in federal, industry and private foundation funding. Examples include:

- **Center for Hierarchical Manufacturing** (UMass Amherst) - Research & education center received a five-year NSF grant to serve as the agency's Nanoscale Science and Engineering Center (NSEC).
- **Massachusetts BioManufacturing Center(s)** (Dartmouth and Lowell) – S&T investments helped both campuses position themselves for large state investments in new research facilities.
- **Massachusetts Medical Device Development Center (M2D2)** (Lowell and Worcester) – Has provided medical device prototyping services and research collaborations to more than 100 startups across the state.
- **UMass Center for Clinical and Translational Science** (system-wide project led by UMass Worcester) - Funds assisted in the creation of a UMass Medical School-led, system-wide clinical and translational research center funded by the National Institute of Health.
- **Center for Personalized Cancer Therapy** (Boston, in partnership with Dana-Farber / Harvard Cancer Center) – Joint project to address racial, ethnic & socioeconomic disparities in cancer incidence, morbidity and mortality.

# UMass Life Sciences Moment Fund

- Created in 2008 to spur inter-campus collaboration and strengthen the University's clinical & translational research.
- Individual awards up to \$100,000 for 1 year; up to \$150,000 for two years
- Goals: New devices, therapies, vaccines; high-risk, high-reward studies.

# How do we stack up against competitors?

- Very well
- One major advantage:
  - Strength in law, policy, and social issues of security.

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  - Forest is the former Director of Terrorism Studies at the **United States Military Academy** where he taught a variety of courses and directed research initiatives and education programs for the Combating Terrorism Center at West Point, covering topics such as terrorist recruitment, training, and organizational knowledge transfer.
  - He was selected by the Center for American Progress and Foreign Policy as one of “America’s most esteemed terrorism and national security experts” and participated in its annual Terrorism Index studies 2006 to 2011.
  - He has published 12 books and dozens of articles in journals such as the Terrorism and Political Violence, Crime and Delinquency, Perspectives on Terrorism, the Cambridge Review of International Affairs, the Georgetown Journal of International Affairs, Contemporary Security Policy, the Journal of Political Science Education, and Democracy and Security.

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  - She is a former term member of the Council on Foreign Relations (CFR) and has held research or teaching appointments at Princeton, Cornell, Harvard, and McGill Universities.
  - Bloom has a PhD in political science from Columbia University, a Masters in Arab Studies from Georgetown University and a Bachelors from McGill University in Russian and Middle East Studies and speaks nine languages.
  - She regularly appears on CNN, Fox News, CSPAN, and NBC Nightly News.