

LISTEN.  
THINK.  
SOLVE.®

## Internships, Co-ops & Technology Collaboration With Industry : Some Best Practices

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Advanced Technology Labs  
Rockwell Automation, Milwaukee, WI

**BIG 10**  
WOMEN'S  
WORKSHOP 2010

Mentoring and Networking Workshop  
for Junior Women Faculty in the Big 10  
[Pfister Hotel](#), Milwaukee, WI  
April 1-3, 2010

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 Allen-Bradley · Rockwell Software

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## Agenda

1. Overview of R&D
2. Collaborative R&D examples
3. Best Practices
4. Internship & Co-op
5. Summary

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### 1. Overview of R&D

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## Rockwell Automation

Leading Global Provider of Industrial Power, Control & Information Solutions

- Annual Sales : \$4.3 billion
- World Headquarters : Milwaukee, WI, USA
- Employees : 19,000
- Serving customers in 80+ countries

End users and machine builders (OEMs) rely on our comprehensive portfolio of [products](#), [software](#) and [services](#) to deliver value and help them meet their objectives:

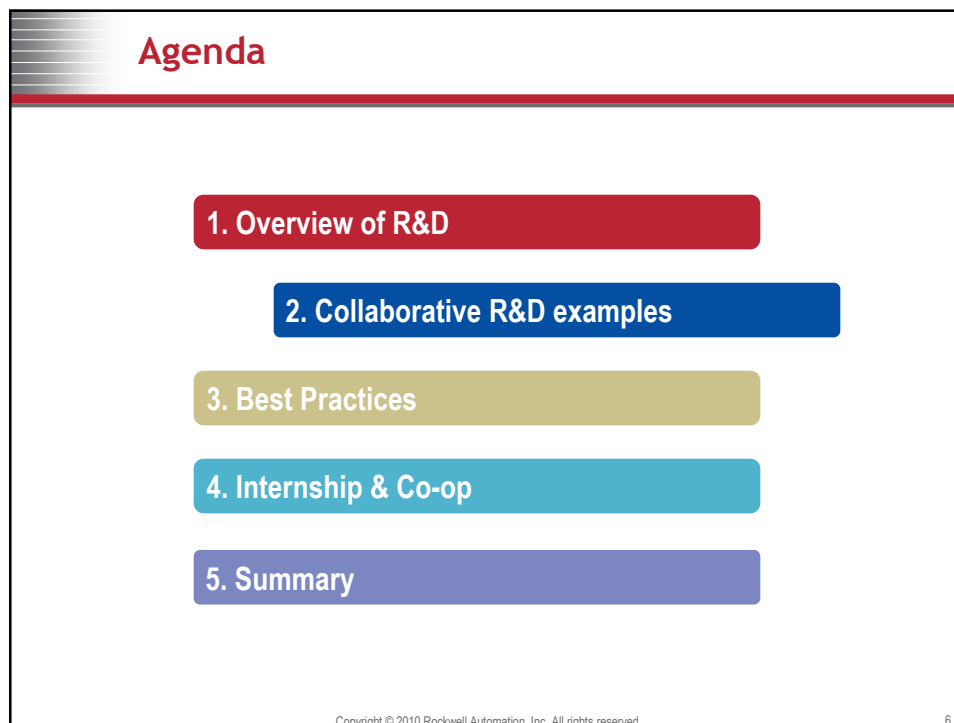
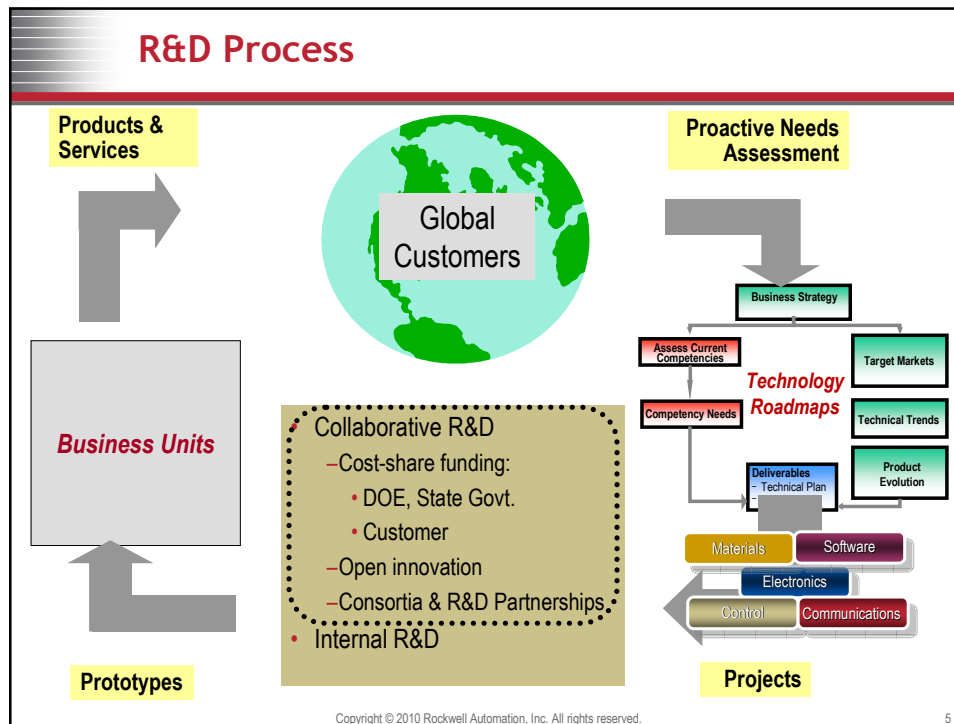
- **Faster time to market** — through speed, responsiveness & flexibility of automated manufacturing
- **Lower total cost of ownership** — through scalable, modular, energy-efficient and open automation control and information systems
- **Better asset management/optimization** — through diagnostics, condition-based monitoring, failure analysis and storage management
- **Broader manufacturing business risk management** — through process variability analysis, regulatory compliance and safety solutions



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## What works

- Be in touch with industry's "ouch"
  - Only thing that stays constant is change
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  - Align with a Champion "inside" Industry, Funding will follow
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  - Allow Industry to take the lead. Develop
    - "umbrella" University/Industry collaborative agreements
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## Renewable Energy: DOE Funding

- Algae can produce 10-20x oil/acre
  - marginal, non-arable land
  - saline/brackish water
  - large waste CO<sub>2</sub> vent resources
  - minimal competition to food, feed or fiber
- Need: Today's dewatering is multistage process ~30% - 50% cost of algae cultivation
- ~\$6M ARPA-E funding for Scaling & Commercialization of Algae Harvesting Technologies
  - novel harvesting, dewatering, drying system
  - reduce energy to < 40 W/kg concentrating from 0.3 g/L to 180g/L
- Partners : Univenture / Algaeventure Systems, Rockwell Automation, Case Western Reserve University (CWRU), Ohio University, NB Innovation



1. Algal Cultivation

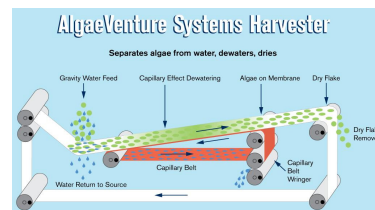


3. Fuel Production



2. Oil Recovery

Source doe.gov



Source : <http://www.algaevs.com>  
<http://arpa-e.energy.gov/FundedProjects.aspx#scaling>

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## Renewable Energy: State funding

- Need : research center for wind-turbine development & education
- \$3M State Grant to CWRU/The Ohio Wind Energy Research & Commercialization Center
  - Install 100kw, 225 kW, 1 MW Wind Turbines at CWRU
    - collaborative R&D platform
  - hands-on education for students
  - Collaborate w/ local Co. to advance design & manufacture of 8,000+ critical turbine components
  - Efficiency and cost improvements
    - near-term impact - create ~ 45 Ohio jobs



Industry partners: Rockwell Automation, Parker Hannifin, Lubrizol, Cleveland Electric Laboratories, Swiger Coil, Phillips Group, Wm. Sopko & Sons Co.

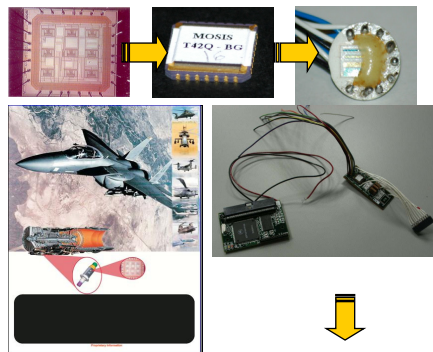
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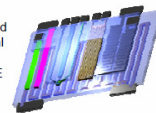
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## MEMS Fluid Health Sensor: Customer funding

- Need : Early detection of abnormal metal wear for fault detection & failure prevention for rotating machinery
- Partnered with a major aircraft company, CWRU to develop & test an on-line electrochemical cell MEMS sensor in a lubricating fluid
  - Able to use indication of chemistry of fluid to detect wear metal ions to provide an early indication of unusual material wear
  - Uses: Aircraft lubricant, HVAC coolant



Next generation fluid sensor with integral heater being fabricated at CASE



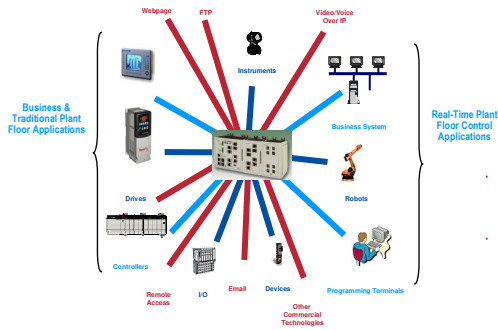
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## Software: Open innovation

- Need:
  - connect a wide range of products using open communication standards
  - download license and royalty-free adapter stack, e.g., through SourceForge.net
- Developed at Odo Struger Lab/Vienna
  - an open-source EtherNet/IP lightweight, scalable, adapter-class software stack written in C for I/O adapter devices



- In order to become an authorized supplier or developer of products built to an ODVA technology, including EtherNet/IP, a company must complete the ODVA Terms of Usage Agreement for that technology, have the agreement countersigned by ODVA, and follow the requirements of the agreement. These requirements include, but are not limited to, obtaining a subscription to the specifications and a vendor ID for the technology, and testing products when products are developed. (The vendor ID is the method by which ODVA publicly lists those companies who have become vendors of products that use an ODVA technology.)
- The ODVA is an international association that supports network technologies based on the Common Industrial Protocol (CIP™) that includes DeviceNet, EtherNet/IP, CompoNet, and ControlNet. [www.odva.org](http://www.odva.org)

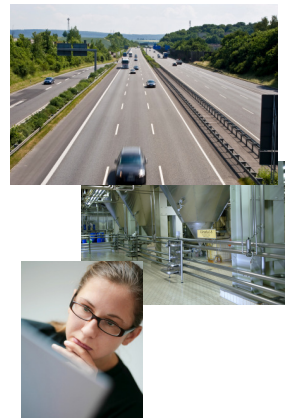
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## Alt. Communications Media: “Connect & Develop”

- Need
  - Low cost Ethernet with good performance
  - Rugged, Application agnostic
  - Should be able to retrofit
- Collaborated w/Professor : well known school
  - Good track record, students and facility
  - Well developed technology, owns successful business in the public works sector
- Agreement w/University & our local CR&D lab
  - Developed technology, assigned IP rights
  - Developed proof-of-concept prototypes
  - Tech transfer to U.S. CR&D lab



Ref: "Connect and Develop: Inside Procter & Gamble's New Model for Innovation," Harvard Business Review, Vol. 84, No. 3, March 2006.

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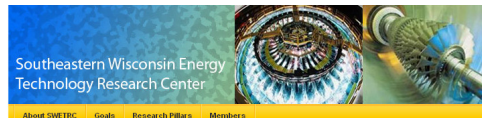
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## Advanced Materials: Consortium

- Research
  - power, controls & energy fields
  - new products & processes that foster economic growth of regional companies
- Workforce Development
  - Train a dynamic workforce- engineers, scientists & technicians in the field of power & energy
- Strategic Partners and Networks
  - between Academic Institutions, Industries, Government & Non Government Organizations

- Advanced Materials for Energy Applications
- Technology for Carbon Management And Energy Conservation
- Alternative Energy Technology
- Sensors and Energy Conversion Devices & Processes



Members : Rockwell Automation, Kohler, Eaton, The Lynde & Harry Bradley Foundation, NETL, ATC, DRS Technologies, Regenco, WE Energies, MSOE, UWM, Marquette University

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<http://www4.uwm.edu/swetrc/>

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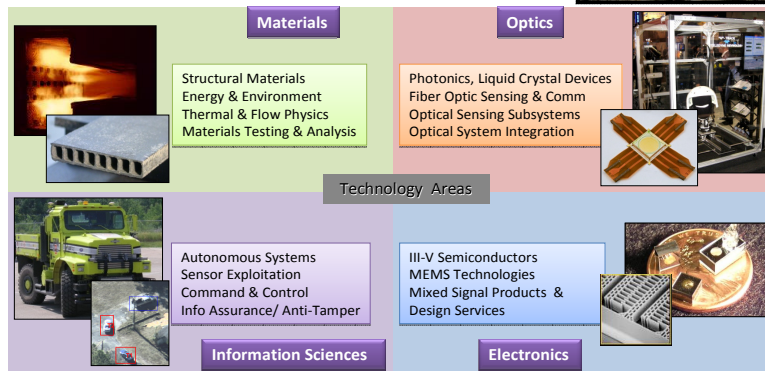
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## R&D Partnership



Research and Development powerhouse since 1962  
 Successful R&D Business, with:

- ❖ Contract R&D for the Government
- ❖ Commercial R&D for strategic commercial customers
- ❖ Niche product spin-offs and transition to businesses



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Source: Teledyne Scientific

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## What may not work

- Ignoring current industry technology, standards and practice
  - Industry goal is to commercialize technology
- Receiving funds and switching to autopilot
  - Do not miss milestones or change goals without consulting Industry
- Engaging with the competition
  - If there is need for pre-competitive R&D, then engage in a Consortium
- Taking industrial partner for granted
  - Exercise care when exploring new projects using intimacy gained with Industry
- Writing IP Agreements exclusively favoring University interests
  - Strike a balance by catering to needs of Industry in drafting IP agreements
- Publishing without consulting with Industry
  - Unauthorized release of information could irrevocably ruin trust

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## IP: discussion topics

### Universities



- Resources
- Have graduate students
- Desirous of owning IP.
  - spin-off companies, licensing revenues
- Publish papers, reports, thesis

### Industry



- Offer funds, facilities
- Have domain expertise/background IP
- Desirous of owning foreground IP
  - Generate revenue stream : new products/customers/markets
- File patents, publish white papers

- 
- R&D increasingly becoming global
    - What if Governments/Universities offer favorable terms elsewhere ?
  - Students sharing IP
    - Has the student signed *any* agreement with the University ?
  - Abiding by Dept. of Commerce Export requirements
    - Does the student have clearance to work on the topic ?

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## Overview Of Internship & Co-op Opportunities

### Internship

- Most common form of opportunity
- Students hail from various disciplines
- 10 – 12 weeks over the summer
- Employers may offer housing assistance
- May extend into part-time work during the school year, if
  - employer is local, or,
  - student can work remotely

### Co-op

- Less common than internships
- Most common among engineering students
- Student takes a semester off to work fulltime
  - Typical May–Dec / Jan-Aug
  - May delay graduation

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## Desirable Student Profile

- Demonstrated track record of excelling in Education, Leadership and Work
- Analytical & innovative approach
- Problem solving skills
- Written/verbal communication
- Ability to lead & follow
- Customer-centric outlook
- Collaborative spirit
- Global perspective
- Flexible nature

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## Summary

- Industry is desirous of generating revenue stream from Innovations
- Know your industry partner
- Develop relationships based on mutual trust
  - People constitute the most important resource
- There is more than one method to work with Industry
  - R&D opportunities for partnership are not local anymore
  - Learn what works and what does not, and remember what did not work!
- Develop fair and equitable processes and procedures
  - IP agreements are likely to take the longest time. Leverage relationship to develop “umbrella” agreements for agile response to FOA’s.
- Have fun, celebrate victories
  - “Success begets success”

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## Questions

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