Radical Innovation and BSAC: Increasing the Chances of Tech Transfer

BSAC Spring 2005 IAB Meeting

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What I Hope to Accomplish

- The Lally Radical Innovation Research Program
- Nature of Radical Innovation
- Our Innovation Model
- Radical Innovation in the Context of BSAC and Implications for IAB members management
OUR STRATEGY IS TO GROW REVENUE FROM NEW PRODUCTS.

HOW OBVIOUS DOES AN IDEA NEED TO BE BEFORE WE’LL STOP CALLING IT A STRATEGY?
What Companies Are Telling Us

- Organic growth from current operations and incremental innovation is not sufficient for survival in the long term
- New sources of revenue must be developed
- Traditional markets and technologies are not sufficient to ensure acceptable growth rates
- For the most part, this message has gotten to senior management only in the past 6 or 7 years.
  - Notwithstanding companies such as 3M, H-P, P&G, etc, often seen as the most innovative companies
  - Most companies do not have formal processes for ensuring radical innovation
Observations in 1995

• We observed overwhelming emphasis on continuous improvement in mgmt and academic attention
  ---from TQM to cycle time to re-engineering to six sigma to our understanding of NPD
• But . . . maintaining or creating competitive advantage also requires discontinuous leaps.
• We know little (or have forgotten much) about how to manage discontinuous leaps.
• Continuous improvement practices inappropriate (detrimental?)
The Lally Radical Innovation Research Project

Phase I: Understand How to Incubate Radical Innovation Projects
- Longitudinal Study of 12 Radical Innovation Projects in Ten Mature Firms
- Launched in 1995
- Multi-disciplinary team of faculty (6-8)
- Major grant from the Sloan Foundation
- Partnership with the Industrial Research Institute
Phase I Companies

1. Air Products
2. Analog Devices
3. DuPont
4. General Electric
5. General Motors
6. IBM
7. Nortel Networks
8. UTC / Otis Elevator
9. Polaroid
10. Texas Instruments
RADICAL INNOVATION

HOW MATURE COMPANIES CAN OUTSMART UPSTARTS

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advancing business through innovation
Phase II of Research

Understand the organizational systems and structures supporting RI

- Longitudinal Study of Radical Innovation Initiatives in Twelve Mature Firms
- Launched in 2001
- Multi-disciplinary team of faculty (9 faculty at 3 Universities)
- Partnership with the Industrial Research Institute
Phase II Companies

- 3M
- Air Products
- Albany International
- Corning
- DuPont
- GE

- IBM
- J&J Consumer
- Kodak
- Mead-Westvaco
- Sealed Air/Cryovac
- Shell Chemical
Core Activities of the Firm

ONGOING OPERATIONS

INCREMENTAL INNOVATION

THE “SQUEEZE”

R.I

Total Amount of Firm Effort = 100%
Radical Innovation Definition

- new to the world performance features,
- 5-10X (or greater) performance improvement, or
- 30 - 50% (or greater) reduction in cost.

Market based or market impact definition: RI changes the competitive basis of a market
Strategic Framework for Radical Innovation Innovations

CURRENT STRATEGIC “FOUL LINES” (STRATEGIC FRAMEWORK OR CONTEXT)
Defining Radical Innovation

<table>
<thead>
<tr>
<th>Technical Uncertainty</th>
<th>Low</th>
<th>High</th>
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- **INCREMENTAL INNOVATION**
- **RADICAL INNOVATION**

**Market Uncertainty**

- **High**
- **Low**
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- **INCREMENTAL INNOVATION**: Put together known technologies in new ways: Otis
- **RADICAL INNOVATION**: New technologies for known markets: GE
Radical Innovation

Incremental Innovation

- Low
- Hi

- Organization Uncertainty
- Resource Uncertainty
- Technical Uncertainty
- Market Uncertainty
Why Radical Innovation Is Difficult: Force Field Analysis

Innovation Drivers: Demand for growth, Competition, Top Management Demand, Long term survival, Revenues decreasing

Innovation Resisters: Current markets, customers, business models, strategy, structure, roles, change, reward system and current success
The Radical Innovation Project Lifecycle: Dupont Biomax®
The Nature of the Radical Innovation Lifecycle

- Long term
- Highly uncertain, unpredictable
- Sporadic -- stops and starts, deaths and revivals
- Non-linear -- idea generation throughout
- Stochastic -- key players come and go, priorities change, exogenous events are critical
- Context dependent -- history, experience, corporate culture, personalities, and informal relations all matter

The tried and true management practices that work for incremental innovation are often inadequate for radical innovation.
AN ELEPHANT IS LIKE A BRUSH.

AN ELEPHANT IS LIKE A ROPE.

AN ELEPHANT IS SOFT AND MUSHY.

AN ELEPHANT IS LIKE A TREE TRUNK.

ELEPHANT IS LIKE A SNAKE.
D – I – C Model
Challenge 1: 
- Idea Generation
- Idea Recognition
- Initial Evaluation

Challenge 2: 
- Project Management

Challenge 3: 
- Market Learning

Challenge 4: 
- Business Model

Challenge 5: 
- Resource Acquisition

Challenge 6: 
- Transition Management

Challenge 7: 
- Leadership and People Roles

Challenge 8: 
- Systems and Processes
Challenge 1: Increase the Flow of Good Ideas

Technical Ideas

Market Ideas

FLOW
FLOW
FLOW
FLOW
FLOW
FLOW
FLOW
FLOW
FLOW
FLOW
FLOW
FLOW

OPPORTUNITY
RECOGNITION
MECHANISMS
Challenge 1: Distinguish Between Invention and Innovation

- **Invention: Based on Competencies**
  - *The “Idea”*
  - Technology, market, architecture, business model, product, service, process, etc.
  - The “idea” leads to a potential “opportunity” but not a realized opportunity

- **Innovation: Based on Dynamic Capabilities**
  - *The “Market Application”*
  - The process of bringing the idea to the marketplace
  - Innovation Funnel: 1000 ideas, lead to 100 opportunities, lead to 10 projects, lead to 1 marketplace introduction
  - The goal is market success
    - *Company hurdle rates*
Companie Outsource R&D

- Industrial organizations expect to outsource about 7% of their R&D activities in 2004, a 12% increase from levels in 2003 (R&D Magazine).
  - Other companies 53%
  - Commercial Labs 53%
  - Universities 51%

- Why?
  - Lack of internal capabilities, focus on core competencies, avoid R&D internal costs, reduce costs, bring new technologies into core areas
  - Focus on business performance at the expense of early stage R&D outsourcing as a way to keep pipeline full
Technology Scanning

- Virtually all companies today are actively scanning external sources for new technologies

- However, these technologies are, for the most part, being used to find better solutions to existing problems, either technological problems or market problems

- Problem: How can Cooperative Research Centers assist affiliated companies to utilize new technologies for new applications and/or new markets
Challenge 1: Generating Ideas
Gap Between Research & Market Application

Existing Intellectual and Research Resources

Existing Incubation and Commercialization Resources

“Valley of Death”

Idea  Patent  Practice  Product  Commercial Business

Product Development Timeline
Challenge 1a: Idea Generation

- **Early RI Capability**
  - Mavericks try to catch the attention of patrons. There is a lack of infrastructure or systematic approach and there is a reliance on individual initiative to make someone listen.
  - Senior management requests new ideas

- **Mature RI Capability**
  - Internet based knowledge management system available to all employees
  - Idea submission forms – more or less cumbersome
  - A front-end set of individuals tasked with maintaining the website, responding to ideas, developing workshops, bringing in speakers, marketing themselves to the organization.
  - Hunters and gatherers are formal organizational roles
Challenge 1.b: Opportunity Recognition

- **Early RI Capability**
  - *Front line supervisors (usually R&D) recognize the opportunity in a proposal*
  - *Sometimes ideas have been recognized by R&D management*

- **Mature RI Capability**
  - *Formal roles: Hunters and gatherers tasked with finding ideas*
  - *A team sifts through ideas providing formal feedback to initiators and forwarding promising ideas to an evaluation board. Team is evaluated on how many ideas are generated and how many are forwarded for evaluation.*
  - *Market applications oriented to small “m” market rather than big “M” market*
Goal of RI Project Management: Reduce Uncertainties So Project Can be Transitioned

Discovery Transition Commercialization

High Uncertainties

Low Uncertainties

Project Incubation
Problem:

How to get BSAC technologies onto the radar screens of IAB affiliated companies?
Getting New Technologies Adopted: Traditional Role of R&D vs. I/UCRC

This problem is not different from the difficulty of internal R&D ideas getting noticed by their companies

- Develop initial applications to within current lines of business
- Provide technological solutions to known problems, customers, products, markets, etc.
  - *Works well for incremental innovation*
  - *Technological solutions understood and accepted by operating units*
  - *May not work well for radical innovation*
The Changing Role of R&D: New Roles

- Develop and “prove” new technologies/applications in demonstration markets to overcome natural resistance of operating units to adopting unfamiliar technologies in unfamiliar markets or even unfamiliar technologies in familiar markets
  - Requires business development expertise
  - Requires different marketing technologies
    - Early stage customer understanding and revenue generation
    - “Exploratory” or “Probe and Learn” marketing
Some Reasons Why Technology Transfer Doesn’t Happen More Effectively

- Companies probably not self aware of innovation dynamics
- Company technologists involved in I/U Centers may not be best people for tech transfer
- Internal tech transfer path not clear
- Path to market is usually seen as big M
- I/U technologies may not have clear market applications
Questions for IAB Members

1. Is your involvement in the BSAC part of your formal job?
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3. Is it clear who to go to with new technology ideas?
4. Is there help to identify potential market applications for new technologies?
Questions for IAB Members

1. Is your involvement in the BSAC part of your formal job?
2. Is there a formal technology scanning function in your organization?
3. Is it clear who to go to with new technology ideas?
4. Is there help to identify potential market applications for new technologies
5. **Is there a formal innovation system in your organization?**
   1. **Discovery:** How are innovative ideas screened and evaluated?
   2. **Incubation:** How are potential projects matured?
   3. **Commercialization:** Is the path to the market clear?
New Roles for I/UCRC Centers for Enhanced Tech Transfer:

- Work with business development functions in companies to identify potential market applications
- Increase probability of tech transfer by finding applications that fit with current offerings in familiar markets
- Find champion in company to support applications
- Understand the RI process in affiliated companies
- Engage business school partnership in I/U Centers
  - Scenario planning
  - Exploratory marketing
Thank You