Radical Innovation Research Research Program: Introduction
The Problem

• Companies challenged in attempts to develop breakthrough/radical innovation capabilities.
  – Single projects occur sporadically.
  – Maverick champions, air cover by senior sponsors.
  – Work against, rather than with the organization.
  – Breakthroughs require breaking rules.
  – No learning across projects, people. No systems developed to leverage organization’s assets.
  – Missed opportunities result

• Four year average lifespan of internal venturing groups. Why?
Radical Innovation Research Program


- Can we describe management practices for breakthrough innovation?
  - Using traditional NPD processes does not work.
- Twelve projects, 10 co’s.
- Multidisciplinary team.
- Prospective, Longitudinal

**Phase II (2001-2005)**

- How do firms build a sustainable BI capability?
  - Average life expectancy: 4 yrs.
- Twelve + nine companies.
- Corporate level.
- Multidisciplinary team
- Prospective, Longitudinal
- Survey (n=90 & counting)
Companies in the Study

Phase I
Cohort I
1995 to 2000

- GE
- IBM
- Air Products
- DuPont
- Analog Devices
- General Motors
- Nortel Networks
- Otis Elevator (UTC)
- Polaroid
- Texas Instruments

Cohort II
2001-2005

- 246 interviews
- 3M
- Albany Int’l
- Corning
- J&J Consumer
- Kodak
- Mead-Westvaco
- Sealed Air
- Shell Chemicals

Phase II
Cohort III
2004 to 2005

- Bose
- Dow Corning
- Guidant
- H-P
- Intel
- P&G
- PPG
- Rohm&Haas
- Xerox

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- H-P
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- P&G
- PPG
- Rohm&Haas
- Xerox
• **Purpose:** To identify and examine current managerial practices associated with radical innovation projects and eventually understand best practice.
A Little Bit of History…But Not Much

- RI Phase I: 1995-2000
- Longitudinal Study of 12 Radical Innovation Projects in Ten Mature Firms
- Definition of Radical Innovation
- Radical Innovation Lifecycle
- 4 Dimensions of Uncertainty, not 2
- 7 Challenges
- RI Maturity

RADICAL INNOVATION: How Mature Companies Can Outsmart Upstarts
Defining Radical Innovation

Projects had an identified team and budget, and were perceived as having the potential to offer either

- New to the world performance features
- Significant (5-10x) improvement in known features
- Significant (30-50%) reduction in cost
1. Air Products
   Oxygen Separation Technology
2. Analog Devices
   Air Bag Accelerometer**
3. DuPont
   Biodegradable Polymer*
4. DuPont
   Display Technology
5. General Electric
   Digital X-ray**
6. General Motors
   Hybrid Vehicle
7. IBM
   Silicon Germanium Devices**
8. IBM
   Electronic Book
9. Nortel Networks
   Internet Software Rental
10. UTC / Otis Elevator
    Multi-directional Elevator
11. Polaroid
    Memory Storage Device
12. Texas Instruments
    Digital Light Processor**
A Radical Innovation Project Lifecycle

DUPONT BIOMAX


D1

Diaper tapes

D2

Shell material for disposable diapers

D3  D4  D5

Technology in search of market applications

D6

Project in limbo. Development work suspended.

D7

New flurry of development activity for agricultural applications.

D8

New applications sought through major corporate PR campaign.

D9

Project transferred to business unit. Multiple applications are pursued.
The Nature of the Radical Innovation Lifecycle

- Long term
- Highly uncertain, unpredictable
- Sporadic -- stops and starts, deaths and resurrections
- 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.
Defining Radical Innovation

Technical Uncertainty

Low

High

Market Uncertainty

High

Low

INCREMENTAL INNOVATION

RADICAL INNOVATION
Four Dimensions of Uncertainty

- Organization Uncertainty
- Resource Uncertainty
- Technical Uncertainty
- Market Uncertainty
Comprehensive Framework for Managing Radical Innovation

Challenge 1: Capturing Breakthroughs
Challenge 2: Living with Chaos
Challenge 3: Market Learning
Challenge 4: Business Model
Challenge 5: Resource Acquisition
Challenge 6: Transition Management
Challenge 7: Individual Initiative

Technical Uncertainty
Resource Uncertainty
Market Uncertainty
Organization Uncertainty
Building the Organizational Capacity for Capturing Radical Innovations

The RI HUB

"gatherer"

"hunter"

"hunter"

Business Unit A

Central R&D

Business Unit B

Other RI Project Tasks

Evaluating and Screening
Radical innovation maturity is defined as the degree to which the organization has embedded a system for initiating, supporting and sustaining RI activities.

Average Life Expectancy of an RI system: 4 years
## Early vs. Mature BI Capacity

<table>
<thead>
<tr>
<th>Early</th>
<th>Mature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executives act as provocateurs, patrons to provide air cover</td>
<td>Leadership sets expectations, clarifies strategic intent, develops RI culture, structures &amp; reward systems. Governance boards help align emerging opportunities with strategic intent.</td>
</tr>
<tr>
<td>Mavericks champion projects.</td>
<td>RI idea hunters seek opportunities. NBCreation personnel work with teams to develop business models. Adopt real options mentality and learning based project management approaches.</td>
</tr>
<tr>
<td>Resources gained through favors.</td>
<td>Individual managers with authority to provide seed funding &amp; internal VC organizations provide multiple sources of capital for RI. Portfolio approach to funding.</td>
</tr>
<tr>
<td>Completion of RI tasks &amp; project staffing rely on individual initiative.</td>
<td>Strategy for identifying, selecting, rewarding and retaining RI champions, experts and team members.</td>
</tr>
<tr>
<td>Communication, metrics barriers challenge project transition. They flounder.</td>
<td>Transition teams established with funding and senior mgmt support to accelerate projects until ready for SBU environment.</td>
</tr>
</tbody>
</table>
Objective: To understand how organizations can systematically develop, evolve and sustain their radical innovation competencies.

Ten academics, different disciplines.

Industrial Research Institute.

Twelve + Nine companies.

Four years.
## Navigating the Great Cultural Divide

<table>
<thead>
<tr>
<th>Operating Groups</th>
<th>New Business Creation Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy, Type of Innovation</strong></td>
<td>Current Strategy; Incremental Innovation to Extend Existing Business</td>
</tr>
<tr>
<td><strong>Culture</strong></td>
<td>Operational Excellence, Customer Intimacy &amp; Execution Skills</td>
</tr>
<tr>
<td><strong>Risk Profile</strong></td>
<td>Risk Averse with Focus on System Efficiency</td>
</tr>
<tr>
<td><strong>Investment Timing and Revenue Focus</strong></td>
<td>New Products in 6-18 Months; P&amp;L Management with In-year Revenue Streams</td>
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</table>
Phase II: The Players

IRI Co-Chairs past and present:
Alan Ayers, Energizer; Ethan Simon, Rohm & Haas;
Dave Austgen, Shell Chemical; Dave McKeough, PPG;
Ian Elsum, CSIRO; Ted Farrington, J&J Consumer;
Steve May, Exxon-Mobil

Academic team:
Gina O’Connor, Al Paulson, Andrew Corbett, Lois Peters, Richard
Leifer, T. Ravichandran, Shreefal Mehta, Dan Robeson: RPI
P.J. Guinan, Heidi Neck, Donna Kelley: Babson College
Richard DeMartino: RIT
Research Program Structure

Longitudinal Study: Org’l Approaches to Building, Nurturing and Sustaining RI

12 Firms

3.5 Years

RI Maturity Assessment Tool: update

RI System Success Survey

RI Portfolio Evaluation Tool: today’s wkshp
Management System Elements

Mandate/Scope

Metrics/Rewards

Leadership/Culture

Skills/Talent Development

Organizational Structure/Interfaces

Processes/Tools

Governance/Decision Making
The Language Used to Describe Innovation

- Horizon1, H2, H3 (McKinsey)
- Making Most of what we have, Getting New Business, Breaking New Ground
- Incremental, Platform, Breakthrough/Radical
- Today, Tomorrow, Beyond
- Incremental, Major Improvements, Step-outs
- Incremental, Substantial, Transformational
- Quadrant 1,2,3,4 (time vs. alignment)
- BU projects, CEO projects, ATP’s
- Incremental, longer term, “we don’t have a clue”
- Aligned, White spaces, Across Businesses
- Scope change (Charles River)
- Gamechangers
- Next Big Thing

- Time horizon?
- Risk level?
- Uncertainty?
- Alignment/Fit?
- Technology Risk?
- Market Impact?
- Company Growth?
- Disruption potential?
- Company renewal?
- Must technology be the source?
Org. Structure: Idea Generator

Technology Board (Decides)

RI HUB
- Idea Creation
- Idea Development
- Idea Screening
- External Scanning

R&D NBD

Case #1
- RI HUB to BU'S

Case #2
- R&D NBD to BU'S/Divisions
Growth Board/Corporate Renewal Team (Advisory)

Venture Board/Business Development Council

- Idea review & elaboration
  - Staffed full time
- External technology acquisition

- Incubation/Development
  - Keep white space businesses through to initial commercialization
  - Oversee incubation of aligned opportunities too far out for BU’s to handle.
Org. Structure: Holistic Sequential Model

CTO-Commercial

Senior Leadership Governance Team

Portfolio Governance Council (Middle Mgmt)

New Business Discovery
- Idea Generation

New Biz Incubation
- Project teams
- Project adv boards/RI staff

New Business Accelerator
- Project teams
- Project adv bds RI staff

Other idea sources (R&D, New Ventures, BU’s…)

New SBU

SBU1 (Accel’r)

SBU2 (Accel’r)

…

SBUₙ (Accel’r)
Org. Structure: Corporate Venturing Model

Venture Review Board (CEO, CTO, COO, BU VPs)

- CEO
- President
- Business 1
- Business 2
- Business 3
- New division

NEW VENTURES

R&D
- BU Related Projects (1,2, …n)
- Ventures Technology

Org. Structure: Corporate Venturing Model
Org. Structure: R&D Management System

Portfolio Governance Board (CTO, EVPs, & BU Leadership)

Exploratory Marketing

Exploratory Research

R&D Directors
Projects 1, 2, 3 ….n

Inventory, Bench

Incubator for unaligned business

BU’s aligned projects “caught” by BU development group
Org. Structure: Self Similar Model

Corporate Strategy

Governance Board

Strategy, Technology, Finance

Corporate RI Hub staffed full time (Projects 1….n) – Funded in BUs

Divisional Hub
-staffed full time
-project 1….n

Divisional Hub
-staffed full time
-project 1….n

Divisional Hub
-staffed full time
-project 1….n
Org. Structure: Mirrored Model

CEO

CTO

R&D Staff (Ops, funding, personnel mgmt.)

RI Program 1 & Team

RI Program 2 & Team

RI Program 3 & Team

RI Program 6 & Team

BU1 Acceleration activity mirror

BU2 Acceleration activity mirror

BU3 Acceleration activity mirror

Planned Acceleration activity mirror
Discovery
Creation, recognition, elaboration, articulation of opportunities.

Incubation
Evolving the opportunity into a business proposition

Acceleration
Ramping up the business to stand on its own

Conceptualization
- Basic Research
- Internal Hunting
- External Hunting/License/Purchase/Invest

Experimentation
- Technical
- Market Learning
- Market Creation
- Strategic domains

Commercialization
- Focus
- Respond
- Invest

Not just one competency….but 3
Each Requires Unique Mgmt System

Governance Culture/Ldshp
Skills
Processes
Structure

Discovery

Incubation

Governance Culture/Ldshp
Skills
Processes
Structure

Acceleration
External Influences
- strained stock market

Sr. leadership declares need for more innovation

Internal Influences
- financial stress of company
- poor earnings

CEO change refocus on innovation
- new competition
- industry consolidation

External Influences
- economic expansion
- global economic expansion
- pace of technological change

Internal Influences
- culture, history of innovation

Capacity & Dynamism
Describing Discovery

The creation and identification of opportunities that may have major impact in the marketplace, either through the delivery of new to the world performance benefits or greatly improved performance.

- Discovery ≠ Invention
- Discovery ≠ R&D
Management System Elements: Discovery

Mandate/Scope: Explore; Create business concepts in alignment with strategic intent.

Leadership/Culture: Owned by CTO. Fluid, imaginative culture.

Org. Structure/Interfaces: Centralized yet diverse, tightly linked to R&D.

Governance/Decision Making: Connections to strategic intent. Able to see possibilities, to enlarge opportunities.


Skills/Talent Development: Creative, inductive reasoners w/ penchant for strategic thinking.

Metrics/Rewards: Quantity of ideas, richness/robustness of concepts.
Incubation: The Long & Winding Road

A competency of experimentation. The ability to experiment with technology and business concepts/models simultaneously to arrive at a demonstrated model of a new business that brings breakthrough value to the market and consequently to the firm.

– Allowances for failures, but expectations of continued pursuit of new frontiers.
– Creation and pursuit of options.
– Movement in multiple directions simultaneously.
– Focus on learning and redirecting.
– Focus on enriching and extending internal and external networks to enlarge scope of the company’s knowledge base and commercial opportunity space….in big ways.
In Incubation many avenues are explored initially, but few enter Acceleration.
Incubation Competency

- Coaching
- Brokering
- Nurturing
- Thinning & Enriching
Management System Elements: Incubation

Mandate/Scope: Experiment; Vet projects through T, M, R, O issues to determine biz potential. Manage portfolio.

Metrics/Rewards: Learning based milestones (project), churn rate (portfolio), magnitude of opps, learning spillover.

Leadership/Culture: CSO, CNO or VP NBD. Inquisitive, learning oriented culture. No ‘failure.’


Org. Structure/ Interfaces: Dedicated group at Corporate level, tightly linked to R&D.

Processes/Tools: Inventory of projects to make killing easier. Learning plan. Strategic Coaching.

Acceleration: Gathering Steam

Activities: Scale nascent businesses so they can compete with mature businesses in their ultimate home (existing BU, new division) for resources, attention.

- Build critical mass of sales, operational infrastructure.
- Establish market presence.
- Develop management team.
- Prepare to blend into fabric of the rest of the organization.

Objectives
- Predictable sales forecasts.
- Acceptable yields.
- A path forward to profitability.

Challenge
- Neither the BU’s job nor R&D’s
Management System Elements: Acceleration

**Mandate/Scope:** Escalate. Mature high impact businesses to predictability and acceptability to operating unit culture.

**Metrics/Rewards:** Growth in sales/inquiries of portfolio businesses: identification of migration path, uplift and spillover opps. NOT margins.

**Leadership/Culture:** General manager orientation. Hard driving, urgent culture.

**Org. Structure/ Interfaces:** Separate structure, even for aligned opps, unless BU’s use acceleration metrics.

**Processes/Tools:** Manage for high growth. Focus, respond to market inquiries, invest in demonstrating path to profitability.

**Skills/Talent Development:** Acumen in nurturing high growth businesses. Ability to interface with mainstream.

**Governance/Decision Making:** Sr. Ldshp team with powerful networks, respect, political clout.
The set of activities that manage the links and interfaces within DIA, oversee its health in terms of the RI mandate, its perceived role in the firm, and its portfolio of businesses.
System Imbalances

- Can’t get heard
  - Incubation
  - Acceleration
  - Discovery

- Failure to leverage learning
  - Incubation
  - Acceleration
  - Discovery

- Big Ideas, Incrementally Executed
  - Incubation
  - Acceleration
  - Discovery

- No Courage to continue
  - Incubation
  - Acceleration
  - Discovery

- Open Innovation at the Extreme
  - Incubation
  - Acceleration
  - Discovery
DIA System Activities

- Monitor and manage system imbalance in conjunction with org’l capacity.
- Attend to portfolio health and diversity
- Assembling and re-assembling Project Teams
- Providing & enabling project infrastructure
- Barrier removal
- Broker external and internal liaisons
- Strategic alignment activities
- Providing help for project resource acquisition
- Education about role of Radical Innovation in the company viz a viz rest of innovation system and ongoing operations.
- Pacing of projects
- Oversee transitions from D→I→A→ landing zone
RI Portfolio Considerations

- **Diversification**
  - Degree desired?
  - Dimensions?

- **Churn rate (viz a viz objectives)**
  - Within D? I? A?

- **Portfolio size objectives?**
  - How many projects/platforms?

- **Portfolio pacing objectives across DIA?**
  - Easy to get caught up with I and A and forget to replenish the pipeline.

- **Cross-portfolio management:**
  - Synergies, spillover, redundancies
RI System Metrics

**Health/Activity of the Portfolio**
- # of new ideas
- # of new projects started.
- # of projects transitioned between stages.
- Synergies across projects
- Diversity in terms of technology/market domains.
- Pacing of projects compared to objective.

**Interface Management**
- Smoothness of handoffs from D→I→A→landing zone
- Communication flows from I and A back to D as new opportunities emerge.

**Market Impact**
- Gaining external recognition as an expert in a particular technology domain.
- Richness/promise of projects. “This one could really change the game.”

**Impact on company**
- # of projects transitioned out into businesses.
- $ impact of those projects.
- Impact of learning within projects on other business arenas.
- Spillover of RI management system elements to other high uncertainty arenas.
- Development of entrepreneurial talent within company as project leaders are recycled and out posted into BU’s.
- Confidence that we can innovate. (vs. “we’ve atrophied.”)
- Increased robustness of new ideas coming in.
DIA Must Be Orchestrated
DIA in Dynamic Environments
Four Organizational Approaches for RI

Fit the competencies to the capacity

<table>
<thead>
<tr>
<th>Rich</th>
<th>Champions or many simultaneous approaches/experiments</th>
<th>Management Systems</th>
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<tbody>
<tr>
<td>Constrained</td>
<td>Hope for change/Seek job elsewhere</td>
<td>Educators/ Process Facilitators/ Middle Management initiatives</td>
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Organizational Capacity

Low

High

DIA Competencies
Model of Radical Innovation Capability

External Influences
- strained stock market
- economic expansion
- new competition
- lawsuit
- industry consolidation

Internal Influences
- Sr. leadership declares need for more innovation
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Internal Influences
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TIME