Management Practices for Breakthrough Innovation: Lessons Learned from a Research Program in Three Phases

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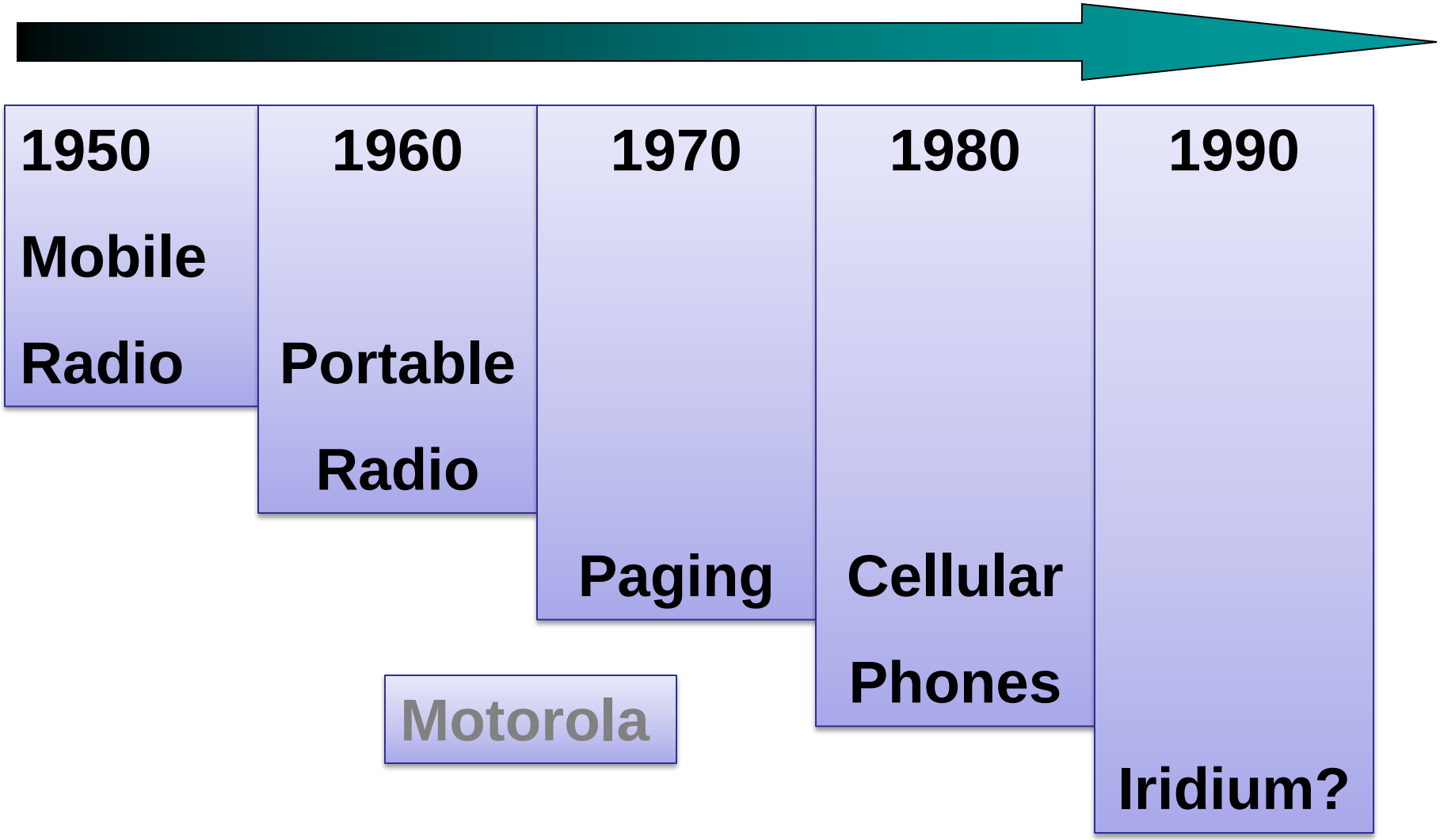
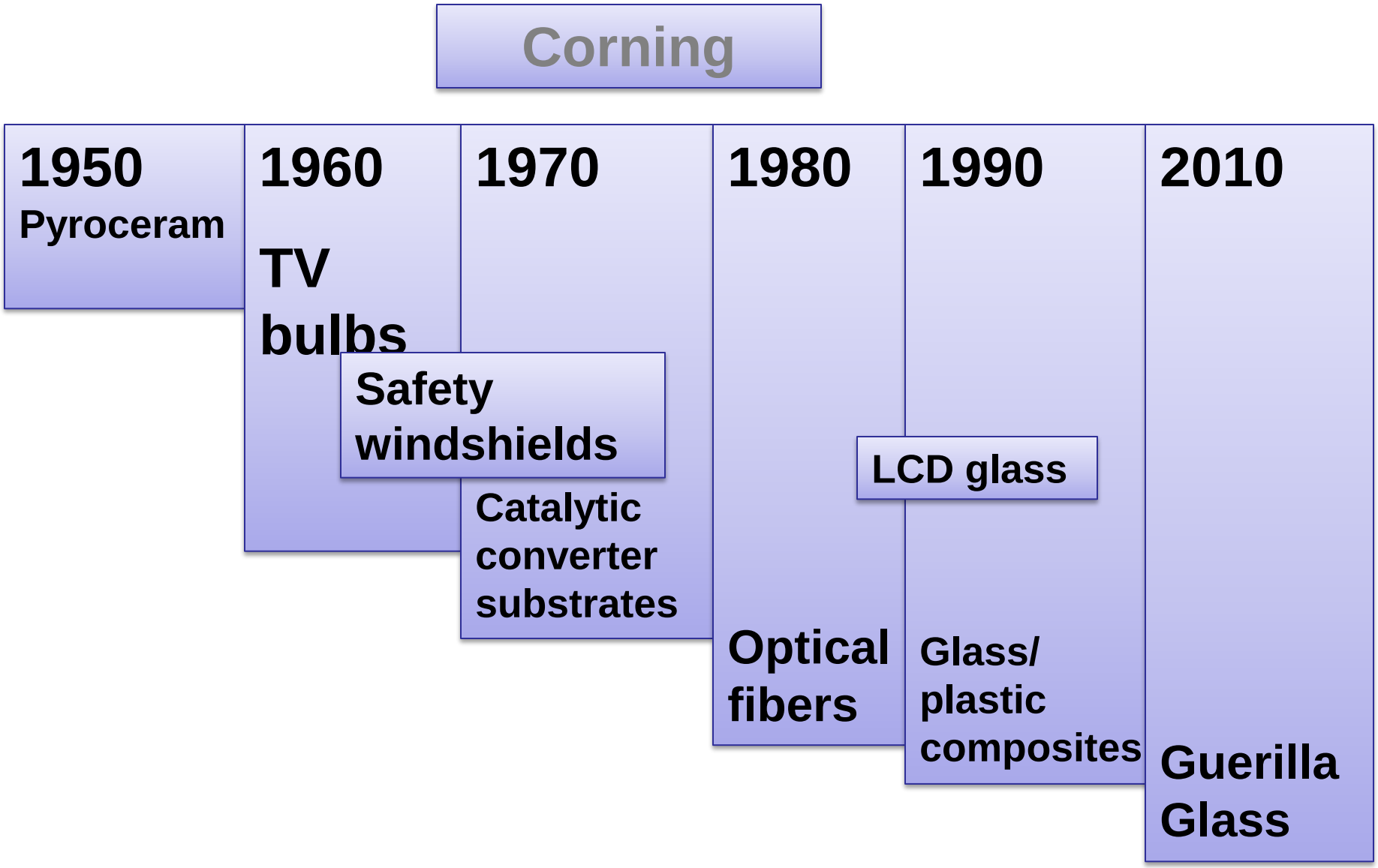
Observation: Breakthroughs are infrequent



Breakthroughs are sporadic



Recent Example: Kodak

- Founded 1880
- Pioneer of film
- ‘Razor & Razorblades’ Business Model
- July 2011 Sells IP
- Jan 2012 Files for bankruptcy
- 47000 jobs lost since 2003 alone

On average, Fortune 500 & equivalent-sized multinationals live shorter lives than humans: average lifespan of 40-50 years (de Geus 1997).

Steve Sassoon
Inventor, Digital Camera, 1975
RPI alumnus & Kodak employee
2009, Obama awards him the
National Medal of Technology and Innovation
2010, Inducted into RPI Alumni Hall of Fame

Why Invest in Breakthrough Innovation?

Innovation Type	Investments	Profitability
Incremental Product Development Projects	86%	39%
Breakthrough Innovation Projects	14%	61%

Source: Kim and Mauborgne, (1997), *Harvard Business Review*

Evidence is Accumulating…

- Sood, A. and Tellis, G (2009), "Do Innovations Ever Pay off? The Value to Investing in Innovation," Mgmt Science 28(3): 442-456.
- Sorescu, A. B. and Spanjol, J (2008), "Innovation's Effect on Firm Value and Risk: Insights from Consumer Packaged Goods," J of Mktg 72 (2): 114-132.
- Cho, H. and Pucik, V. (2005), "Relationship between Innovativeness, Quality, Growth, Profitability and Market Value," Strategic Mgmt J 26(6): 555-575.
- Sorescu, A. B., Chandy, R.K, and Prabhu, J. C. (2003), "Sources and Financial Consequences of Radical Innovation: Insights from Pharmaceuticals" J of Mktg 67 (Oct): 82-102.
- Zahra, S. A. 1991. Predictors and Financial Outcomes of Corporate Entrepreneurship - an Exploratory-Study. Journal of Business Venturing 6(4): 259-285.
- Salomo, S., et. al., (2008) Innovation Field Orientation and its Effect on Innovativeness and Firm Performance, Journal of Product Innovation Management 25: 560– 576.
- Kock et. al. 2011 The Mixed Blessings of Technological Innovativeness for the Commercial Success of new Products, Journal of Product Innovation Mgmt 28 (S1): 28-43.

…..Supra-normal returns to investment in BI

Why invest in Building a BI Competency?

Sorescu, Chandy and Prabhu, JM Oct 2003 study of the census of innovations from 1991-2000 in pharmaceutical industry. 255 breakthroughs introduced by 66 publically traded firms. Total new product introductions: 3891 (most incremental). Breakthroughs + BI = 7% of total….Rare.

- ✓ A large Majority of BI's come from a minority of firms…so a ***Competency can be developed to do BI. It's not just luck***.
- ✓ Original inventing companies introduced 75% of the breakthroughs studied in the pharmaceutical industry (25% were licensed or bought from other firms)….so ***the argument that fast second is better is not empirically supported.***
- ✓ Dominant firms in the industry (highest market share, assets and profits…i.e. the largest)commercialized significantly more BI's than non-dominant firms.
- ✓ ***Those firms that successfully commercialize BI also are the ones with most incremental innovations***.
- ✓ # of patent applications by the firm was NOT correlated with BI success…so ***technical prowess is not sufficient***.
- ✓ ***Breakthrough innovations achieved more than 3 times the NPV of technological breakthroughs alone.***.

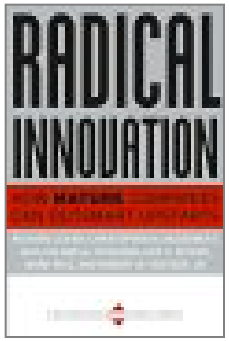
Conclusions regarding Impact of Investment in BI

- It's not the investment in R&D that makes a difference, but the processes or capabilities that leverage R&D to create value in the marketplace
  - Execute for future business platforms
  - Willingness to cannibalize within the current org structure
  - Learning based approaches over Stage Gate
- Results in increased financial performance
- Results in better financial market returns
- Demonstrated across a variety of industries

Radical Innovation Research Program

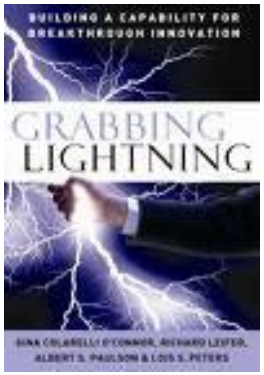
Phase I (1995-2000)

- Can we describe management practices for breakthrough innovation?
  - Using traditional NPD processes does not work.
- Twelve projects, 10 co's.
- Multidisciplinary team (10)
- Prospective, Longitudinal
- 2 Tools
  - Transition Mgmt
  - Learning Plan



Phase II (2001-2005)

- How do firms build a sustainable BI capability?
  - Average life expectancy: 4 yrs.
- Twelve + nine companies.
- Corporate level.
- Multidisciplinary team (6)
- Prospective, Longitudinal
- 2 Surveys + 2 Tools
  - Port Eval Tool
  - BICA



Radical Innovation Phase III (2009-2014)

- Talent Mgmt: Roles & Responsibilities for an Innovation Function
  - Three Faculty, several Ph.D students.
  - Eleven companies: Snowball Sample
  - Prospective, Longitudinal (less important)
  - 1 Survey (developed, pretested) 1 Tool (TBD)

- Status:
  - Qualitative project completed
  - Book proposal under development, publisher interested.

Defining Breakthrough Innovation

Project with a team and a budget, that the company perceives as having the *potential* for significant strategic impact, via development of:

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

Breakthrough Innovation **Capability:** Portfolio's of BI's. Sustainable pipeline. Over and over.

Companies in the Study

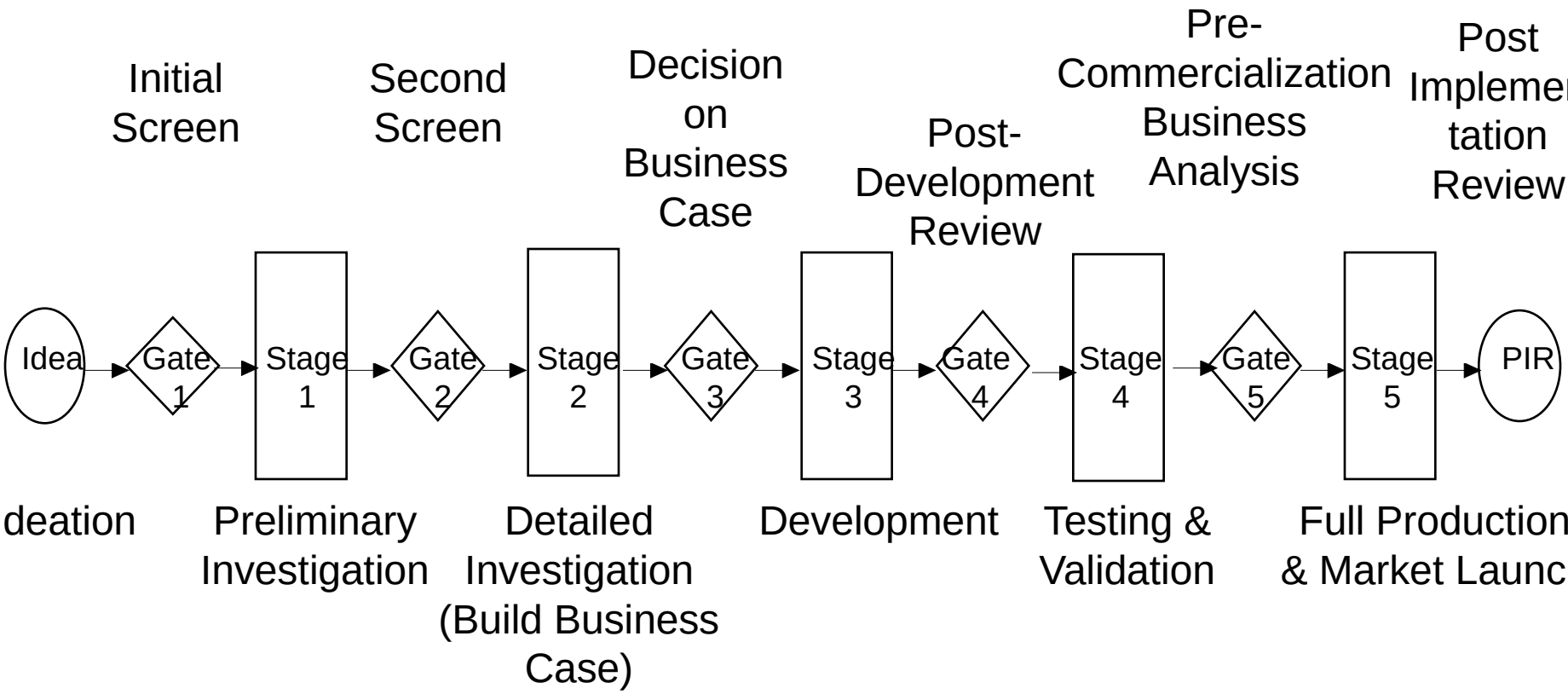
Phase I → | Phase II → | Phase III →

Cohort I 1995 to 2000	Cohort II 2001-2005	Cohort III 2004 to 2005	Cohort IV 2010 to 2013
GE →			
IBM →			
Air Products →			
DuPont →			
Analog Devices			
General Motors			
Nortel Networks			
Otis Elevator (UTC)			
Polaroid			
Texas Instruments			
	246 interviews		
	3M	Bose	Bayer Material Sciences
	Albany Int'l	Dow Corning	Corning
	Corning	Guidant	DSM
	J&J Consumer	H-P	*DuPont*
	Kodak	Intel	*GE*
	Mead-Westvaco	P&G	Grundfos
	Sealed Air	PPG	John Deere
	Shell Chemicals	Rohm&Haas	Moen
		Xerox	Newell Rubbermaid
			Pepsico
			Sealed Air
186 interviews			180 interviews

Phase I Companies and Their Projects

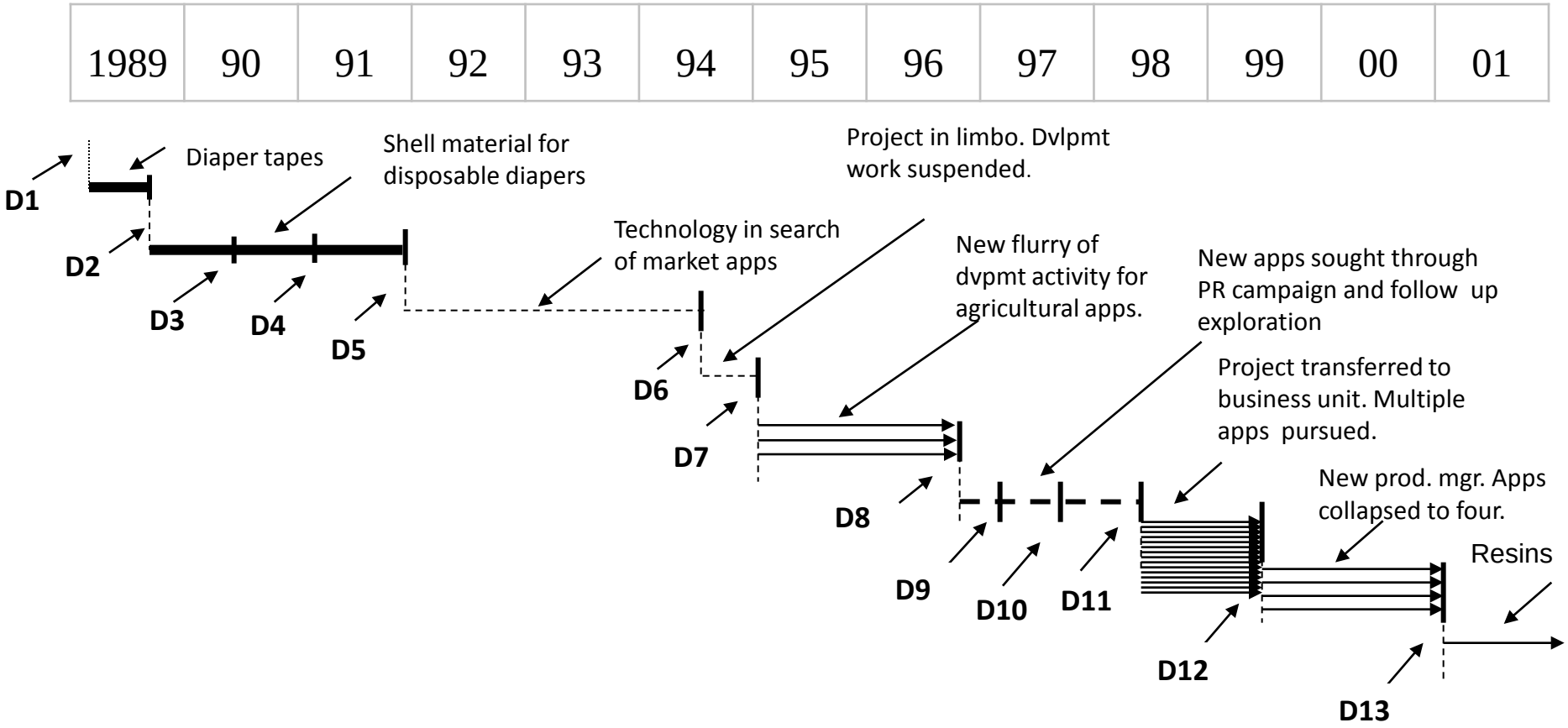
Company	Project
Air Products	1. Oxygen Separation Technology
Analog Devices	2. Air Bag Accelerometer
DuPont	3. Biodegradable Polymer
DuPont	4. Display Technology
General Electric	5. Digital X-ray
General Motors	6. Hybrid Vehicle
IBM	7. Silicon Germanium Device
IBM	8. Electronic Book
Nortel Networks	9. Internet Software Rental
UTC/ Otis Elevator	10. Bi-directional Elevator
Polaroid	11. Memory Storage Device
Texas Instruments	12. Digital Light Processor

Stage-Gate New Product Development Process

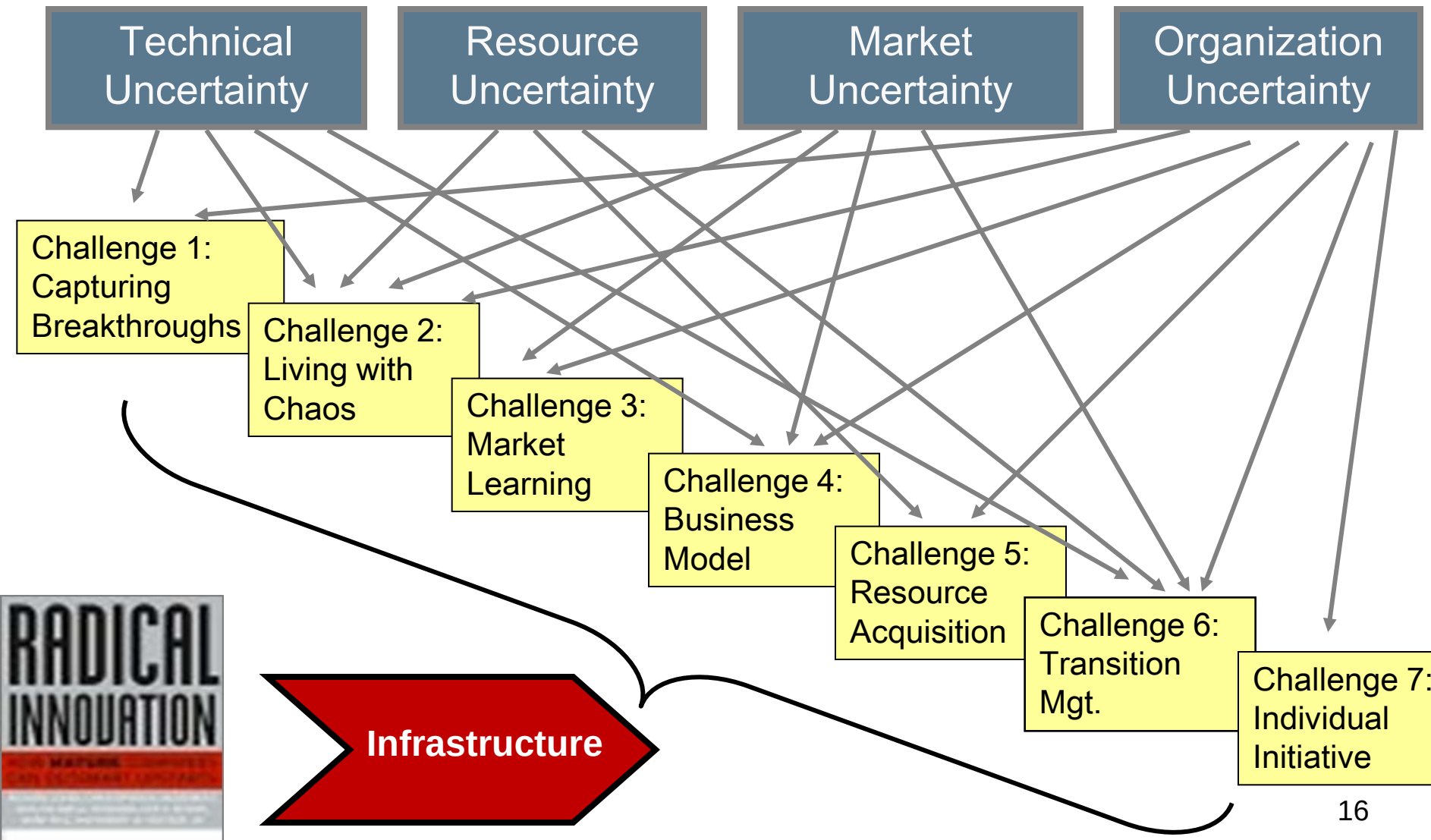


Source: Robert G. Cooper, Winning at New Products, Addison-Wesley 1993

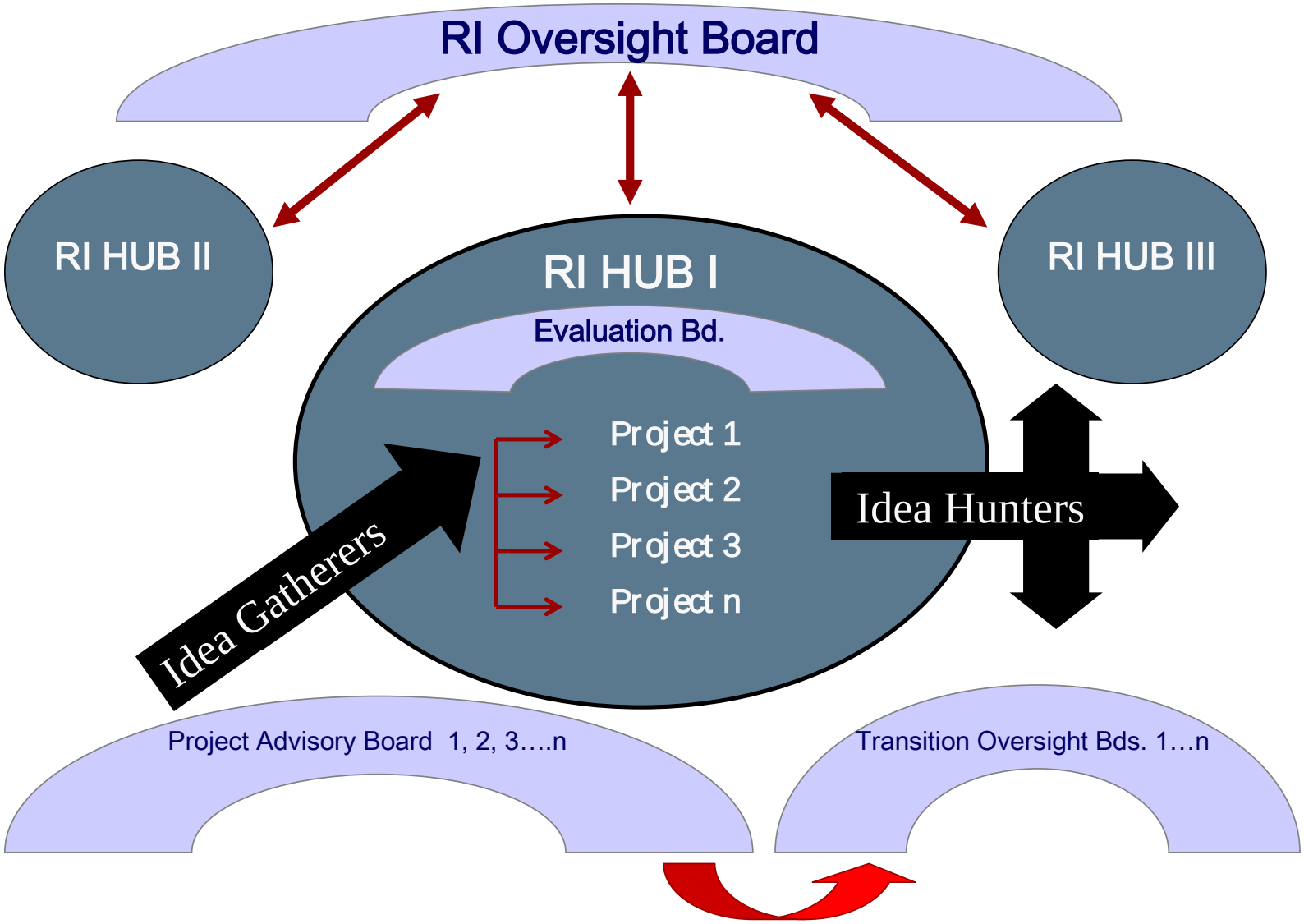
The BI Project Lifecycle: DuPont Biomax®



Phase I: Framework for Managing Radical Innovation



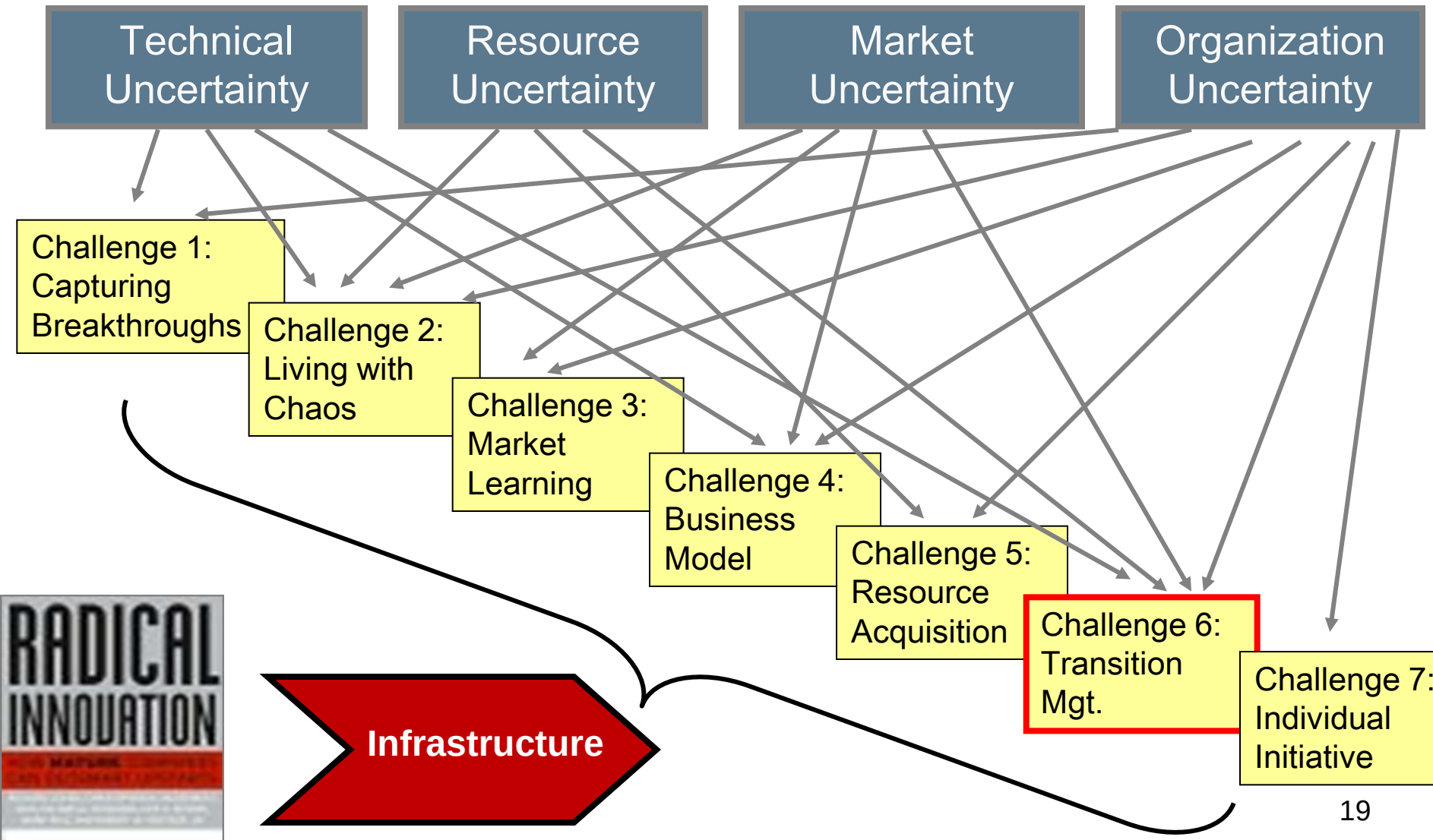
The Radical Innovation Hub



Early vs. Mature BI Capacity

Early	Mature
Executives act as provocateurs, patrons, and champions to compensate for lack of supportive culture.	The firm's leadership sets expectations, develops BI culture, establishes facilitating organizational mechanisms (hubs) and develops goals & reward systems.
Mavericks try to catch the attention of patrons. There is a lack of infrastructure and systematic approach.	BI idea hunters seek opportunities. Hubs establish effective evaluation boards. Non-traditional marketing & business creation personnel work with BI technical teams to develop business models. There is a learning orientation to project management
Acquisition of resources is ad hoc. Project teams often expect a budget allocation for funding.	Individual managers with authority to provide seed funding and internal VC organizations provide multiple sources of capital for BI. The firm adopts a portfolio approach to funding BI projects.
Completion of BI tasks, project staffing and champions rely on individual initiative.	BI hubs work with HR to develop a strategy for identifying, selecting, rewarding and retaining BI champions, experts and team members.
Communication difficulty makes transition difficult, often flounders and relies heavily on intervention of senior management.	Transition team established with funding and senior mgmt support continues development until uncertainty reduced for successful transition.

Phase I: Framework for Managing Radical Innovation



Phase I Follow on Project: Transition Readiness Assessment Tool

1. What is the right operating home for the radical innovation?
2. Are technical specifications set?
3. Do expectations about market development match reality?
4. How will applications and markets unfold?
5. How do manufacturing challenges impact market entry objectives?
6. How does the project team deal with the SBU's expectations?
7. How does the project team finalize the business model?
8. How does the project team sustain funding during the transition?
9. Who are the right people for the transition team?

Transition Readiness Tool: Methodology

- Spring ’00: Lally team drafted survey structure and content based on Phase I case learning.
- Summer ’00: Worked with IRI co-chairs to ensure comprehensiveness and correct structure.
- Fall ‘00: Developed long form of survey and pretested with IRI subcommittee. Conducted reliability analysis and shortened the instrument.
- Dec-May 2001: Validated in 7 co’s (does it work?) and one workshop with 16 other participants.
- Created user friendly version (computerized, automatic scoring).

Breakthrough Innovation Capability

Breakthrough 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 a BI system: 4 years

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 (Stage Gate does not apply).
- No learning across projects, people. No systems developed to leverage organization's assets.
- Missed opportunities result
- Lack of systematic approach to managing the variety of skill sets needed

Four year average lifespan of internal venturing groups. Why can't companies be 'ambidextrous?'

Previous Experiments

- “We have an innovative culture” (3M)
- New Ventures Groups (Nortel, P&G)
- Skunkworks (IBM, Raytheon)
- Incubators (Xerox PARC)
- Shared equity with innovators (Lucent)
- Corporate Venture Capital Funds (JJDC, Intel Capital)

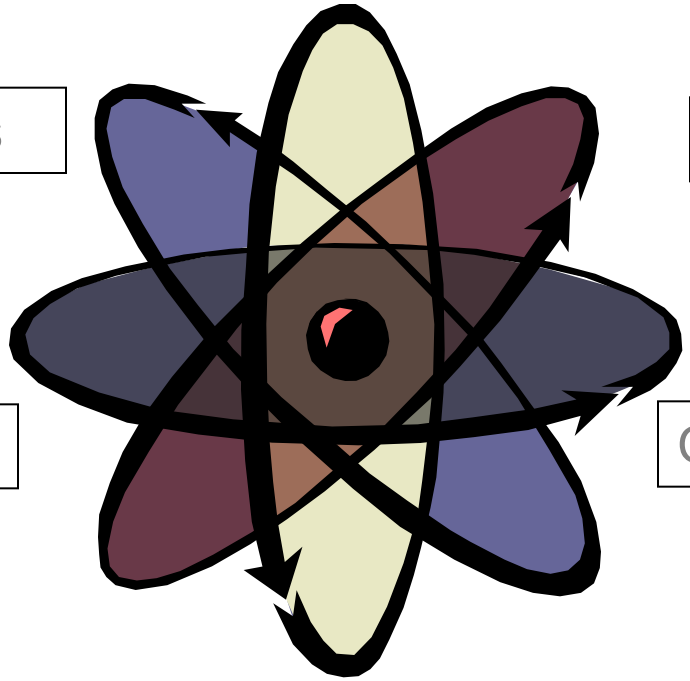
Christensen’s *Innovator’s Dilemma*: Ambidexterity is impossible: leave the breakthroughs to the start ups.

Phase II: Management Systems for BI

Mandate/Scope

Metrics/Rewards

Leadership/Culture

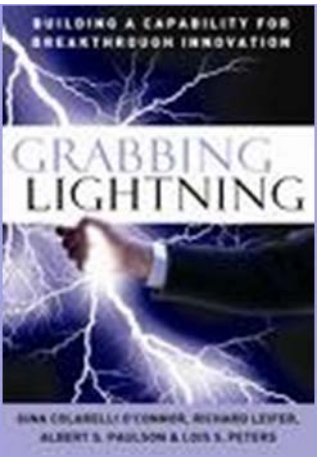


Skills/Talent Dvlpmt

Org. Structure/Interfaces

Processes/Tools

Governance/Decision Making



Participating Companies

Phase I (1995-2000)
Cohort I
Site Visits
1995 to 2000

Cohort II
Site Visits
2001-2005

Phase II (2000-2008)
Cohort III
4 meetings
2004 to 2005

Phase III (2010…2014)
Cohort IV
Site Visits F. 2011-13
Calls 2010 to 2013

186 interviews

246 interviews

181 interviews

- *GE*
- *DuPont*
- *IBM*
- *Air Products*
- Analog Devices
- General Motors
- Nortel Networks
- Otis Elevator (UTC)
- Polaroid
- Texas Instruments
- *Sealed Air*
- *Corning*
- 3M
- Albany Int'l
- J&J Consumer
- Kodak
- Mead-Westvaco
- Shell Chemicals
- Bose
- Dow Corning
- Guidant
- H-P
- Intel
- P&G
- PPG
- Rohm&Haas
- Xerox
- Bayer Material Sci
- DSM
- John Deere
- Grundfos
- Moen
- Newell Rubbermaid
- Pepsico

Data Collection: 12 Primary companies

- Interviewed 3 levels:
  - Person(s) responsible for BI mandate
  - Those to whom s/he reported (CEO, CTO, VP Strategy)
  - Those that reported to him/her.
- Initial qualifying interview re: history of BI initiative and current structure
- Site visit to interview all members
- Follow up each 6 months with primary contact and suggested others due to frequency of changes.

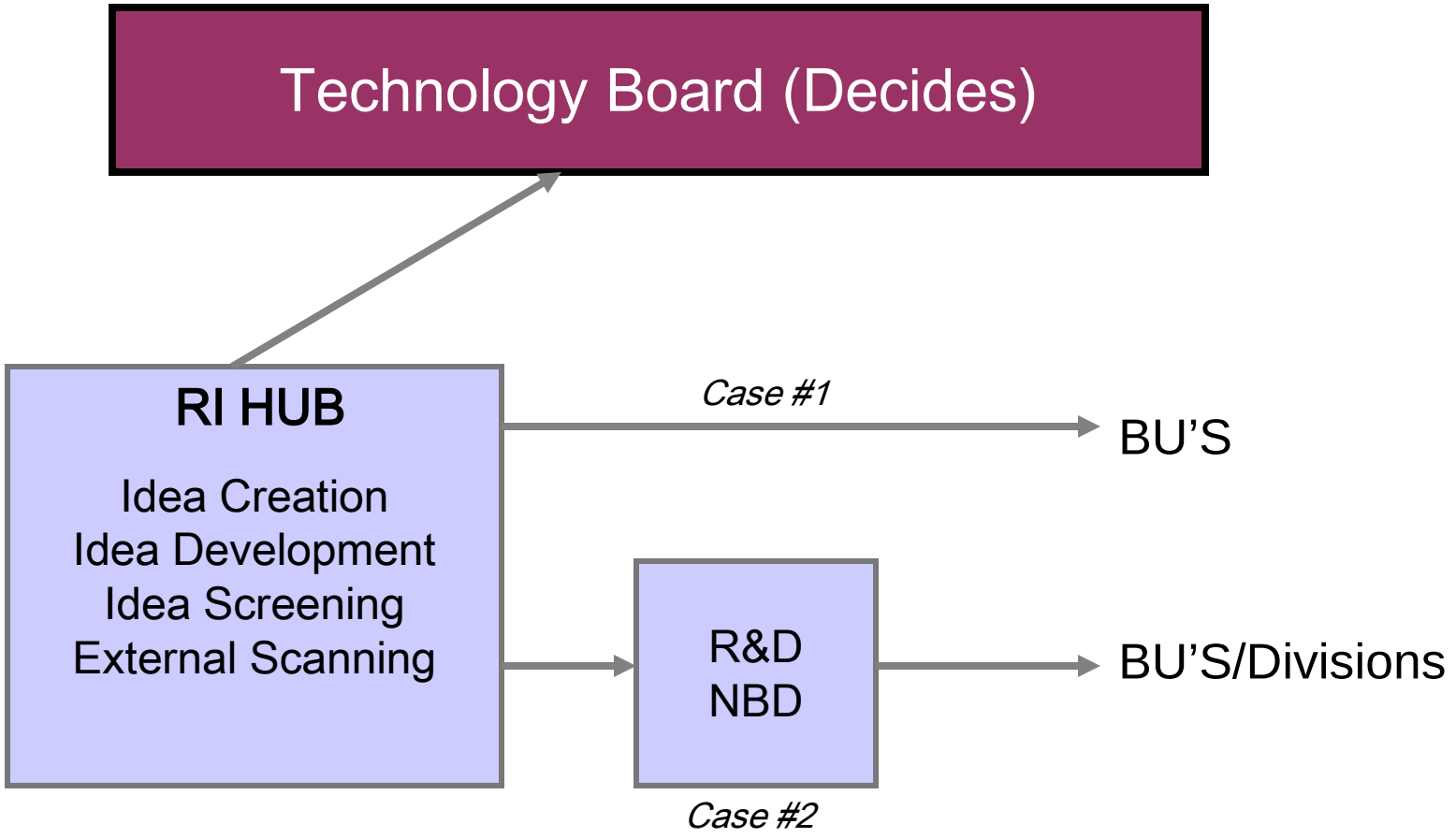
Data Analysis

- Coded interview transcripts at three levels of detail for all elements of the management system.
  - Note takers during interviews
  - Word documents coded from transcripts
  - Excel cross case comparison summary
- Drew organization structures and their evolution over three years.
- Developed timelines for each case.
- Annual team meetings off site.
- Two team meetings at RPI with co-chairs present to identify important learning.
- Validated findings with Cohort III companies over 4 sessions.

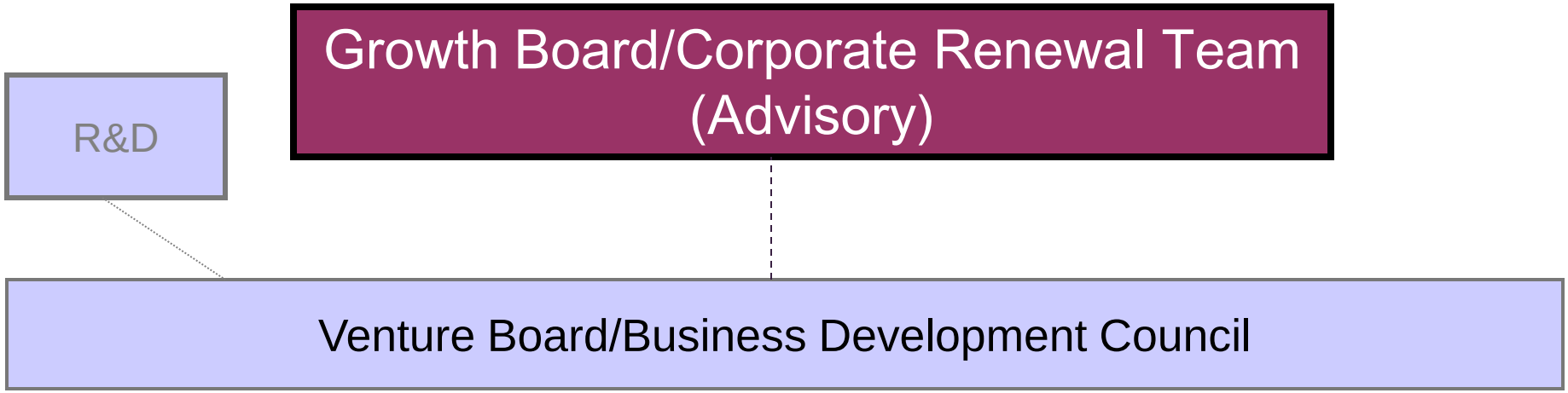
Phase II Key Insights

- Organization structures for BI.
- The D-I-A model.
- Organizational capacity.
- Orchestration.
- BI capability develops in stages.

Organization Structure: Idea Generator



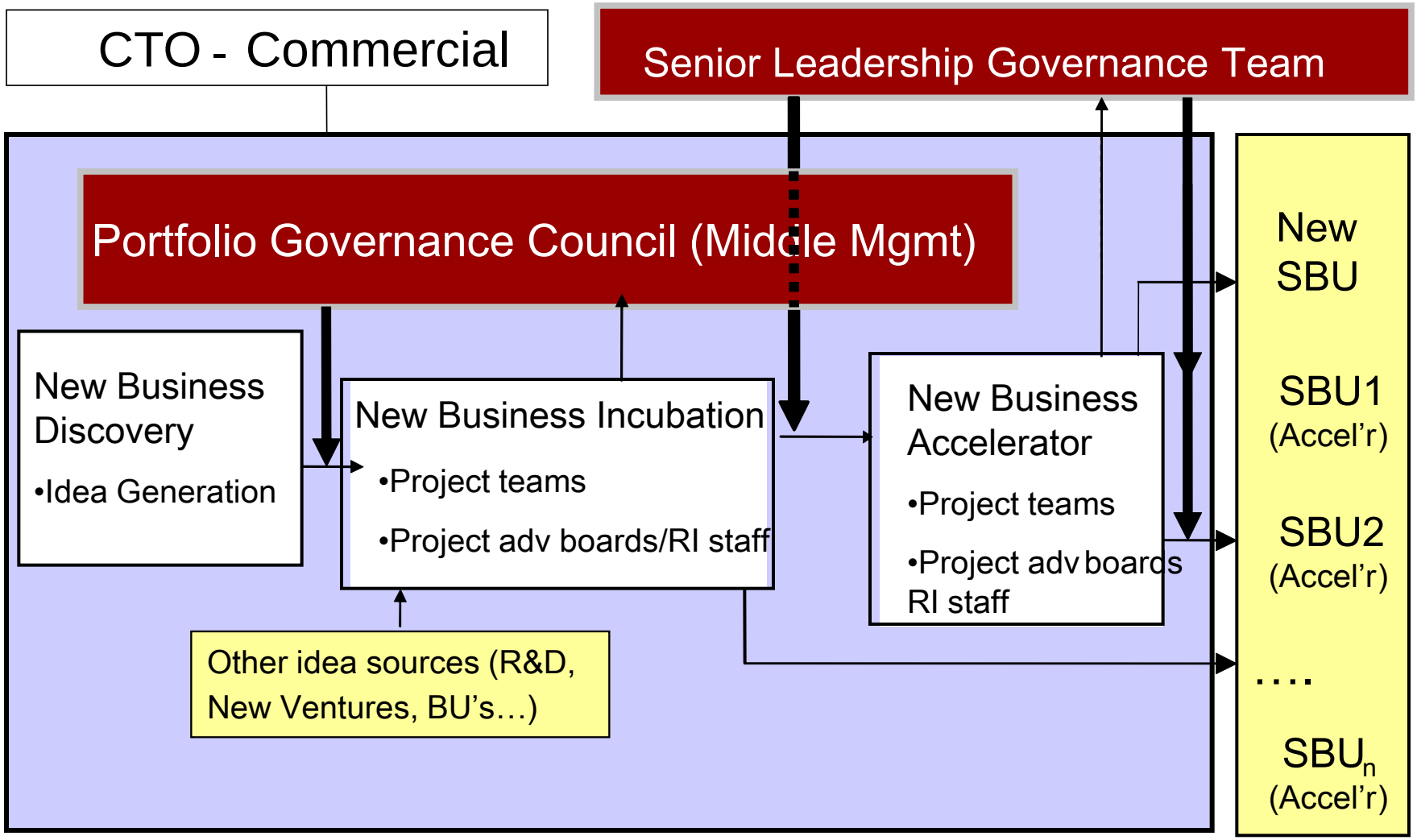
Organization Structure: Idea Manager & Incubation



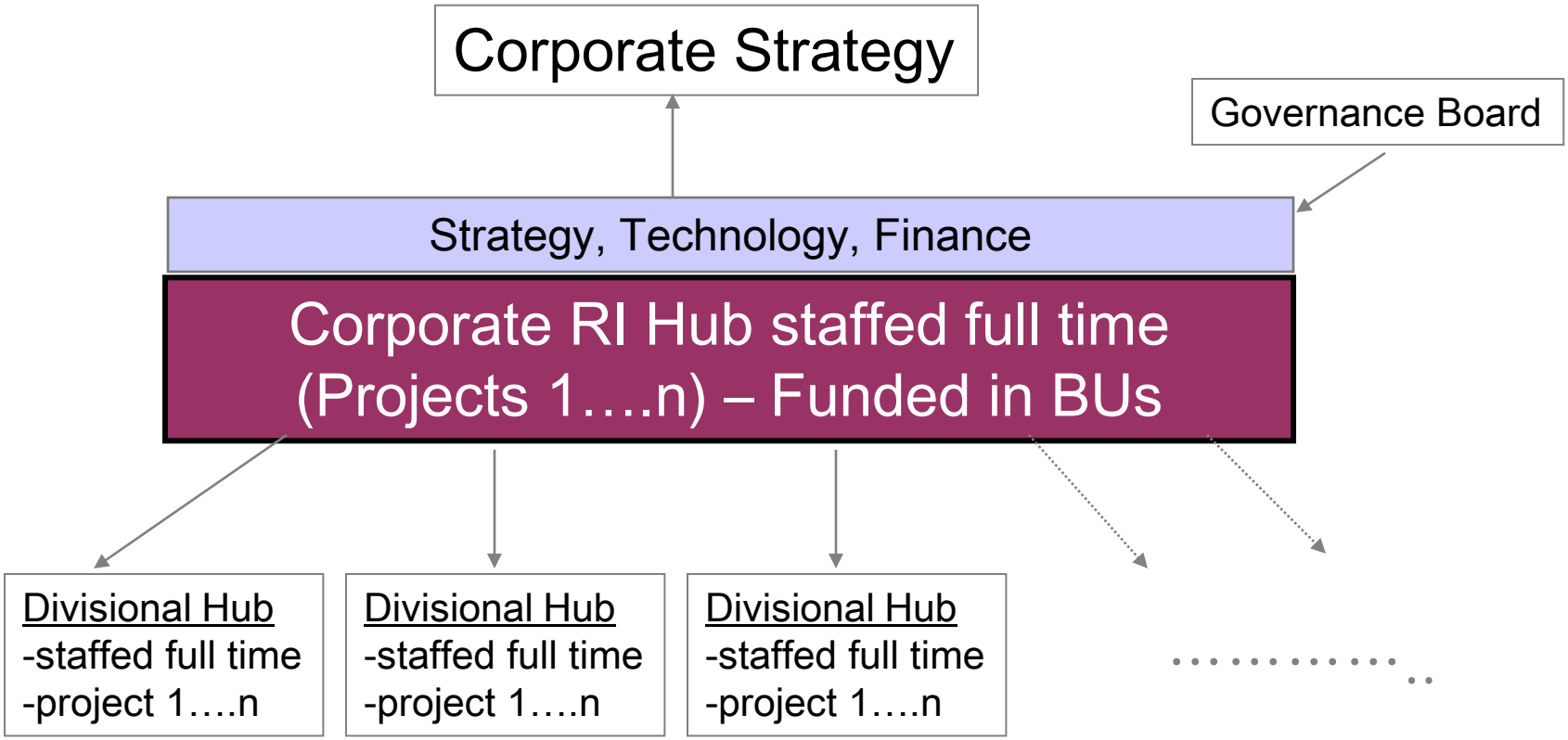
- Idea review & elaboration
  - Staffed full time
- External technology acquisition

- Incubation/Development
  - Keep white space businesses through to initial commercialization
  - Oversee incubation of aligned opportunities too far out for BU's to handle.

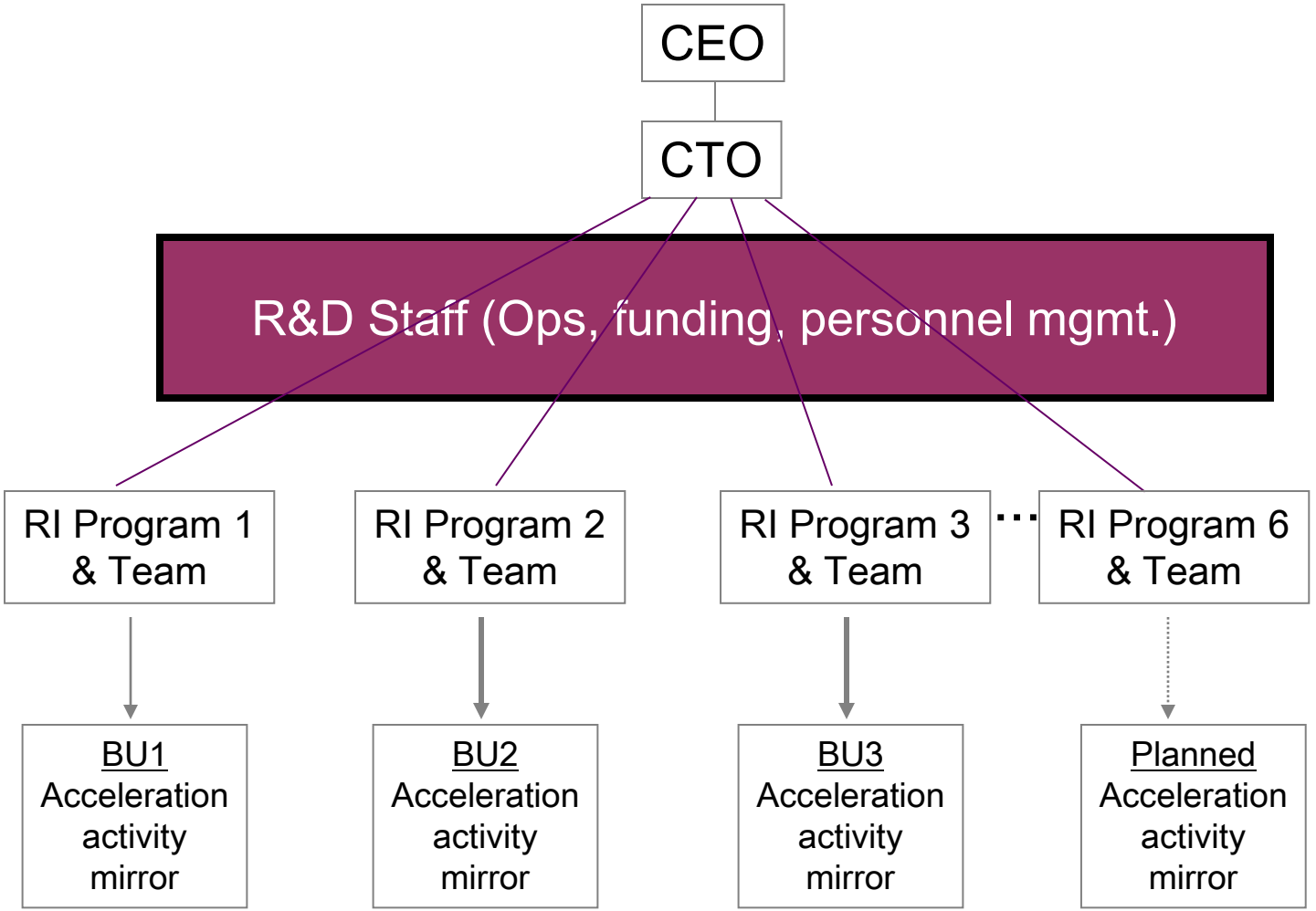
Organization Structure: Holistic Sequential Model



Organization Structure: Self Similar Model



Org. Structure: Mirrored Model



Phase II Key Insights

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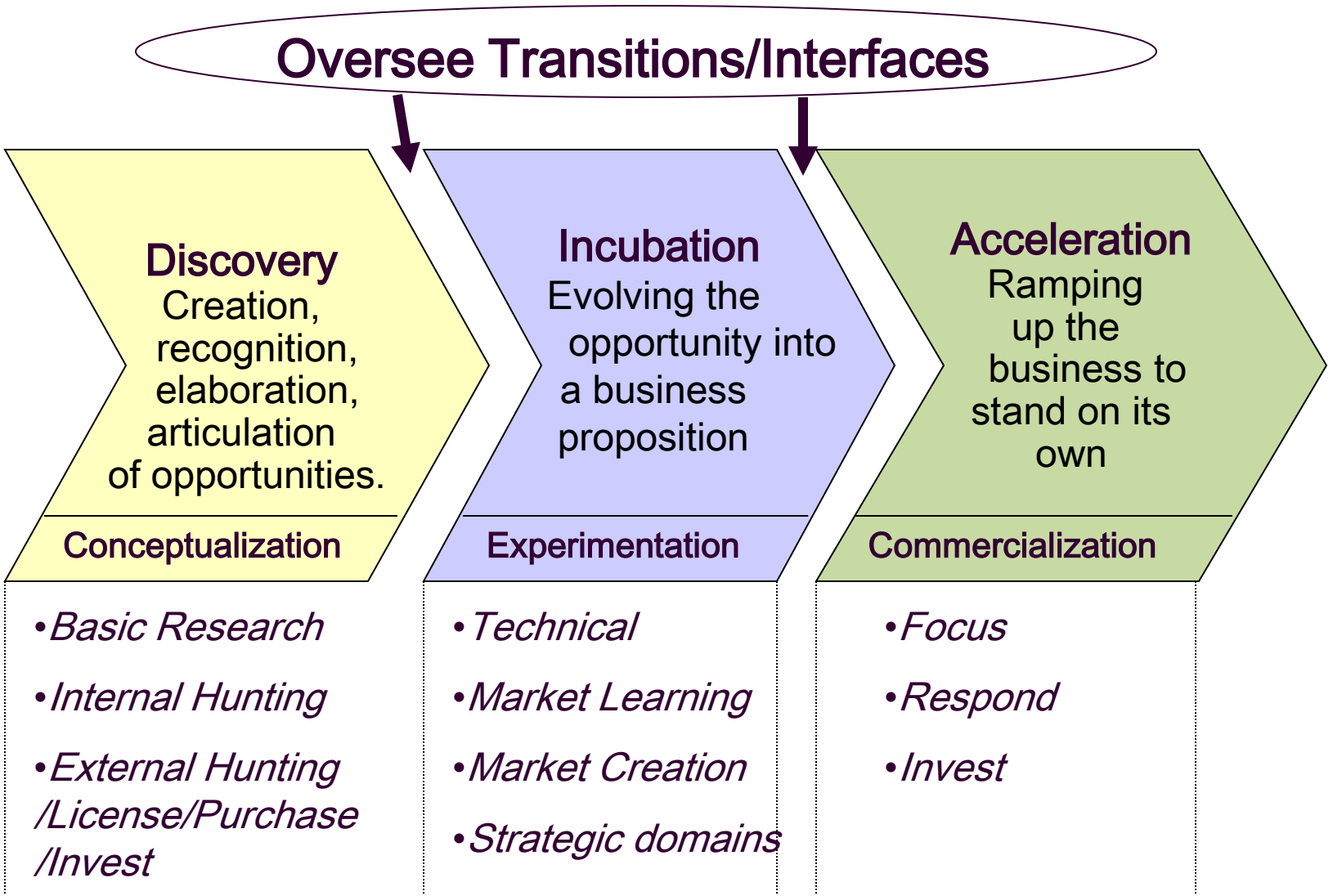
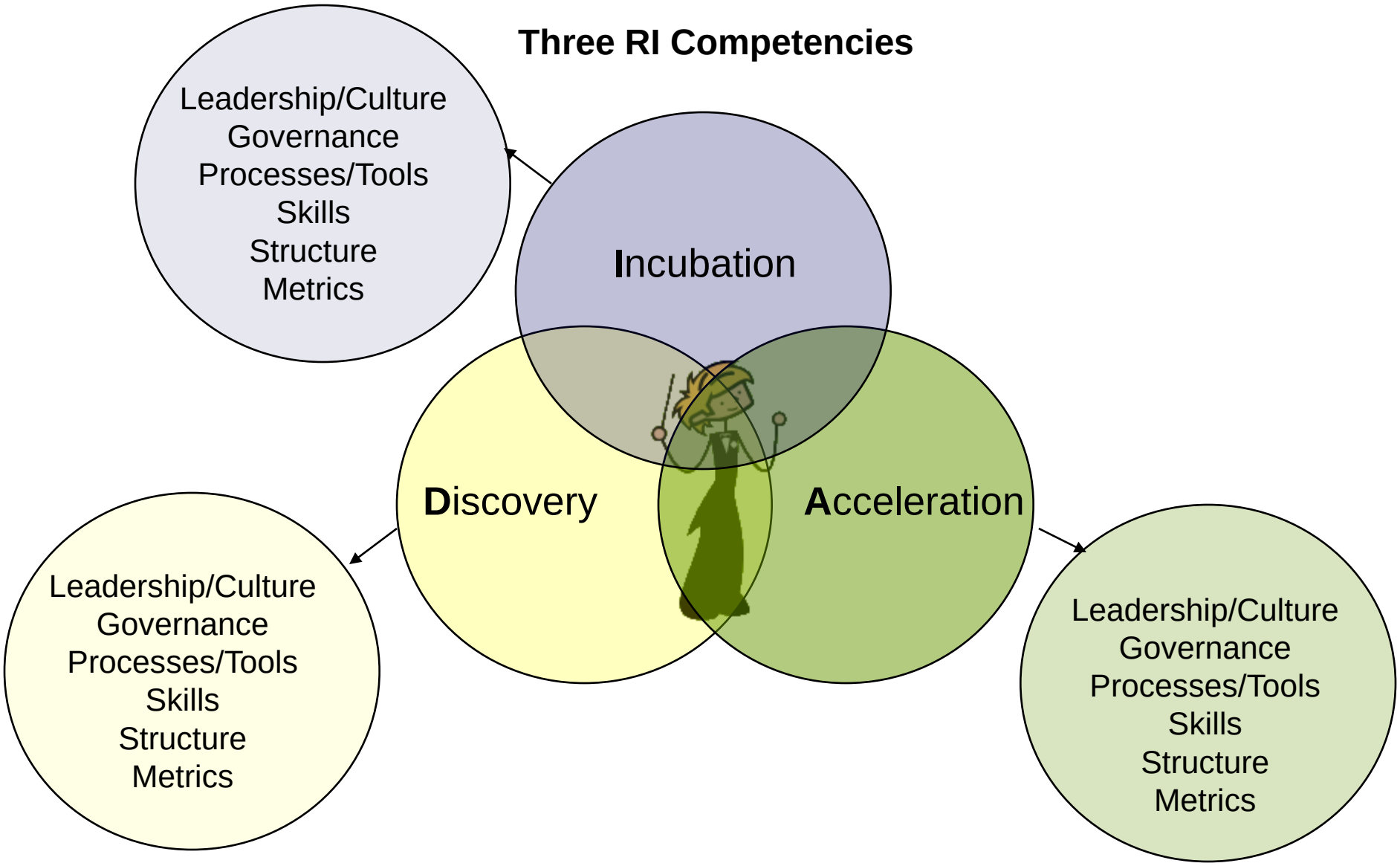
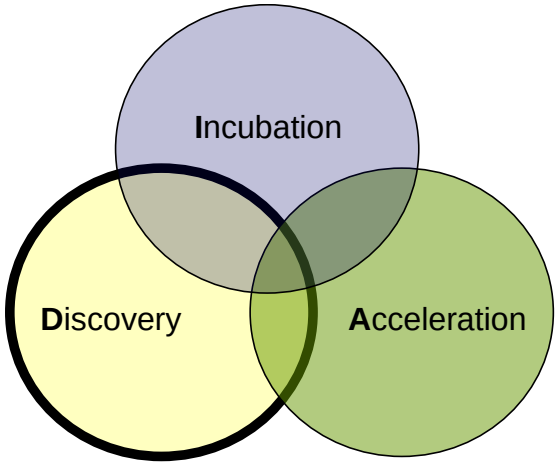
Not just one competency….but 3



DIA isn't Linear

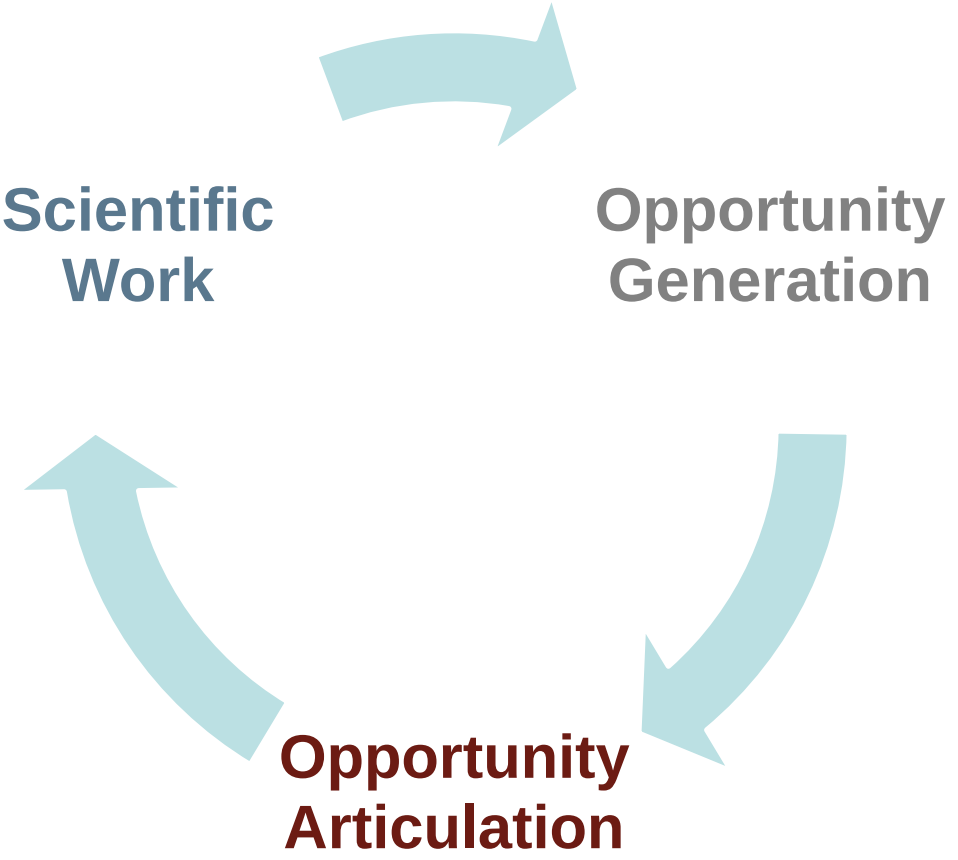


The Discovery Competency



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



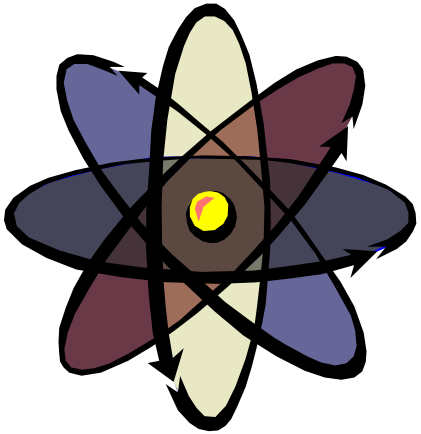
Discovery Mismatches

- Companies desire Breakthrough Innovation but do not have deep scientific expertise, not organized to leverage it.
  - Open innovation not the complete answer.
- Discovery generates a wealth of opportunities… many of which the company will never invest in.
- BI is about new domains yet companies tend to tighten link to BUs over time.
- BI ↔ Strategic intent reciprocal influence not happening.
- Companies confuse Breakthrough innovation with Diversification or NPD efforts..

Management System Elements: Discovery

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

Metrics/Rewards: Quantity of ideas, richness/robustness of concepts.



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

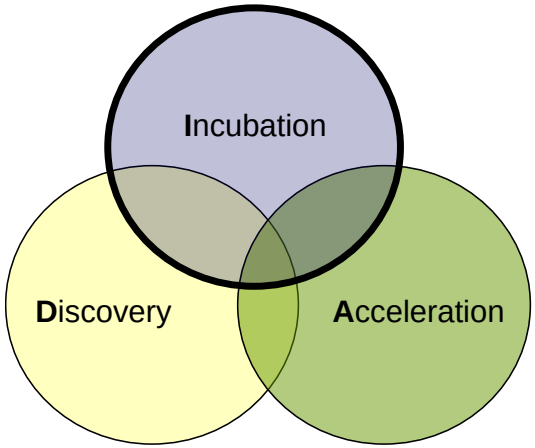
Skills/Talent Dvlpmt: Creative, inductive reasoners w/ penchant for strategic thinking.

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

Processes/Tools: External & internal scanning, open sourcing of ideas, networking. Opportunity elaboration & socialization. Able to combine disparate bits of info.

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

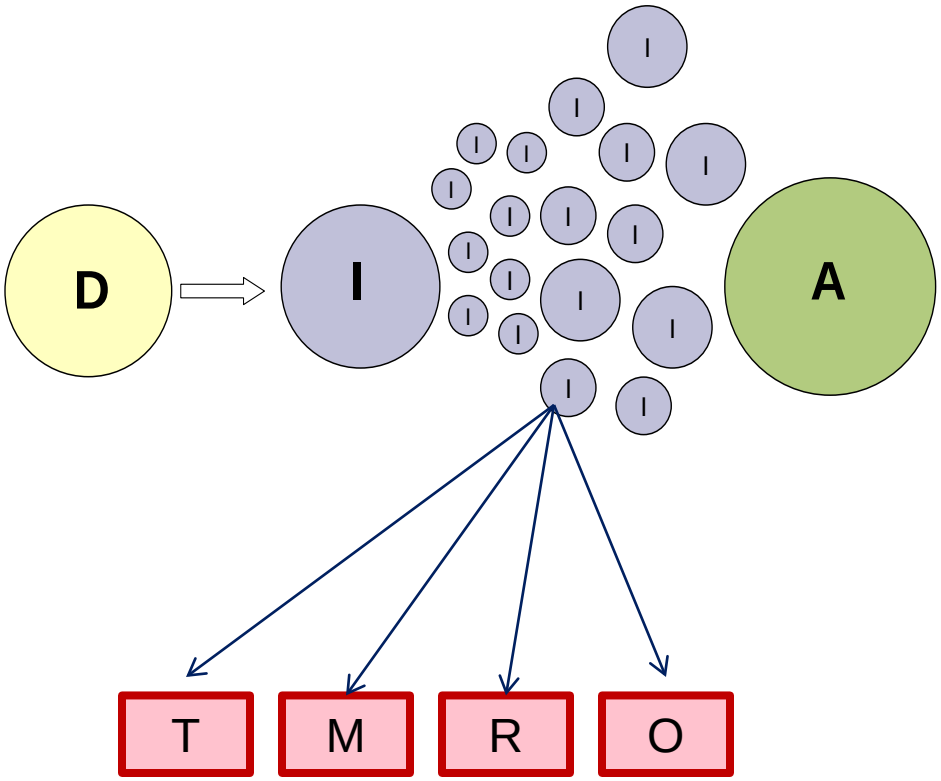
The Incubation Competency
A Long & Winding Road

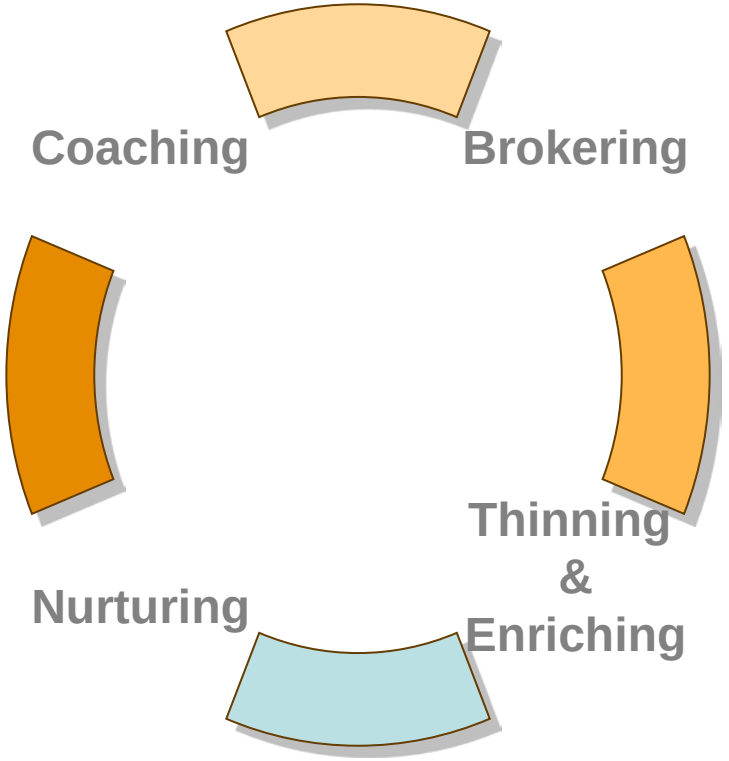


Incubation Defined

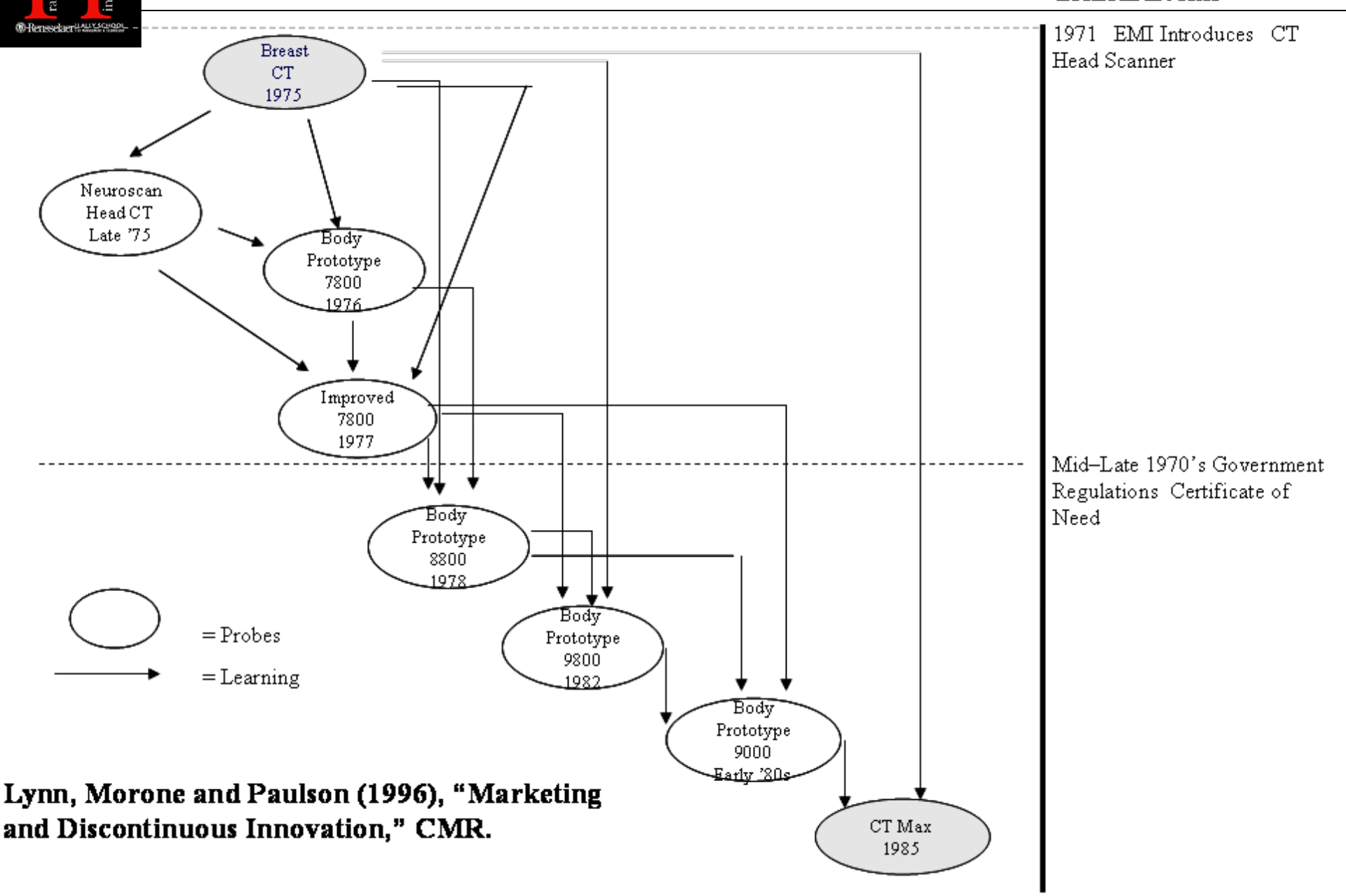
- A competency of experimentation. The ability to experiment with technology and business concepts/models simultaneously to arrive at a demonstrated model of a new business that brings breakthrough value to the market and consequently to the firm.
  - Allowances for failures, but expectations of continued 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.

Incubation Competency



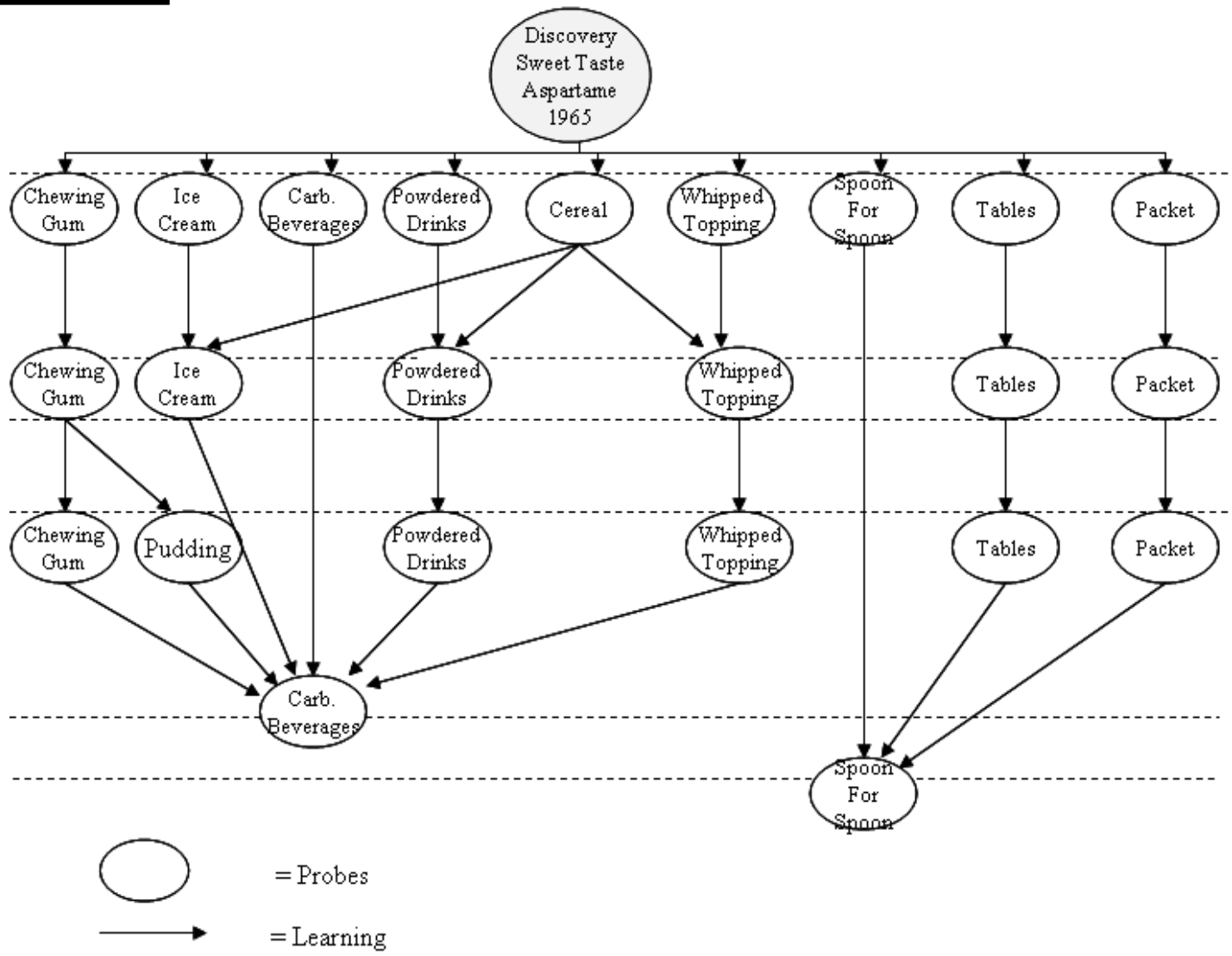


GE's Probing and Learning Process-CT Scanner



Lynn, Morone and Paulson (1996), "Marketing and Discontinuous Innovation," CMR.

Searle's Probing & Learning Process-Nutrasweet



Critical Events

1970 Cyclamates Banned

1974 FDA Approved

1975 FDA Stay

1981 FDA Approved

1983 FDA approval carbonated beverages

Late '80s FDA approval spoon-for-spoon

Efforts to develop a truly practical degradable material are reaching fruition. DuPont scientists have created an inexpensive polymer that decomposes without harm to the soil or the environment.

By now, the problems associated with overburdened landfills are widely recognized. Although recycling is the preferred solution, degradable materials can also play an important role. Yet, cost barriers and other issues have consistently blocked their wide-scale adoption in major consumer applications.

To meet this challenge, DuPont scientists have created a new family of highly versatile polymers based on polyethylene terephthalate (PET) technology and known commercially as DuPont Biomax® hydro/biodegradable polyester. Depending on the application, up to

Raised on a diet of plastic cups,

three proprietary aliphatic monomers are incorporated into the polymer. The monomers create weak spots in the polymeric chains, thereby making them susceptible to degradation through hydrolysis. The large polymer molecules are cleaved by moisture into smaller molecules, which are then consumed by naturally occurring microbes and converted to carbon dioxide and water.

The average American family generates 6,488 pounds of trash each year. The availability of products made with degradable polymers would reduce impact on the environment.

A polyester that microbes find tasty.

Biomax® can be recycled, incinerated or landfilled, but is intended mainly for disposal by composting and in-soil degradation. Researchers performed a series of tests to determine environmental impact, including plant germination and seedling emergence, earthworm weight gain and mortality, and microbial population density. In all tests, the materials were found to be harmless to the environment at every stage in the decomposition process. They are virtually undetectable to the unaided eye in about eight weeks.

Because Biomax® is a modified PET polymer, it can be manufactured with existing equipment using existing bulk monomers. This means that it is only marginally more expensive to produce than PET itself. Currently available degradable materials, on the other hand, can cost twice as much.

Degradable fishing line and fishing nets would help alleviate a serious problem for sea mammals who ingest or become entangled in aquatic trash.

How to make your products disappear. The sheer number of potential applications for Biomax® is immense. Because it can be made into fibers, films or resins, it is suitable for a range of single-use products, including domestic wipes, yard waste bags, the top and back sheets of disposable diapers, blister packs and disposable eating utensils. It can be used to create geotextiles, agricultural films, seed mats, plant pots and bags that cover ripening fruit. It can find application in coated paper products such as disposable plates and cups, aluminized films for food

snack bags and gum wrappers.

packaging and hot-melt adhesives. It is also suitable for thermoformed packaging, blown bottles and injection-molded objects.

Product properties are diverse and customizable, but are generally tailored to mimic polyethylene or polypropylene. Biomax® is soft, pliable, low in noise and has a good hand. Melting points are high for a degradable material, generally around 200°C, which opens up a range of processing options. It can be formulated to be as low in strength as low-density polyethylene or as high as half the strength of DuPont Mylar® polyester film. Elongation can range from 50 to 500 percent.

Turf grass grown on a mat of degradable DuPont Biomax® weighs one-tenth as much as sod grown in soil.

A world with less trash. Share the dream.

Throughout DuPont's history, many of our most important contributions have only come to market through collaboration with other companies. If the substance of this article leads you to conclude that a development opportunity might exist between your company and DuPont, fax us (at 302-695-9840) an outline of your non-confidential idea on your company letterhead.

DUPONT

Better things for better living

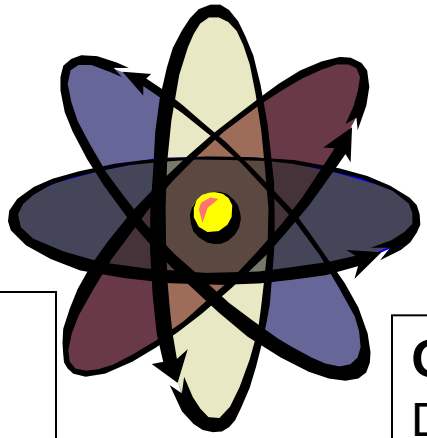
Incubation Mismatches

- Incubation is about experimentation and generation of options, but
  - metrics frequently drive for targeting and financial results.
- Who is responsible for Incubation??? Everyone needs it and no one staffs it.
  - Project managers ≠ Incubation experts necessarily.
- Early market participation and early harvesting may violate company culture
  - Cultures of ‘executional excellence’ cringe at the thought of klugey prototypes or informal launches.
- Aligned opportunities are strategically more comfortable, but tactically more difficult.
  - BI teams alienate functional leads and cannot get next jobs.

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.'

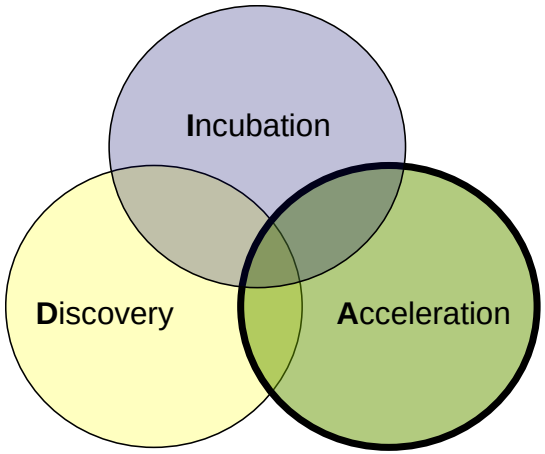
Skills/Talent Dvlpmt: Project leaders: NBC expertise, entrep'l acumen,rich networks. Staff: strategic coaching, nurturing capabilities.

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.

Governance/Decision Making: Project level: advisory boards of experts. Portfolio level: Sr. BU and Corp representatives.

The Acceleration Competency
or
Gathering Steam & Building Critical Mass



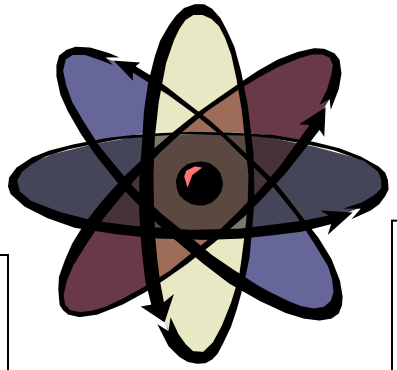
Acceleration: Gathering Steam

- 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.

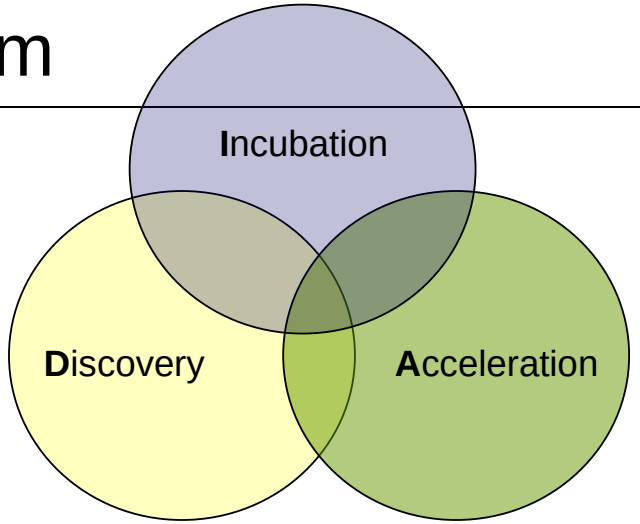
Skills/Talent Dvlpmt: Acumen in nurturing high growth businesses. Ability to interface with mainstream

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.

Governance/Decision-Making: Sr. Ldshp team with powerful networks, respect, political clout.

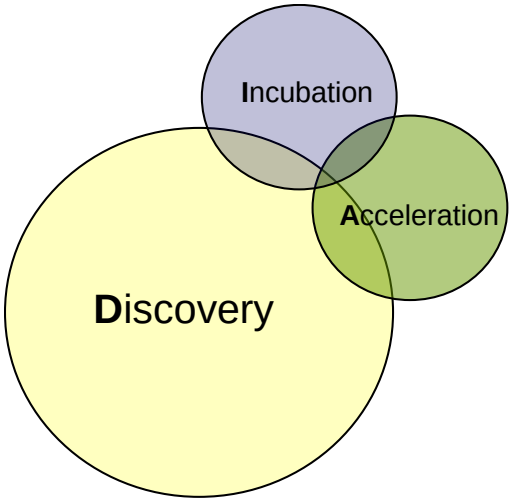
The DIA System



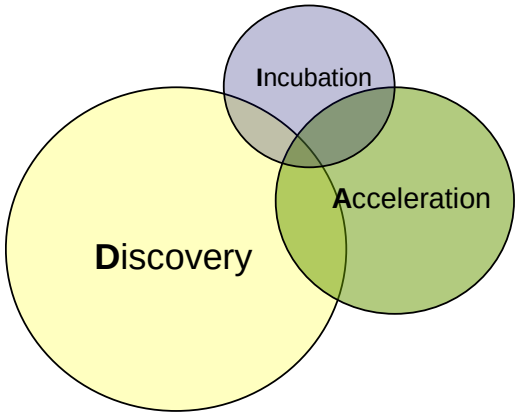
- The set of activities that manage the links and interfaces within DIA, oversee its health in terms of the RI mandate, it's perceived role in the firm, and its portfolio of businesses.
  - Monitor /manage system imbalance in conjunction with org'l capacity.
  - Attend to portfolio health and diversity (Churn? Size? Pacing?)
  - 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.
  - Oversee transitions from D→I→A→ landing zone

System Imbalances

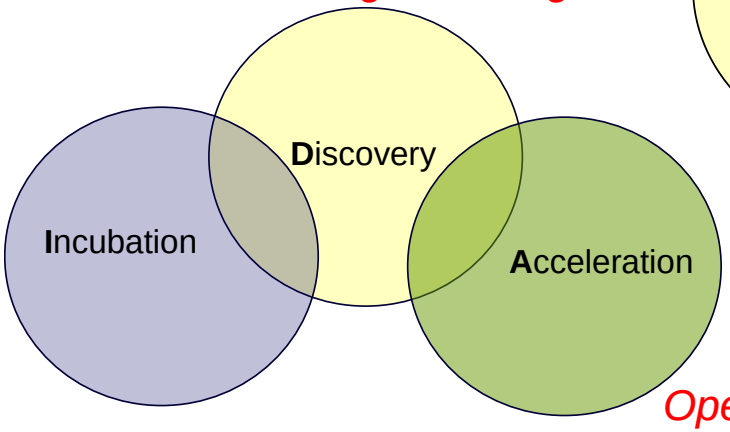
Can't get heard



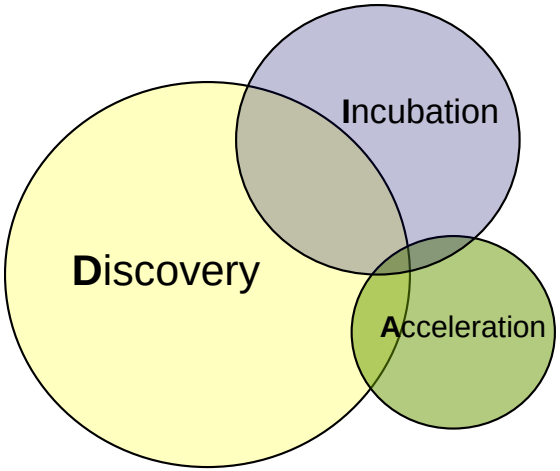
Big Ideas, Incrementally Executed



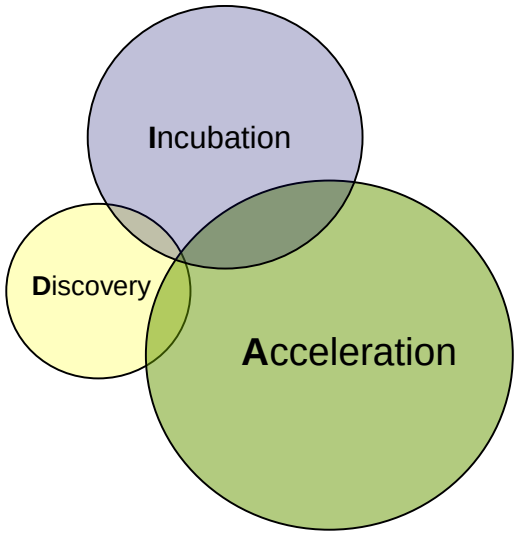
Failure to leverage learning



No Courage to continue



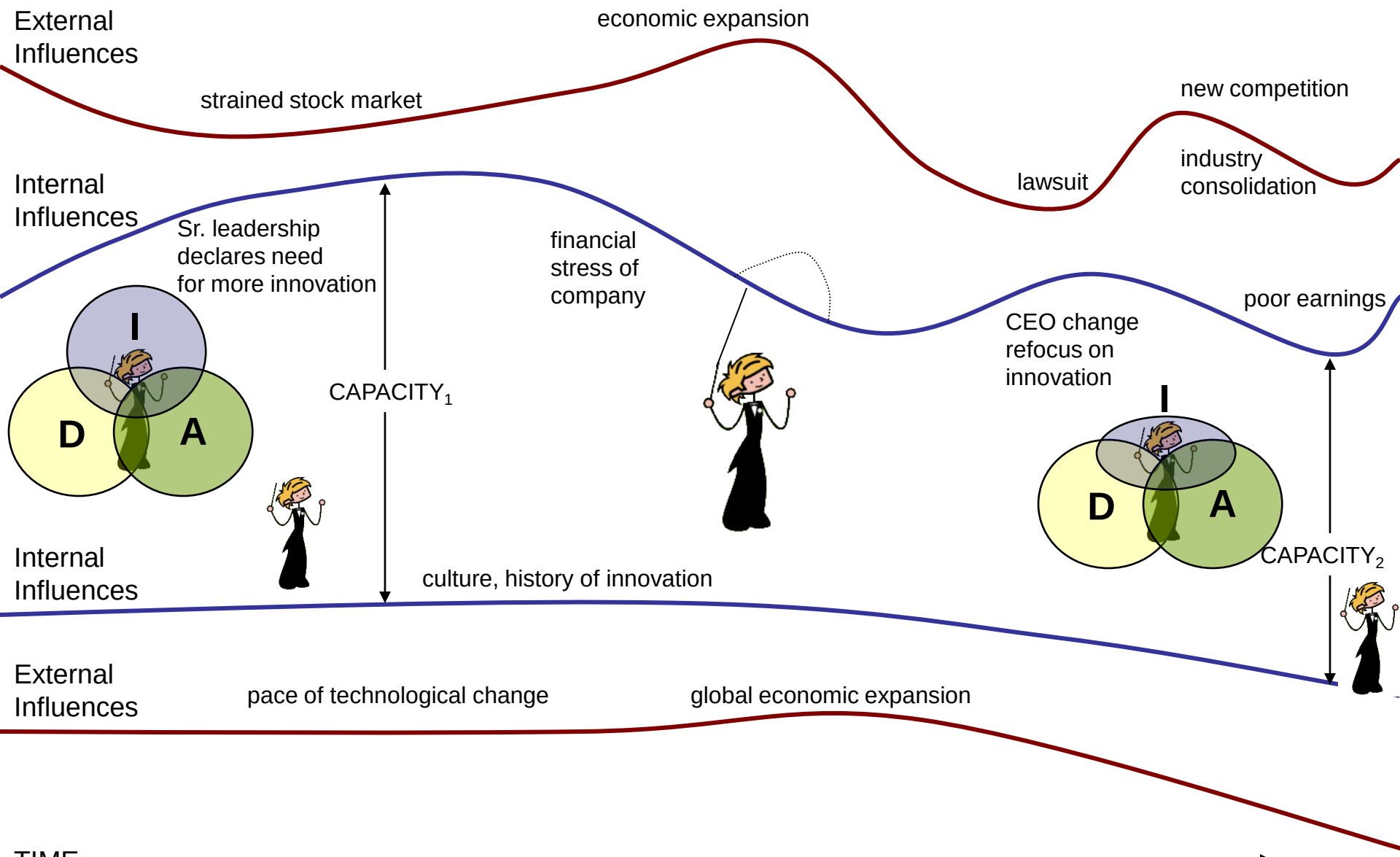
Open Innovation at the Extreme



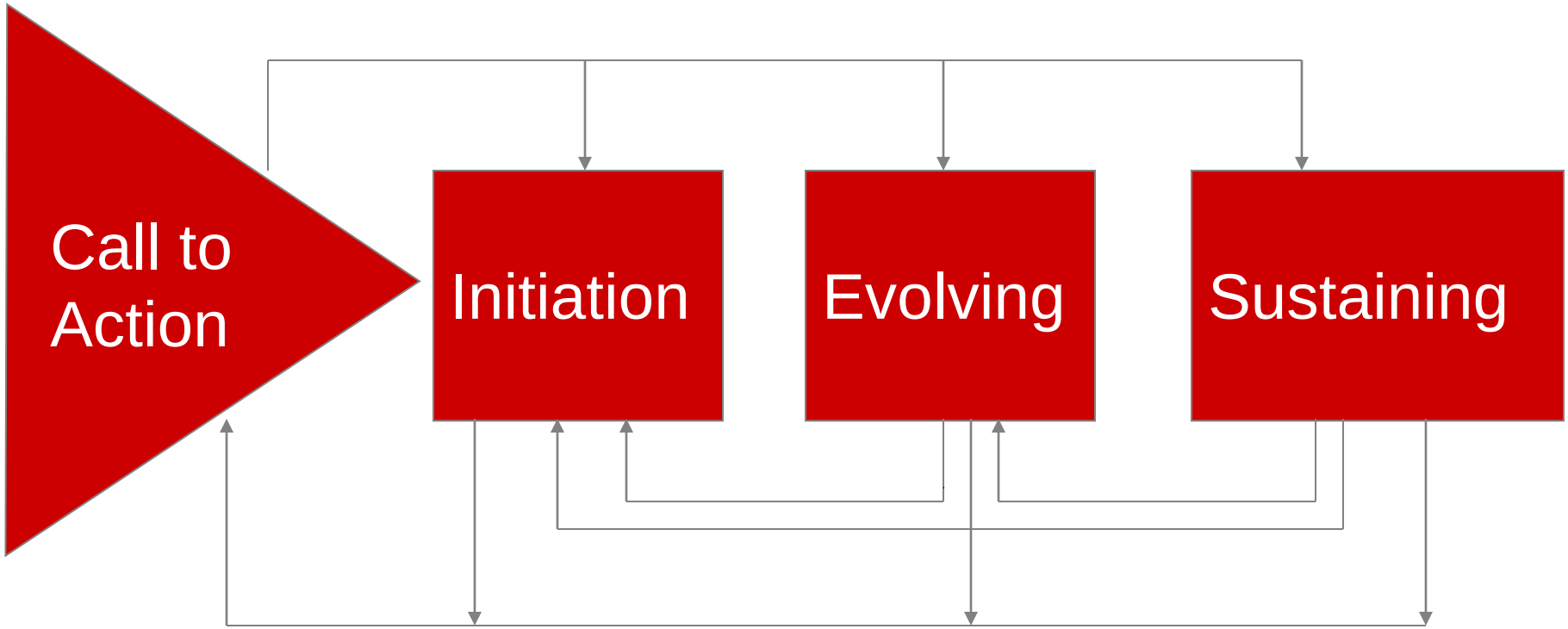
Phase II Key Insights

- Organization structures for BI.
- The D-I-A model.
- Organizational capacity.
- Orchestration.
- BI capability develops in stages.

Orchestrating to Get Things Done



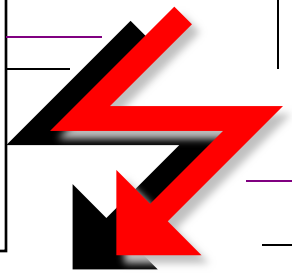
Stages of Capability Development



Call to Action: Challenges

Purpose and Scope: Objectives not clarified across the organization resulting in misinterpretation of the initiative both inside & outside innovation community.

Expectations: Senior and middle management non-alignment of expectations.



Commitment: Objectives are often short-term, but building a growth capability is a long-term investment.

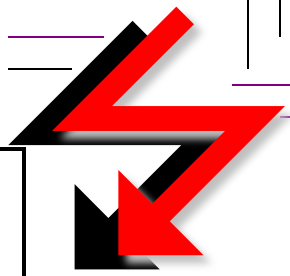
Performance Objectives: Misalignment of expectations regarding business focus, timing, risk and revenue requirements.

Getting Started: Challenges

Leadership Experience: Most NBD leaders lack entrepreneurial experience as they came up through conventional system.

Idea Flow Yields High Volume, Low Quality Ideas: Tension re how tightly to specify strategic growth areas and manage risk.

Positioning: Announcing is helpful to build awareness…but heightened visibility increases expectations.



New Business Creation Skills: Severe shortage of expertise results in mismatches of capabilities and requirements.

Process Tension: Understanding that conventional processes and skill sets are inadequate for NBD.

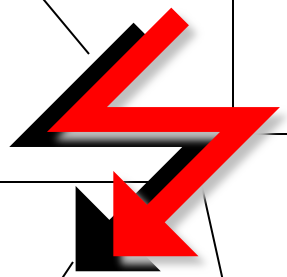
Mission Retrenchment: Initial (lofty) mission comes under pressure as innovation group recognizes need for education and culture change. Pressure to “get one out the door”.

Evolving: Challenges

Failure: Building new business is much riskier career path than growing current businesses. Fear of failure reigns.

Idea Generation: Innovation/NBD groups begin to focus less on ideation and more on collecting and tilting up new businesses…So where will the new ideas come from?

System Interfaces: As complexity of innovation system evolves, or elements of it experience change in leadership, lack of interfaces for a period of time.



Mandate Creep: Tightening link to aligned opportunities/BU's can diminish opportunity search for more innovative ideas. How evolve Strategic Intent?

Organizational Readiness: Difficult to transition new businesses when BU's not willing to receive them.

Restrictive Governance Boards: Composed mostly of people who rose through operations system.

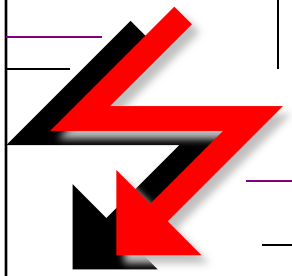
Focus: How keep eye on long term prize while harvesting small wins along the way within each project?

Leadership Demands: Innovation leaders are challenged to manage inward, outward and upward simultaneously.

Sustaining: Challenges

Capacity Changes: How power down but not completely shutter the capability?

Succession Planning: How select and develop next CNO and innovation staff given volunteerism mentality and view of role as temporary development rotation?



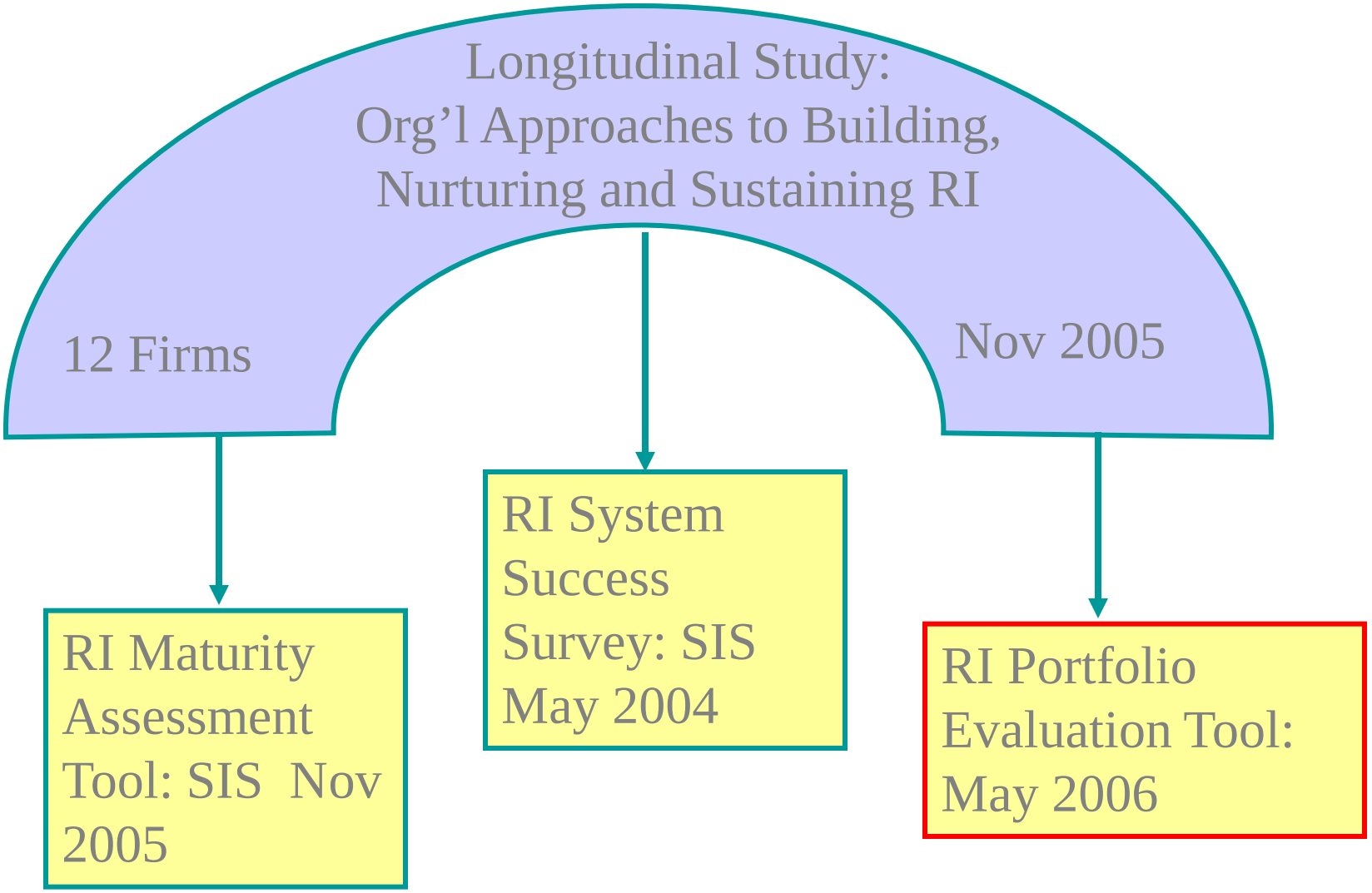
Over Achievement: More projects generated and nurtured than the organization can absorb.

Performance Objectives: Misalignment of expectations regarding scale of impact on bottom line. BI helps initiates new growth, but not enough to account sum total of the co's net growth requirements.

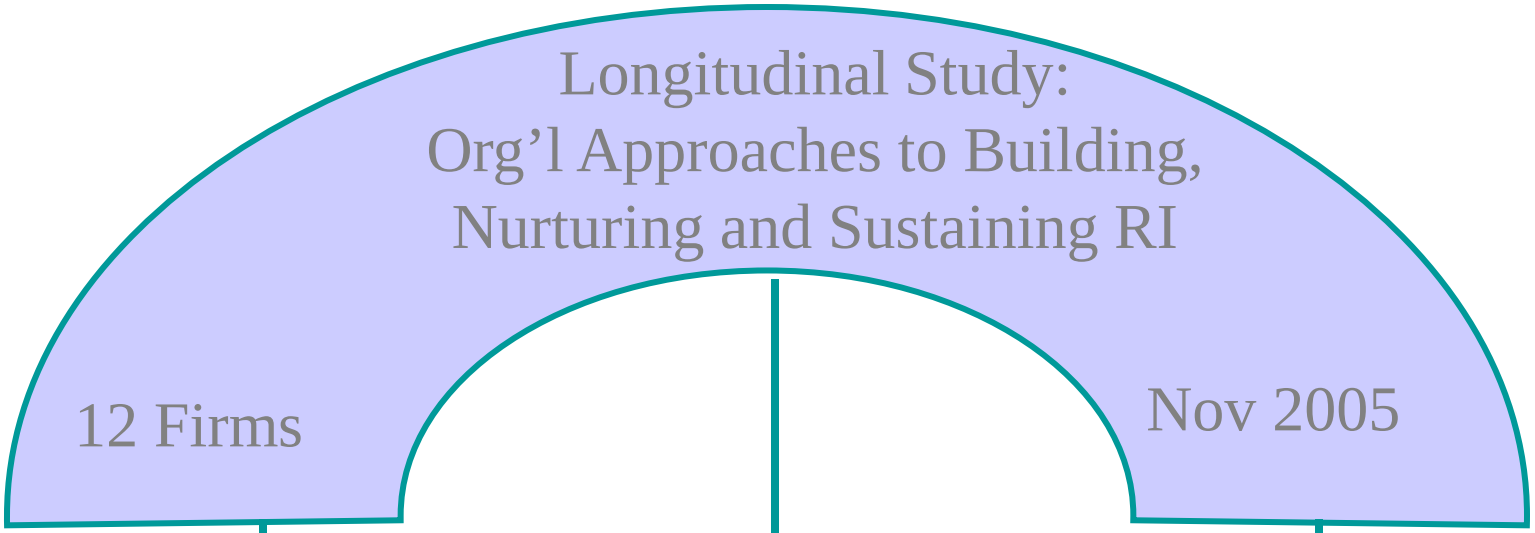
BI Capability Roadmap: Architecting for Success

Strategic Innovation Agenda	• Strategic Intent • Entrepreneurial and Operations Cultures • Education and Expectations Management
Portfolio Innovation System and Talent Management	• Right Type and Level of Resource Commitment • Portfolio Flow, Pacing and Transitions • Appropriate Evaluation Criteria and Metrics • Internal and External Interface Management
Project Team Learning and Uncertainty Management	• Uncertainty Reduction • Staged Learning • Rewards and Recognition

Radical Innovation Phase II
Research Program Structure (Oct 2001-May 2006)



Radical Innovation Phase II
Research Program Structure (Oct 2001-May 2006)

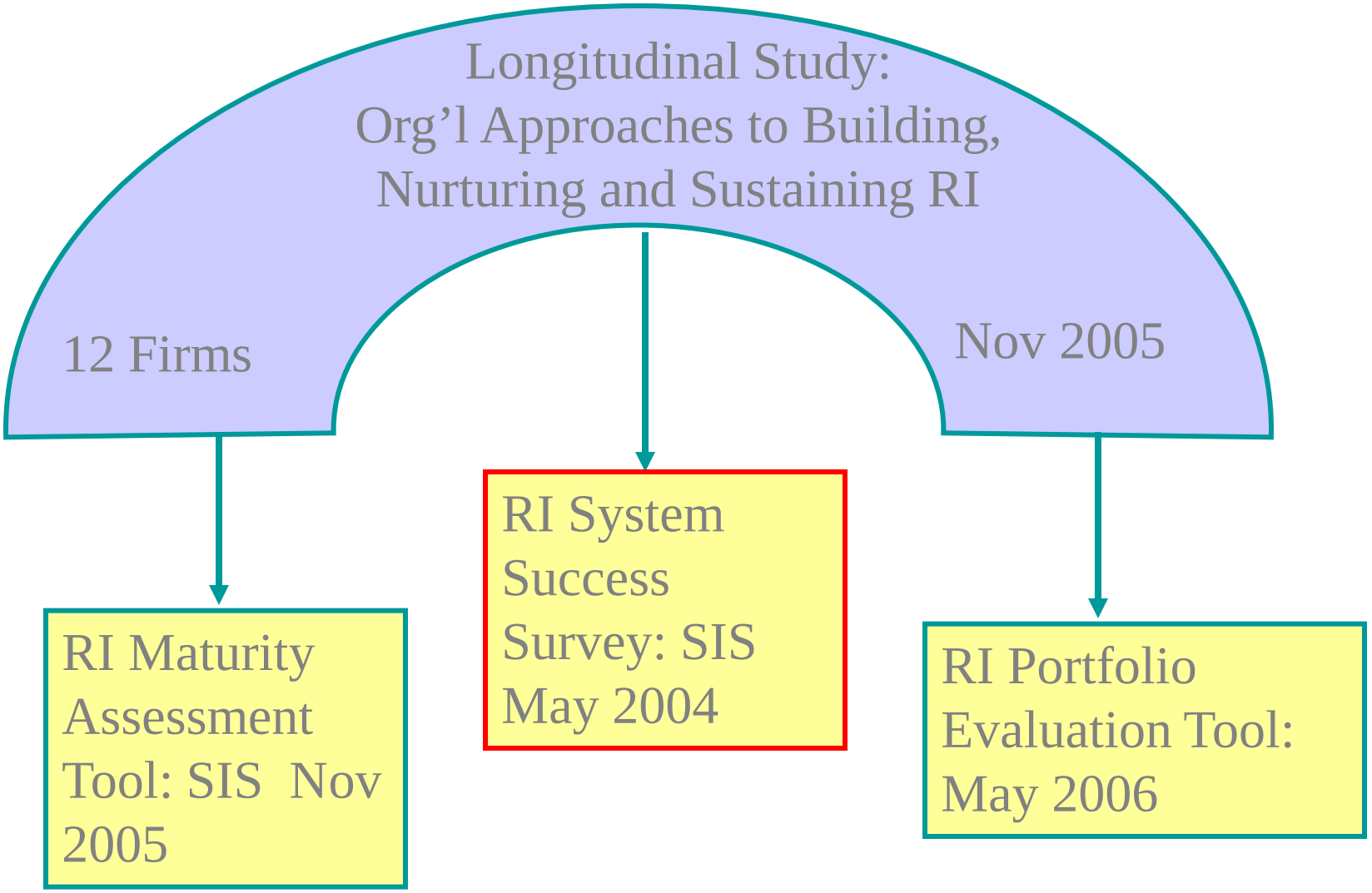


RI Maturity Assessment Tool: SIS Nov 2005 Grabbing Lightning Appendix

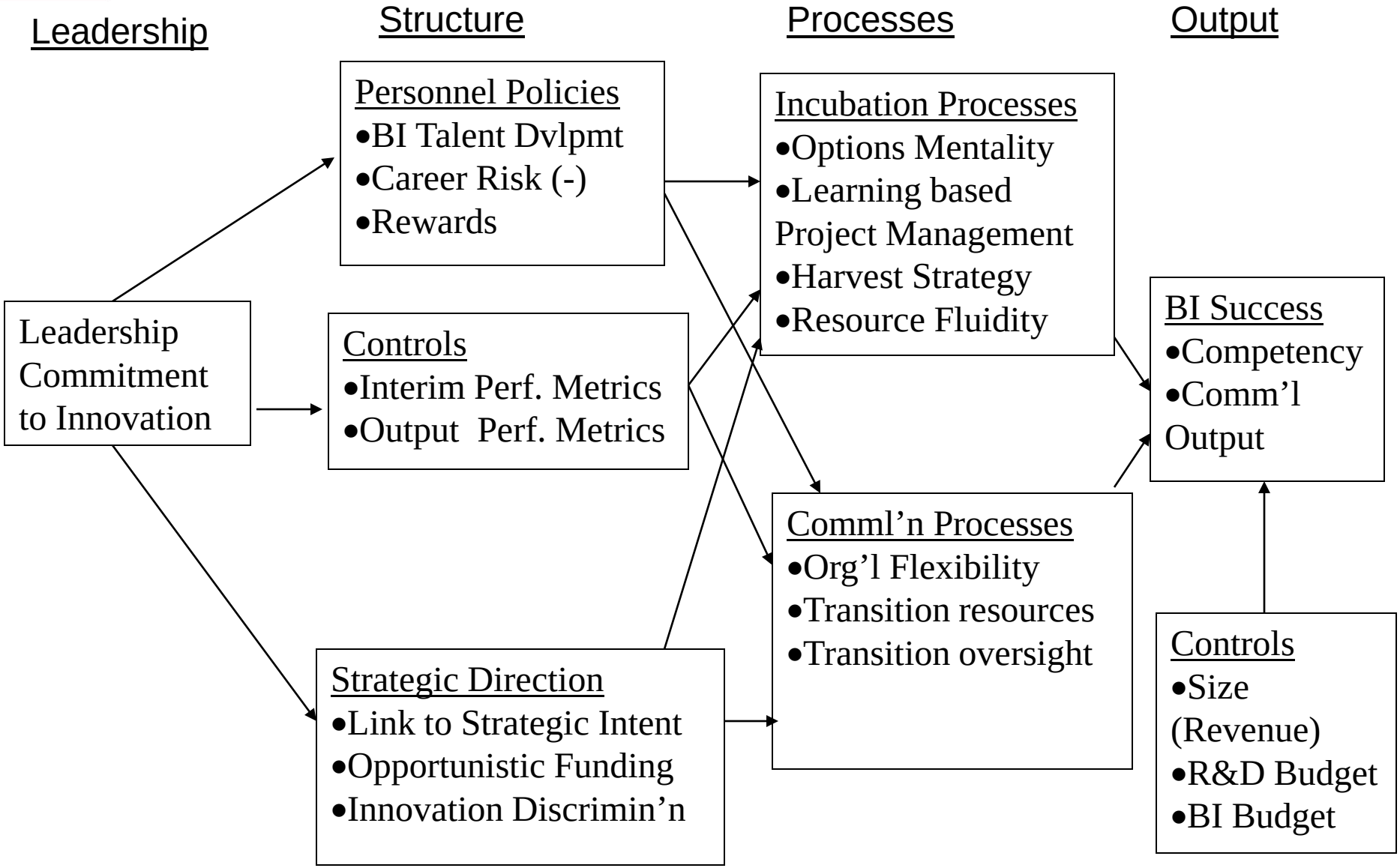
RI System Success Survey: SIS May 2004

RI Portfolio Evaluation Tool: May 2006

Radical Innovation Phase II
Research Program Structure (Oct 2001-May 2006)



Conceptual Model: Operationalizations

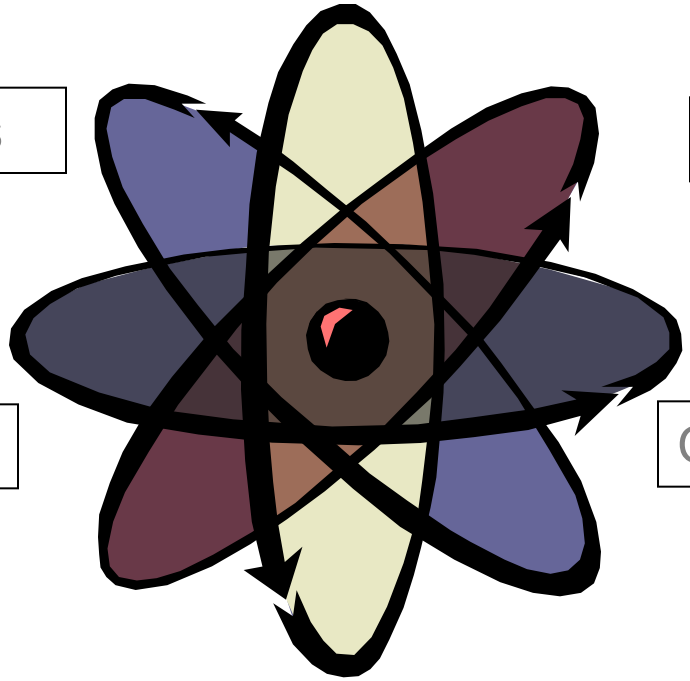


Phase II: Management Systems

Mandate/Scope

Metrics/Rewards

Leadership/Culture

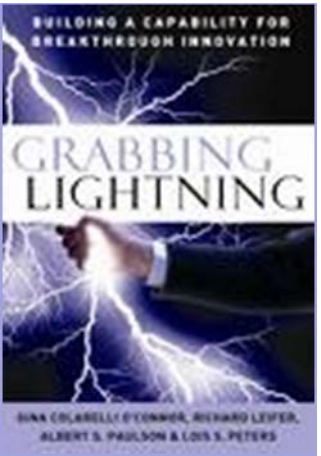


Skills/Talent Dvlpmt

Org. Structure/Interfaces

Processes/Tools

Governance/Decision Making



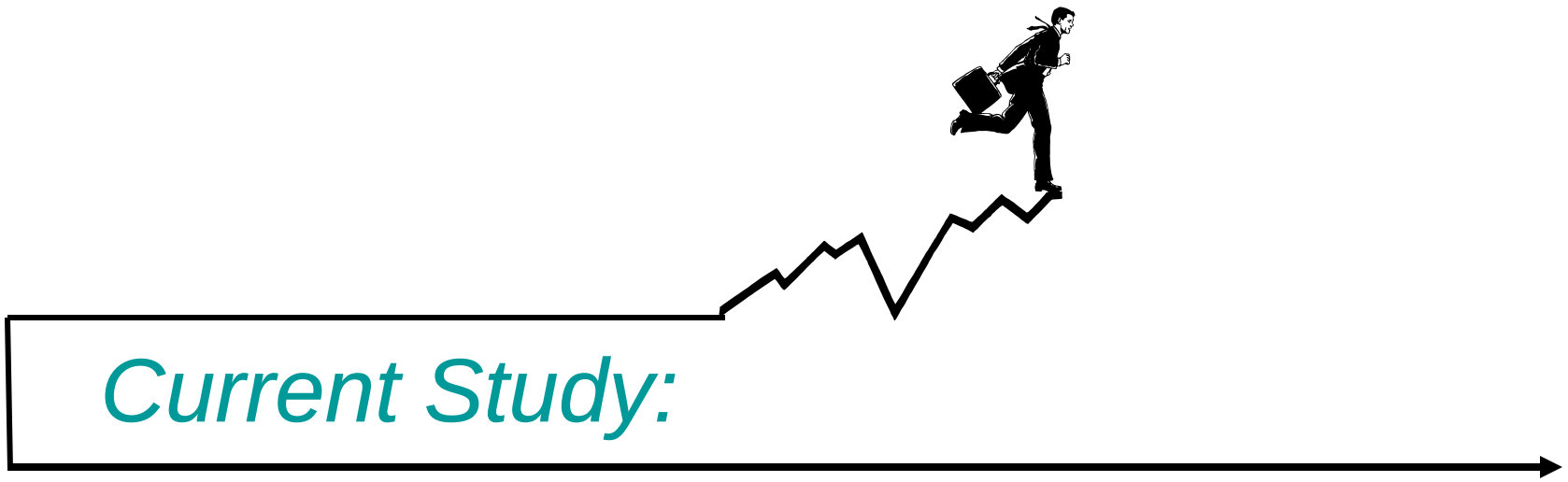
Talent Development for Innovation

- New Roles emerging, across all levels
  - Chief iNnovation Officer (CNO); Sr VP Strategic Growth, EBO Czar; VP, Strategic Innovation;
  - Exploratory/Inbound marketing group (Corning/DuPont)
  - VP, New Business Development/Creation (Sealed Air)
  - Commercial Development Officer (Air Products)
  - Director of New Growth (Ashland)
  - Director, Gamechangers (Royal Dutch Shell)
  - Idea hunter (MeadWestvaco)
  - Accelerator team (Kodak)…….

But …..No career paths.

I'll never become a VP in this group. I have to rotate back out to the business units.

Phase III



Institutionalizing an Innovation Competency through People: Career Paths for the Innovation Function

Over Arching Question

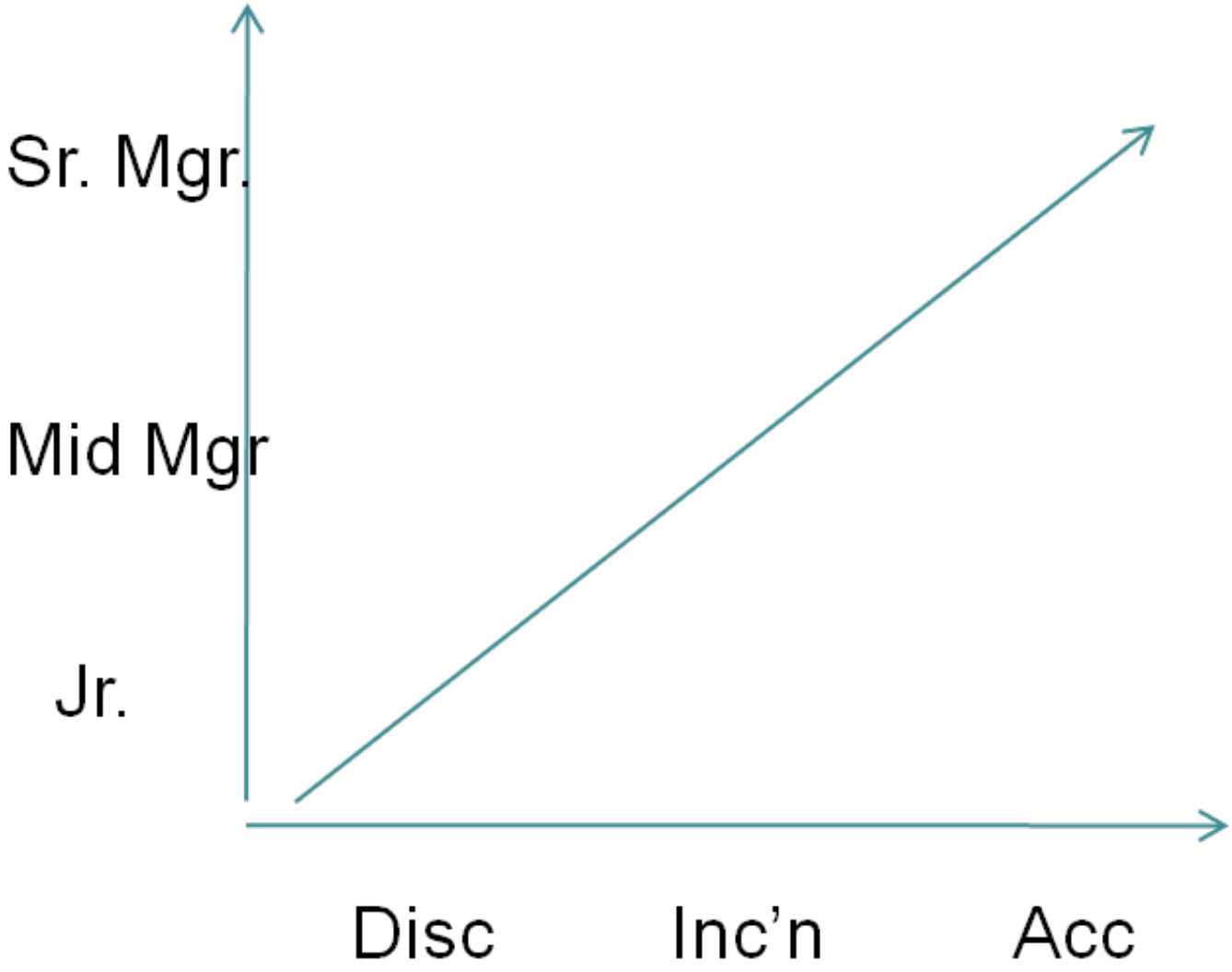
What roles, talent development and talent management practices contribute to institutionalizing breakthrough innovation?

- Maximizing individual career satisfaction
- Maximizing a company's breakthrough innovation capability

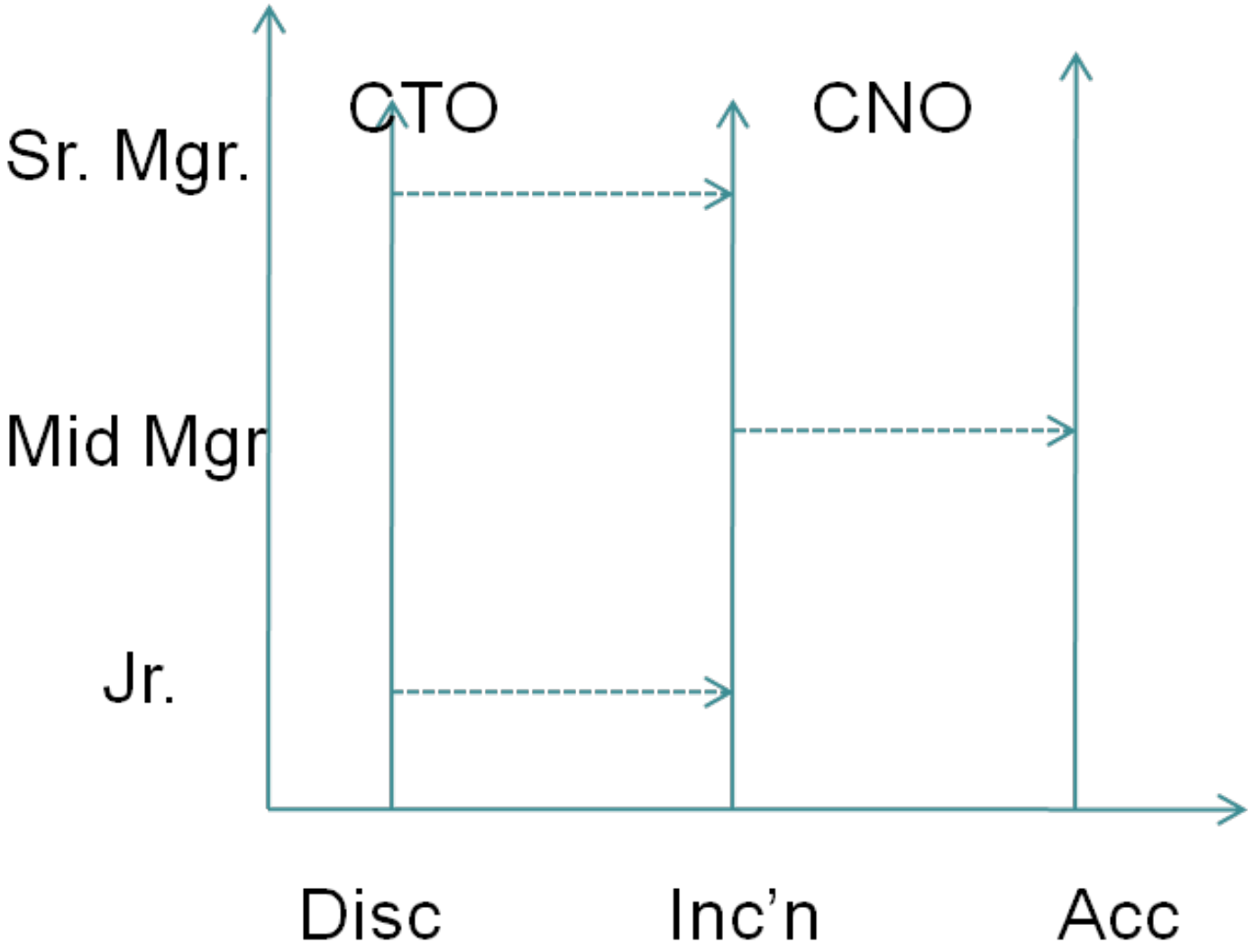
Risks for BI Innovation Experts

1. Project Failure puts Jobs at Risk:
   - *It's difficult for the teams to let us know that the project isn't making headway or gaining traction. If it gets killed, they may very well get the pink slip.*
2. Unpredictability: Cannot provide sales forecasts and budgets for planning purposes with any confidence.
3. Scale: Projects initially have few people, small budget.
   - *I thought I was being demoted!*
4. Career Atrophy/Unclear Career Path
   - *Our group was perceived as a "timeout" in your career. Some internal networks were concerned that moving to (our group) was a dead end that will hurt your career.*
5. Recognition Discount…innovation teams given little credit once the new business begins to take off:
   - *Everyone remembers the failures, but no one remembers who came up with the successes.*

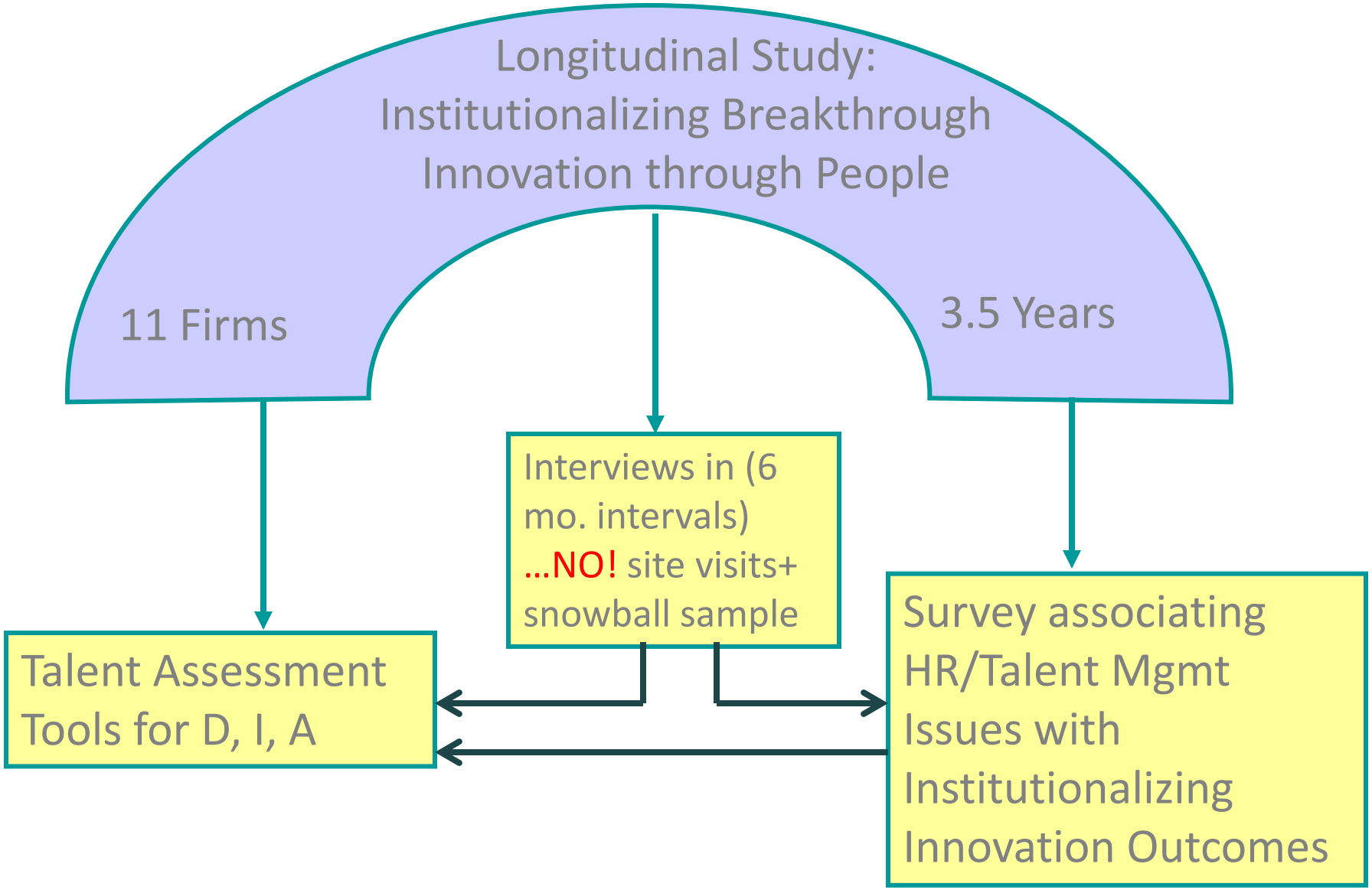
The Seemingly Obvious Path: 3M



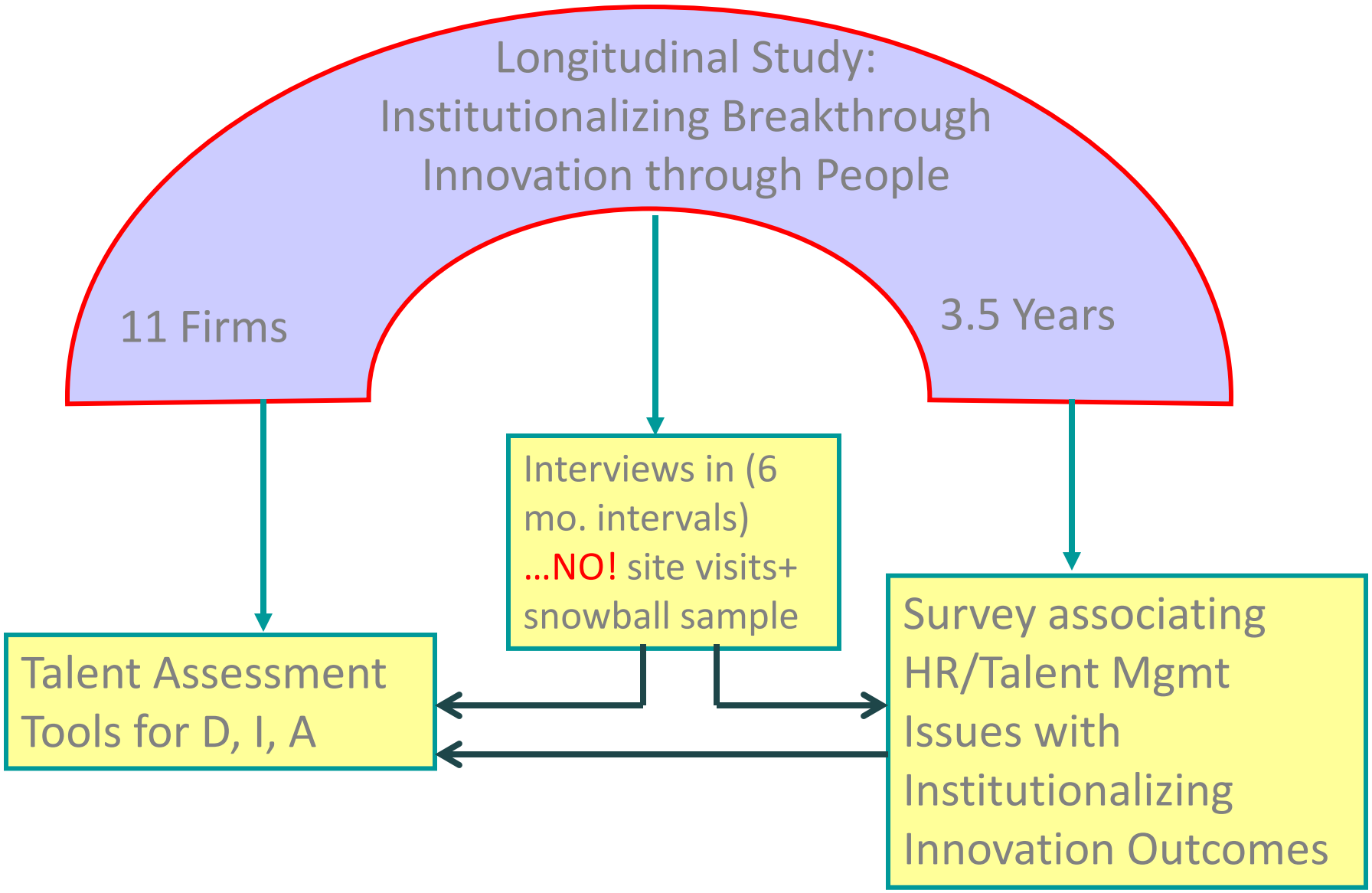
A More Logical Approach?



BI Phase III Program Structure



BI Phase III Program Structure



Interview Respondents

- Began with person responsible for BI.
  - Asked interview questions about the BI org structure, staffing, talent management issues.
- Did not do site visit at the outset. Mistake!
- Followed up in 6 months. Not enough change in personnel to make a difference.
- Lack of site visit compromised relationships with companies.
- Conducted site visits and learned of others not in the BI group but important to success.
- Began requesting interviews. Moved to snowball sampling technique.

Phase III Project Time-line

2010 Fall IRI Meeting: Program Launch

First Interviews Begun

Completed First Interviews June 2011

Analysis & Team meetings

Final Report Field Study Sp & Fall '14 IRI Meetings

Participants Recruited, Qualifying Calls Begun

Qualifying Calls Con't.

One Last Qualifying Call

Site Visits 9/11-3/13

Final check emails

Survey Data collec-tion

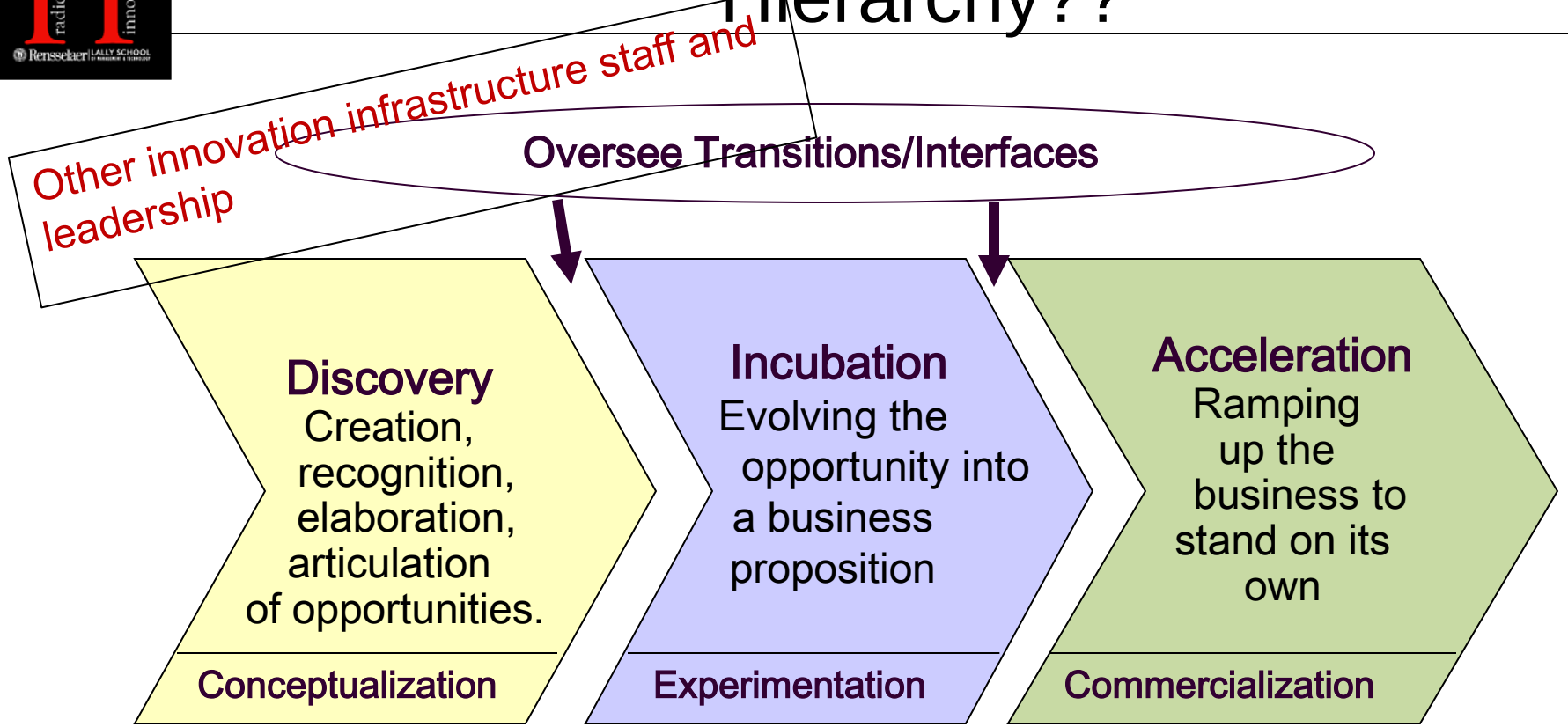
Participant Forum May 2014 RPI

Final Report Survey Results Spr 15

2010 2011 2012 2013 2014

9 site visits completed
181 interviews across 11 companies.
Survived 4 leader/sponsor changeovers, failed 2.

Hierarchy??

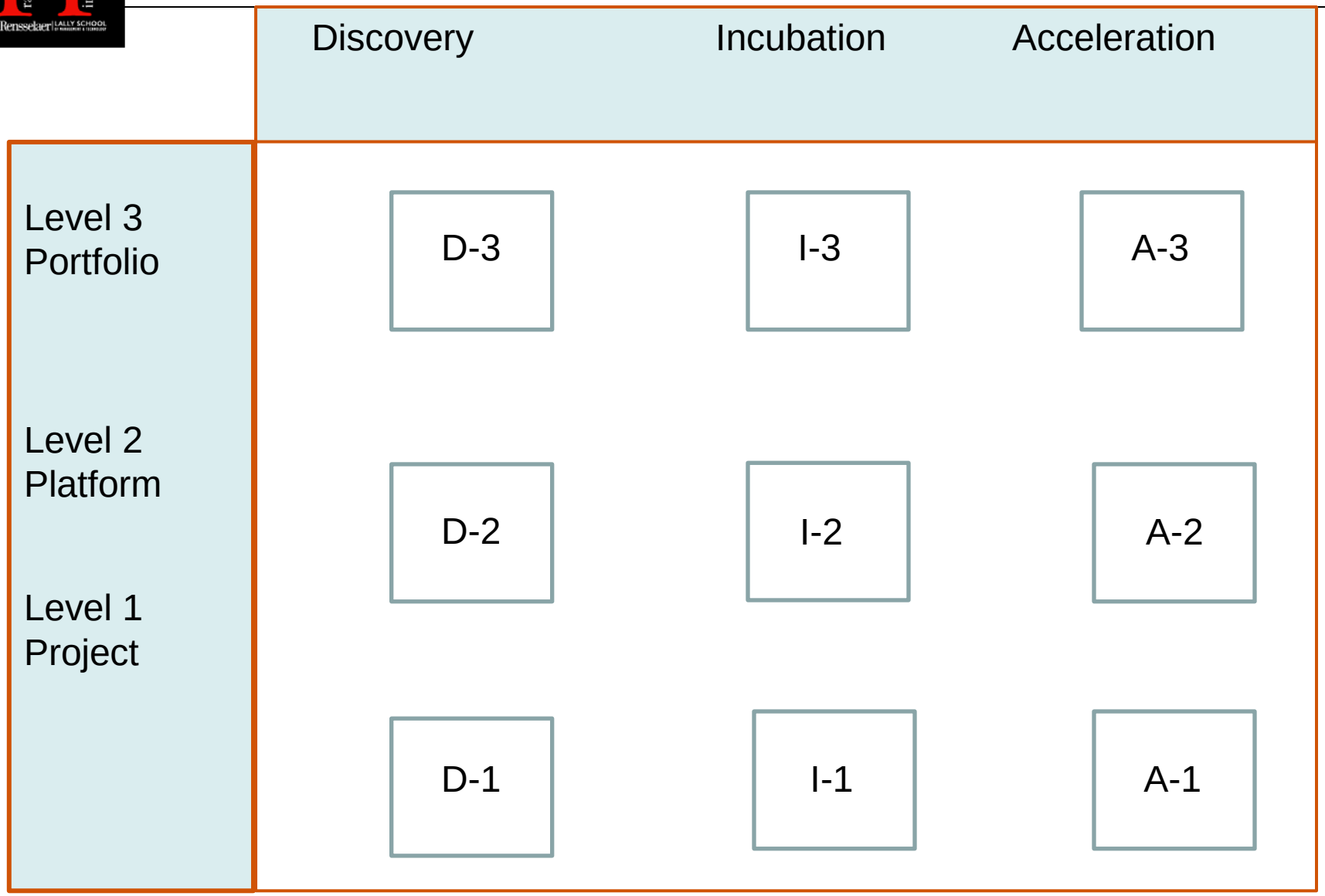


- *CTO Champions connection to strategic intent*
- *Portfolio Lead for cross portfolio synergies*
- *Project analysts scope opportunities; unbiased assessment.*

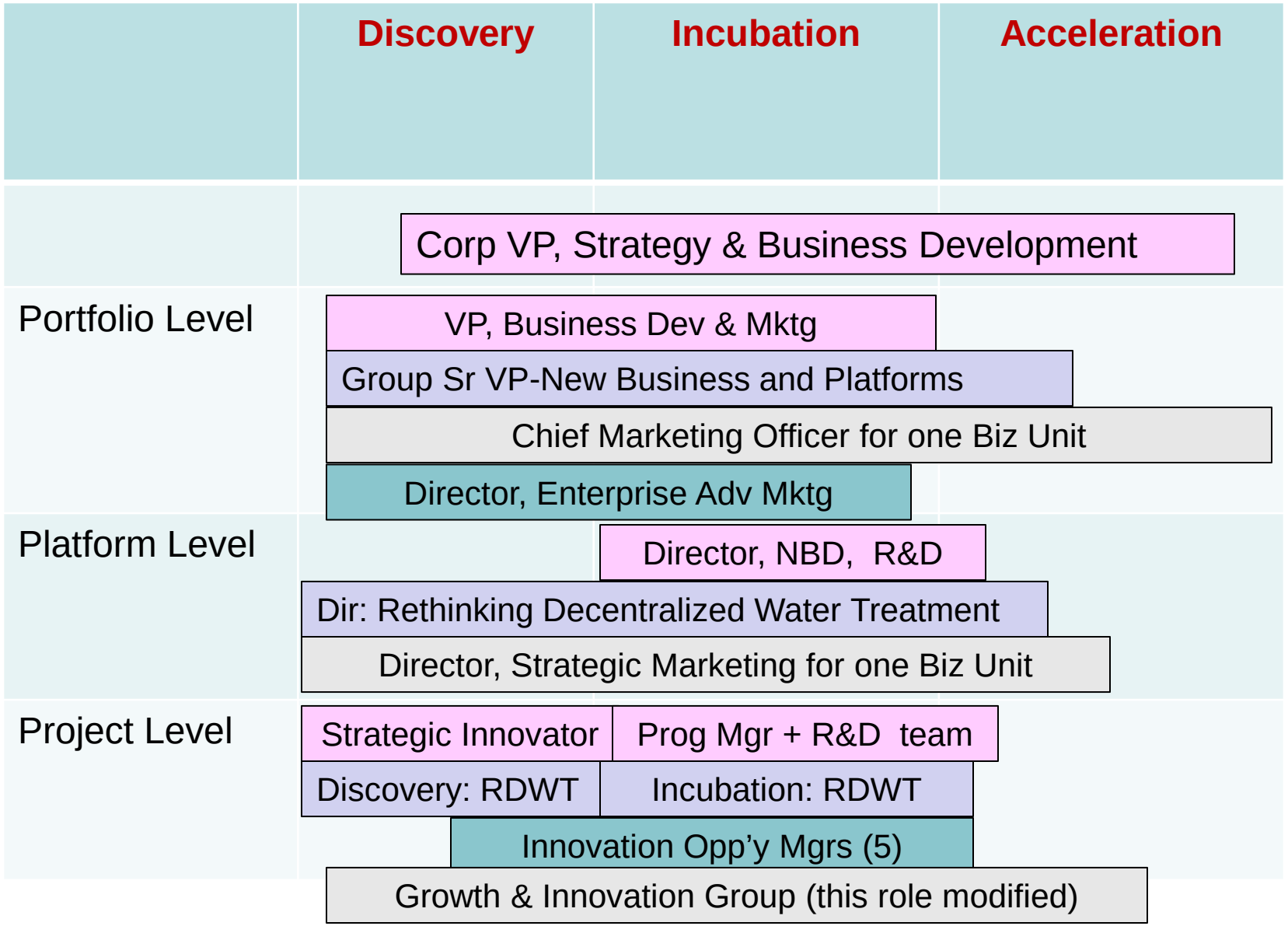
- *SVP Biz Dev, Strat. Innov manages interfaces, connects to strategic intent, oversees portfolio*
- *Program/platform Managers evolve business strategy*
- *Team members conduct learning experiments*

- *Growth Council /BU lead Funds, monitors business health*
- *General Mgr and leadership team for the new business*
- *Functional contributors within the new business*

An Innovation Function



“We’re putting them in monstrous roles”



Interviews per category (n=134)

	Discovery	Incubation	Acceleration	Innovation Infrastructure Leadership & Staff
Portfolio Level	7	10	0+6	• Strategy Developers (2) • Process Facilitators/ coaches (16) • Strategic Partnerships (2) • OD (2) • HR (9) • R&D (2) • Procurement (1) Total = 34
Platform Level	26	18	2	
Project Level	19	8	5	

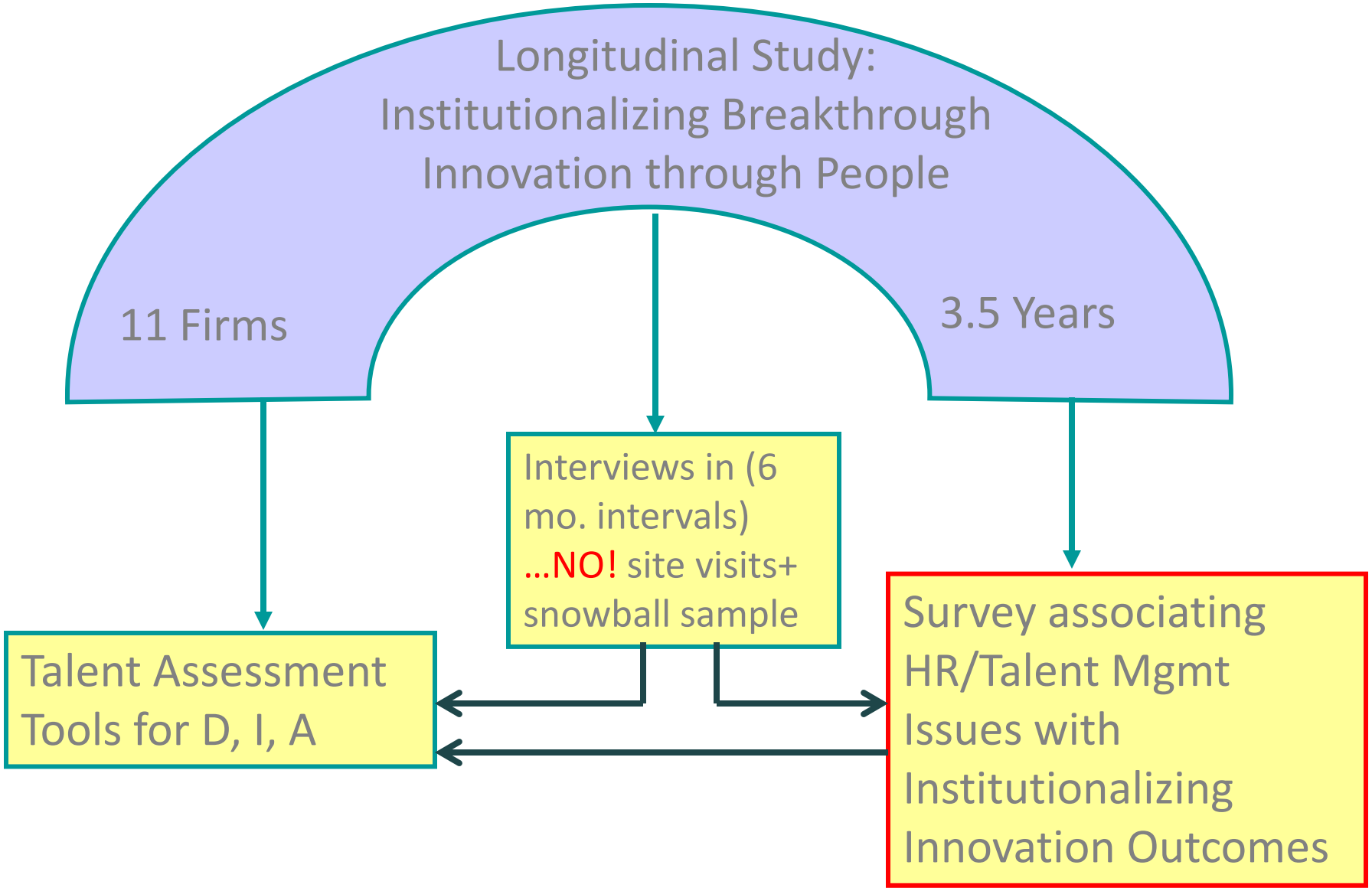
An Innovation Function

	Discovery	Incubation	Acceleration
Level 3 Portfolio	Director Discovery	CNO	Innovation Council
Level 2 Platform	Opp'y Domain Leader	New Biz Program Owner	General Mgr., New Biz
Level 1 Project	Opportunity Developer	Project Leader	Functional Mgr

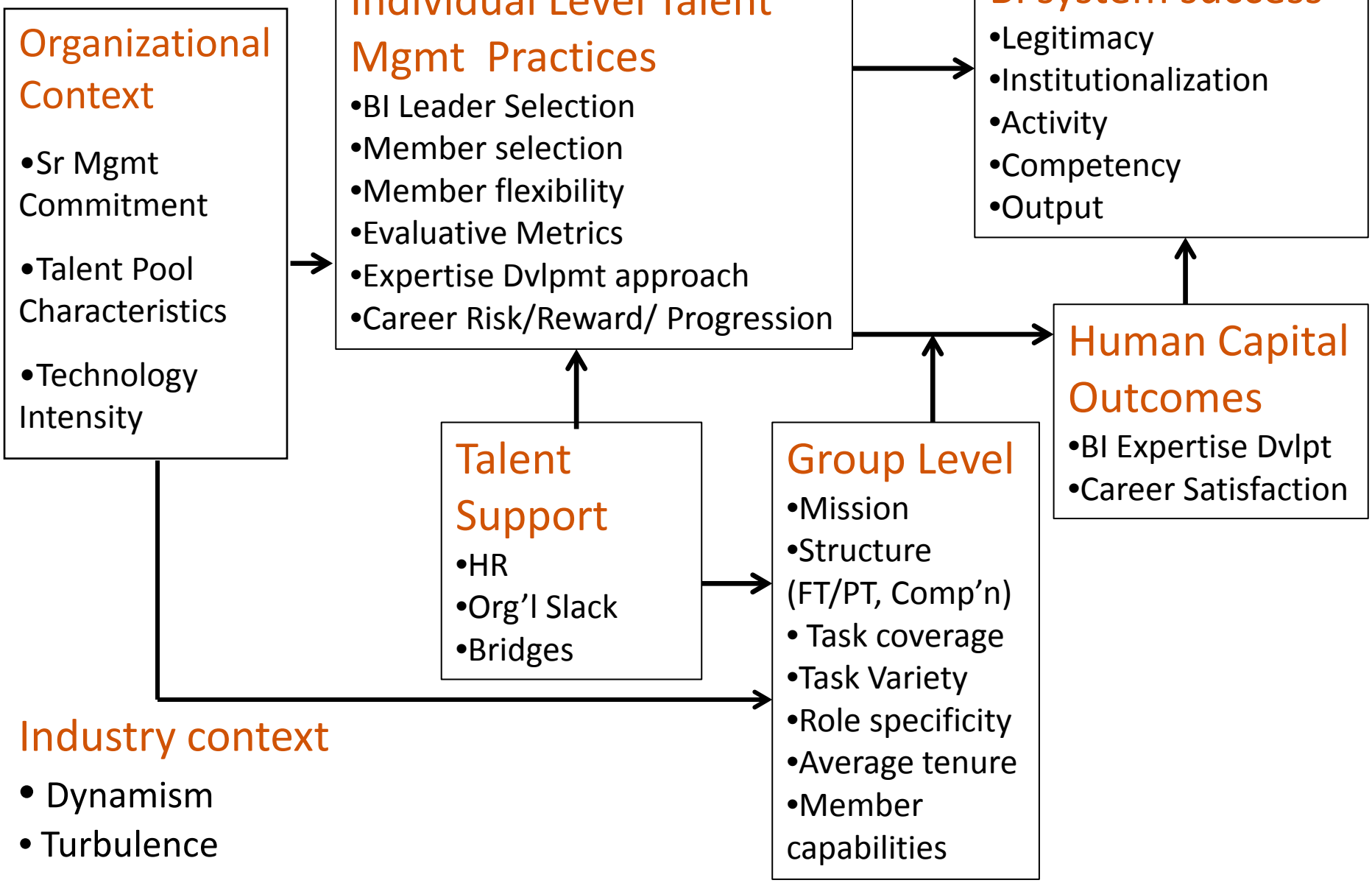
For each role we studied:

1. Responsibilities
2. Tasks/Activities
3. Performance Excellence metrics
4. Personal Characteristics
5. Skills/Expertise
6. Critical Experiences

BI Phase III Program Structure



Conceptual Model: Survey developed & Pretested

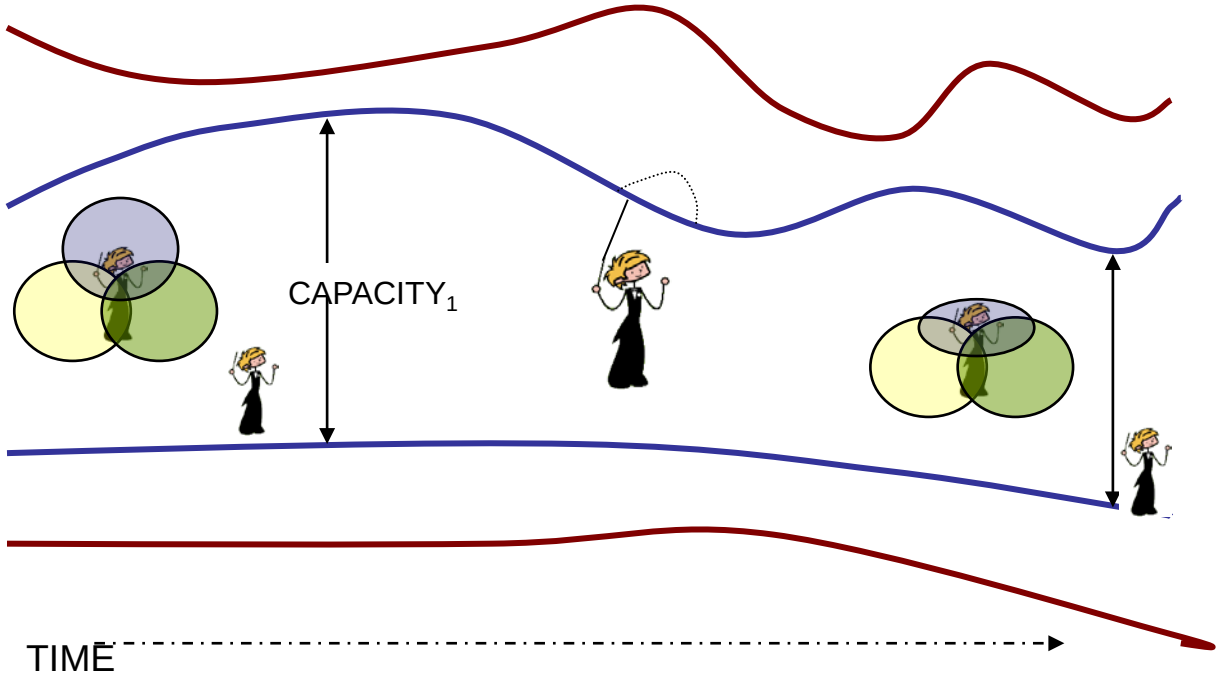


Reflections on Building a Research Platform

- Each research study drives the next.
- Stay close to industrial sponsors, but don't let them drive your agenda. Lead them by articulating latent issues.
- Have multiple objectives. This is too consuming and too difficult for simplistic goals. Setbacks in one set of goals are compensated with gains in another.
- Cannot expect immediate outcomes, but interim outcomes are crucial to ensuring progress.
  - Conference papers and presentations.
  - Team meetings.
  - Reports to industry sponsors.
- One person cannot drive a research program alone. Need at least 2 passionate, committed people.

Innovation: an Emerging Management Discipline

- Amazing progress among most of our companies in the 4 year observation period.
- New roles emerging. Career paths for NBC a concern.
- Not a program, but a constant (budget, people)
- Discipline and rigor, but not process.
- Metrics focused on portfolio rather than project level.
- But….very new yet. Most feel as if they're on the track, but wish they had better direction.



Research Output

Phase I published papers

- RI hubs (AME)
- Project mgmt processes (J Ops.Mgmt, SMR)
- RI Mgmt Strategy (JPIM*, RTM)
- Market Learning (4 JPIM)
- Transitioning project to BU's (IEEE*, RTM)
- People Issues (JET-M)
- Opp'y Rec. (CMR*, R&D Mgmt)
- Research Methods (Org Sci)
- CVC Models (JMTP)
- New Market Creation (JPIM)
- Nature of Uncertainty (JPIM)

Phase II published papers

- Management Systems for Innovation (Book Chapter, JPIM)
- Org. Structures and Innovation Competencies (JPIM*, RTM)
- Open, Radical Innovation (Bk Ch)
- Management Approaches (Book Ch, IJTech Mgmt)
- Corp Entrepr'l cognition (ETP)
- Embeddedness vs isolation (JPIM)
- Intra-Org'l networks (JBV)
- Risk Mgmt. (IJHTMgmt Research)
- RI Portfolios (RTM)
- RI Governance (JET-M)
- Routines for BI (R&R)
- Survey data…….

THANK YOU–
QUESTIONS & DISCUSSION?