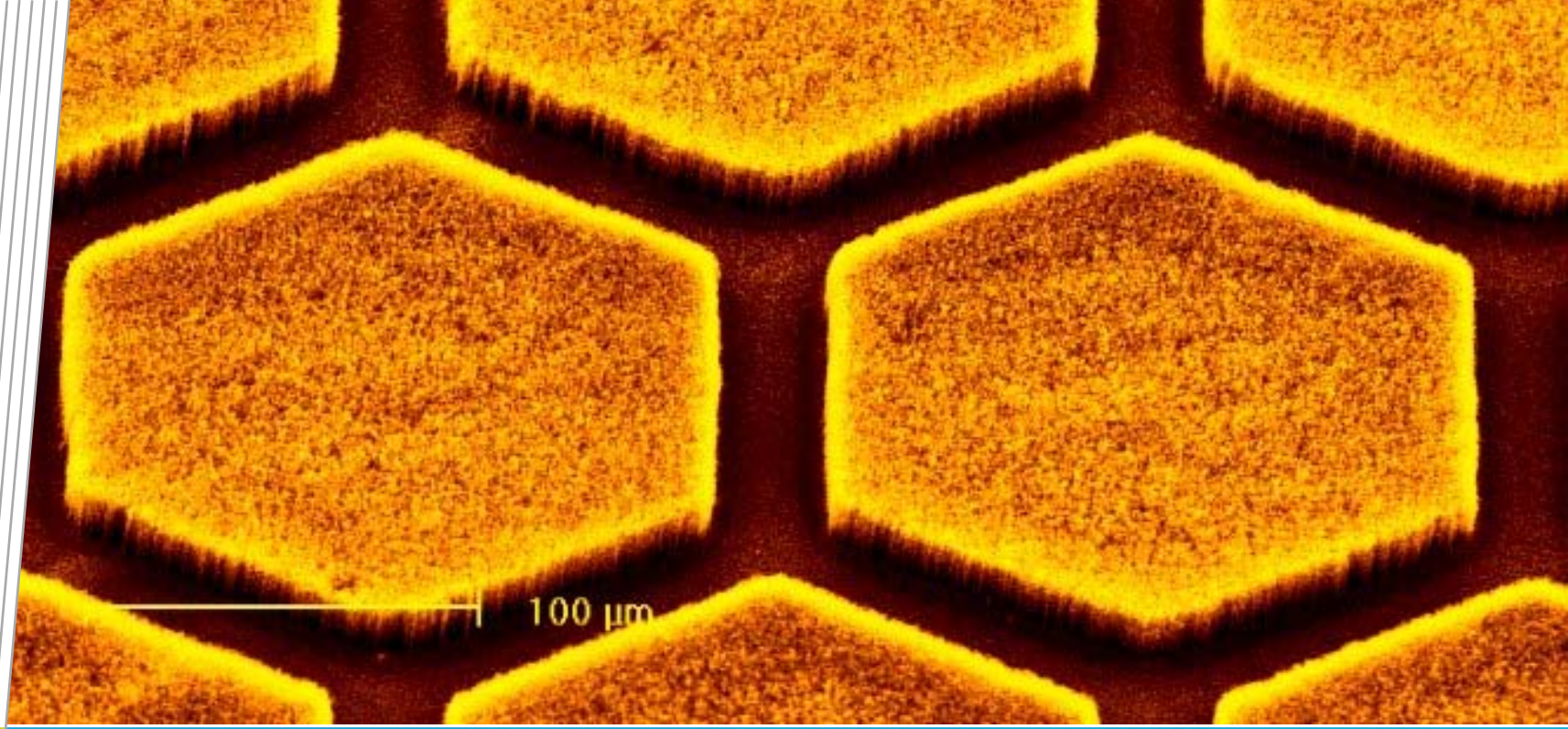

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‘Managing’ high uncertainty innovation

Ian Elsum

Workshop on Supporting Risk-Aware Research

11 July 2008

CSIRO

Today. . .

- Industrial Research Institute Research-on-Research studies

Some conclusions about high uncertainty innovation

- Organisational competencies for success
- Essential elements of a project management framework

Key conclusion

- One size does not fit all – distinctly different management frameworks are required for success in research, development and/or innovation with high compared with low uncertainty. Most organisations find this difficult to cope with.

Industrial Research Institute (IRI)

An association of companies doing industrial R&D

- 225 members; ca.US$90 billion collective annual expenditure on R&D
- Member companies represent almost every type of industry
- Annual sales range from <US$1 million to >US$150 billion, and annual R&D expenditures from ~US$1 million to >US$7 billion

The mission of IRI is to enhance the effectiveness of technological innovation in industry

- Identify and promote effective techniques for the organisation and management of research, development and engineering in support of technological innovation.

Research on Research Committee (RoR)

- identify, share, audit, embrace, and deploy current best practices in the management of innovation
- use creative methodology to determine future best practices in innovation

IRI RoR studies of high uncertainty innovation

Radical Innovation

IRI – many people from many member companies

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: Rensselaer

P.J. Guinan, Heidi Neck, Donna Kelley: Babson College

Richard DeMartino: RIT

Managing High Uncertainty Projects

IRI – many people from many member companies

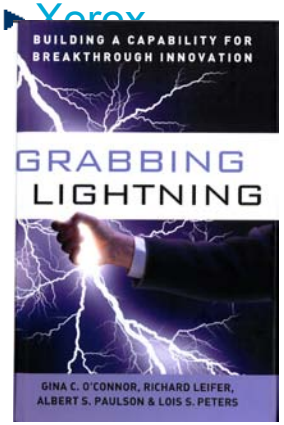
Co-Chairs past and present:

Kurt McWilliams, Sasol; Bonnie Bachman, Motorola; Ian Elsum, CSIRO

Radical innovation: a longitudinal study

Phase I → Phase II

Cohort I 1995 to 2000	Cohort II 2001-2005	Cohort III 2004 to 2005
GE	246 interviews	Bose
IBM		Dow Corning
Air Products		Guidant
DuPont	3M	H-P
Analog Devices	Albany Int'l	Intel
General Motors	Corning	P&G
Nortel Networks	J&J Consumer	PPG
Otis Elevator (UTC)	Kodak	Rohm&Haas
Polaroid	Mead-Westvaco	Xerox
Texas	Sealed Air	
	Shell Chemicals	



Radical Innovation

Innovation = invention + exploitation

Radical innovation

A radical innovation project as one with the potential to produce significant strategic impact through one or more of the following:

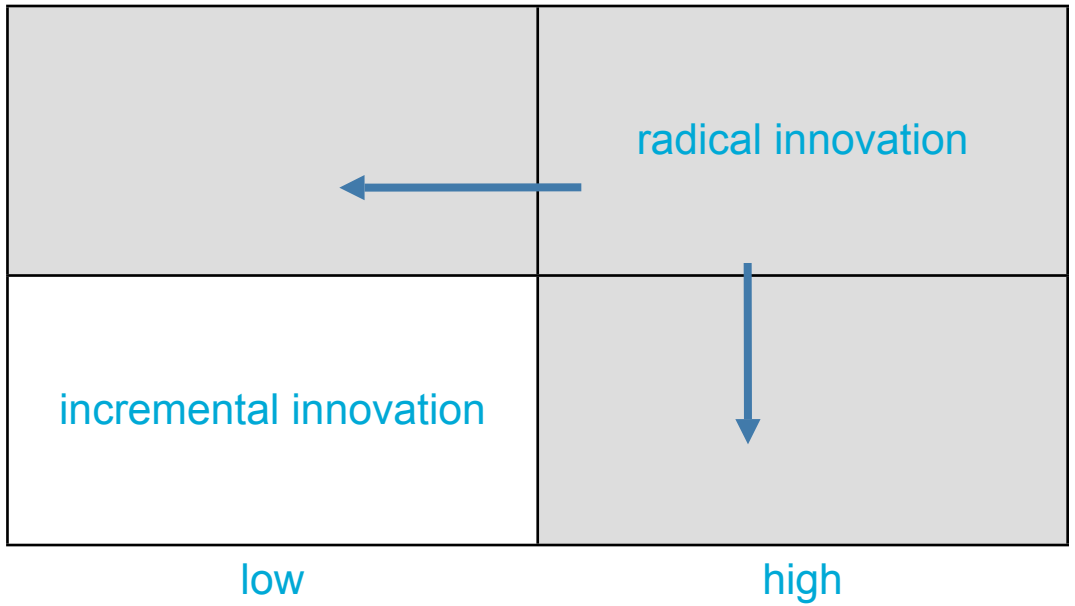
- new to the world performance features, or
- greater than 5 – 10X performance improvement, or
- greater than 30 – 50% reduction in cost

Other terms are “step-out innovation” or “break-out results”. The exact term is not critical. The key point is the focus on *significant* changes, not incremental innovation.

Phase I study: High uncertainty along 4 dimensions

- Technology
- Market/ path to market/ business model
- Organisation
- Resources

Uncertainty



Uncertainty is the key issue for managing radical innovation

Uncertainty is NOT the same as risk

Risk and Uncertainty

- Uncertainty is NOT the same as risk
- Risk is best understood as describing a known probability of an event.
- Uncertainty refers to the absence of sufficient information to predict probabilities of occurrence or results.
- The ability to describe risk implies some prior experience. It is not possible, for example, to talk meaningfully about a given project having a “20% probability of success” in the absence of prior experience. To the extent that a research team is attempting to overcome a challenge that is truly novel, it may more properly be said to be facing uncertainty rather than risk.

Success in dealing with the uncertainties of radical innovation

Phase II – organisational competencies for sustained success in radical innovation

An "incubation" competency is key to success

- This involves an organisational ability to **explore** multiple technology, market and business model paths for an innovation.

The key characteristics of an incubation competency are

- Learning-based project management
- Options mentality
- Resource fluidity
- Market probe and learn
- Entrepreneurial talent development

These are different from conventional R&D management practices

Gina O'Connor and T Ravichandran *Management Practices for Breakthrough Innovation: An Empirical Test* unpublished manuscript 2008

Why RoR on “Managing High Uncertainty Projects”?

- Considerable anecdotal evidence that conventional Stage-Gate® process was inhibiting innovation

combined with

- The conviction that it is possible to have a phased or periodic review process that does not inhibit innovation

Big ideas incrementally executed

- Almost all, and certainly all widely used, frameworks for managing R&D or innovation are risk management frameworks
  - There's an implicit underpinning assumption that the activities are relatively predictable (the rational plan approach to NPD)
  - The spoken or unspoken ideal is 'stick to plan' and management processes reinforce this
  - Unfortunately, this assumption is true for only a subset of innovation or R&D – low uncertainty, incremental innovation.
- Applying risk management frameworks to high uncertainty projects results in 'big ideas incrementally executed'
  - This has been a common observation, including within the IRI/ RPI radical innovation longitudinal study

Adverse effect of Stage-Gate® controls

Stage-Gate® controls restrict learning in new product development projects which adversely affects the market performance of novel new products

- Repeated application of strictly enforced and objective evaluation criteria makes projects more inflexible. Inflexibility leads to learning failure which adversely affects the market performance of novel new products.
- This is worse in turbulent technical environments.
- Gate conditionality does not mitigate the adverse effect.

R Sethi and Z Iqbal

Stage-Gate Controls, Learning Failure, and Adverse Effect on Novel New Products

Journal of Marketing 72(1) 118-134 (2008)

‘Managing’ high uncertainty projects

Some essential elements

- Loose frameworks
  - need adaptability / flexibility because uncertainty is high
- Learning based frameworks
  - options mentality
- Decision-making framework congruent with the type of innovation being undertaken
  - intuition

From a major study of innovative companies . . .

The message from managers in innovative large companies

"There are too many unknowables, variables. . . . Ultimately, one must use intuition, a complex feeling, calibrated by experience. . . . It's a judgement about people, commitment and probabilities. . . . You dare not use milestones too rigidly."

Brian Quinn *Managing innovation* HBR 1985

The key to effective management of innovation

. . is to ensure that the management approach is congruent with the type of innovation being undertaken

"One size" does not fit all types of innovation

- Distinctly different management frameworks are required for success in research, development and/or innovation with high compared with low uncertainty. Most organisations find this difficult to cope with.

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Thank you

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