The Innovation Games Framework

A Primer on Roger Miller et Marcel Côté
Innovation Reinvented: Six Games that Drive Economic Growth
University of Toronto Press

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1. INTRODUCTION
How we got into this study

Roger Miller

- Puzzles and mismatches between theory and reality of innovation
  - Large Engineering Projects
  - Study of Flight Training
- The specific trigger
  - Meeting in Banff with the President of Industrial Research Institute
  - Invited by ROR (Research on Research) Committee of IRI to a workgroup on Managing Innovation

Marcel Coté

- Invited to collaborate
  - Partner in Secor
  - Practical approach through consulting and investing
  - Academic background
2. STUDY OF INNOVATION
Schumpeter and his disciples

- Schumpeter I; creative destruction and economic development
- Schumpeter II; large firms and the formalization of R&D and marketing (IRI)
- Radical change and industry life cycles: Utterback and Abernathy
- The triumph of entrepreneurs; Birch. Silicon Valley, Route 128
- Disruptive and Sustaining innovations: Christensen combines Schumpeter I and II
The commonly accepted model of innovation in 2nd half of XXth century

- Market spaces exist exogenously: can be discovered
  - Buyers have needs
  - Scientific and market research

- Innovation is managed strategically as Closed & Proprietary

- Products are to be functional at launch
  - Standalone and self-contained
  - Customers; learning and trial are easy
Commonly accepted model

- The best products win
  - Meritocratic
  - Minimal social influences only merits
- Value of Innovation is appropriated through IP and patents
- Turning Point when loss of Patent Protection
- Innovation depends mostly on new technologies
### Diversity in Innovation; our preference

<table>
<thead>
<tr>
<th>Keith Pavitt</th>
<th>Michael Best</th>
<th>Others</th>
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<tbody>
<tr>
<td>- Science intensive</td>
<td>- Mass production</td>
<td>- Giovani Dosi</td>
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<tr>
<td>- Supplier dominated</td>
<td>- Entrepreneurial</td>
<td>- Storper and Salais</td>
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<tr>
<td>- Scale intensive</td>
<td>- Scale intensive</td>
<td>- Nelson and Winter</td>
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<tr>
<td>- Specialist</td>
<td>- Systems integration</td>
<td>- Etc.</td>
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<tr>
<td>- Information intensive</td>
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Shift to innovators’ perspective
3. THE INNOVATORS’ PERSPECTIVE
The diversity of innovation as practised by managers

Innovation is part of the process of management

- What do innovators do
- What business context do they face
- How do they create value for clients
- What moves are crafted to respond to competitive situation
- What strategies underlie the ways to collaborate
4. MINE: SURVEY, CASES AND INTERVIEWS
Gathering the information to capture the innovators’ perspective

World survey focussing on corporate moves and actions
- The business context
- Practices by which value is created for customers
- Competition and collaboration practices
- Levels and direction of R&D-Innovation efforts
- Organizational practices to manage innovation
- Ecosystems
- Performance

852 valid responses from firms or business groups across 20 sectors
- Broad global target of 4,000
- North America 50%
- Europe 17%
- Asia 24%
- Others, rest

Case studies to complement with qualitative information
- 50 cases and over 200 interviews all over world
- Structured interviews with issues for discussion
50 cases and over 200 interviews (examples)

Accelerys Systems, USA
Cambridge Technology Partners, USA
Cap Gemini, France USA
Metsalito Paper, Finland
Nokia, Finland
Cisco, USA
Mercury computers, USA
Cadence Systems, USA
Dassault Systemes, France
Autodesk, USA

Teck Cominco, Canada
Novartis, Switzerland
Samsung, South Korea
LG, South Korea
Lurgi, Germany
SAP, Germany
LMS, Belgium
RIM, Canada
Pratt & Whitney, Canada
Norsk Hydro, Norway

etc
5. RESULTS OF THE MINE SURVEY
Cluster Analysis

Cluster analyses were performed using
context variables
strategic variables
product architecture variables

Stability was achieved with 7 clusters

High levels of clusters: making sense was difficult

One game was innovation support: consultants, research advice etc

Six games were competitive and became our focus
The statistical analysis: Two basic roots help understand games

Principal components, cluster and canonical analysis:

I- Market maturity
- Emerging: reaching new customers
- Mature: competing for known customers

II- Product architecture
- Stand-alone: little interaction
- Open systems: platform-based
- Closed systems: essential components

The two roots provided insights
- A basic taxonomy (2 x 3 = 6 games)
- Diversity of games
- The case studies were then used to documented each game

Six relevant clusters (1 – 6)

The 7th cluster: supporting organizations
Vertical dimension
Identification of key roots

Dynamism in Markets and Technologies

- Market take-offs and emergence
  - Annual sales growth 23.5%
  - Disruptive change (19.5% of innovation efforts)
  - New platforms 29% of innovative efforts
  - Average investments in R&D over sales 19.5%
  - Contribution of innovation to profitability 43%

- Market Evolution; growth, maturity
  - Annual sales growth 11.1%
  - Disruptive change (9.5% of innovation efforts)
  - New platforms 19% of innovative efforts
  - Average investments in R&D over sales 3-4%
  - Contribution of innovation to profitability 27%
Horizontal Dimensions
Architecture of products and services

- Autonomous and Self-contained Products
  - Low interconnectedness: Sony Walkman, pills, batteries, medical devices
  - Artefacts, standalone, commodities
  - Dynamics: better mouse trap selected on merit

- Open modular products and services on platforms
  - Blackberry: smart phone platform sponsored by RIM but offering multiple proprietary and open applications over the Internet (Blackberry)
  - iPods, iTunes, video
  - Dynamics: network effects, tipping, strategic moves

- Tightly-integrated Systems
  - Multi-technologies, non-standard, complex, proprietary
  - ATM systems for a bank, Formula 1, Enterprise Applications Software's
  - Tools for chips (EDA) Rational drug design, etc.
  - Dynamics: merits, tight-integration, closure
6. THE GAMES’ FRAMEWORK
VIVID DESCRIPTIONS AND TRANSITIONS
## The six games of innovation

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<tr>
<th>Emerging markets</th>
<th>Stand alone products</th>
<th>Platform-based systems</th>
<th>Closed systems</th>
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<td>Eureka!</td>
<td>Battles of Architecture</td>
<td>System Breakthrough</td>
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<td>Mature markets</td>
<td>New and Improved</td>
<td>Mass Customization</td>
<td>Pushing the Envelope</td>
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- **Stand alone products**
  - Eureka!

- **Platform-based systems**
  - Battles of Architecture

- **Closed systems**
  - System Breakthrough

**Mass Customization**

- **Pushing the Envelope**

**Eureka!**

**Battles of Architecture**

**System Breakthrough**

**New and Improved**

**Mass Customization**

**Pushing the Envelope**

**Mass Customization**

**Pushing the Envelope**

**Mass Customization**

**Pushing the Envelope**
What is an Innovation Game?

The ways similar industries compete and evolve…
…by capitalizing on innovation

The context defines a specific “game” and…

■ How value is created
■ Its winning strategies
■ The key rules
■ The best practices and core competencies
■ The ecosystem
When the game changes...

Inevitable in an evolving economy

Emerging markets slowly morphing into maturity
Mature market displaced by an emerging market
Close systems ➔ open systems
Stand-alone products ➔ mass customization modules

Managing a game transition: a tough act

■ Incumbents lacking foresight and competencies

A TYPICAL STRIKE-OUT
The Telcos’ inability to enter the Internet economy
Growth and innovation come mostly from mature markets

Emerging markets (< 10% of GDP) account for 1/3 of innovation

- A small sector, but growing at ~ 5X the rate of the economy
- ICT-Producing industries: 4.2%; life science: <1%; Internet industries: ~4%

Mature markets: 90% of GDP, 65% of innovation-induced growth

<table>
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<tr>
<th>Est’ed share of GDP</th>
<th>Estimated share of GDP Growth*</th>
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<tr>
<td>Emerging markets</td>
<td>10%</td>
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<tr>
<td>Mature markets</td>
<td>90%</td>
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* The estimate assumes that capital, labor and technological progress contribute equal share to GDP growth
Eureka! An emerging market for a stand alone product

Single pod coffee machine, Viagra, Cirque du Soleil, Post-it Notes,

A 15 to 25 year adventure

- Significant evolution of the product
- While the customer base builds up

An invention, rapidly emulated

Toward the end, a brutal consolidation

Product management, marketing, managing growth
Eureka!:
The business context

Early in the game: 1 to 3 years after take-off

- A new « hot product » rapidly enlarging its customer base
  - An enthusiastic proselytising user community supports its development
- A very large number of new entrants, mostly entrepreneurs
  - Entry demands familiarity with the developing market, but little capital
- The product evolves rapidly, with significant improvements

Later in the game, after five to eight years of growth

- The market still grow at >10% as the range of users keep on expanding
- Market leaders have emerged: their yearly releases redefine the product
  - Segmentation appears: all leading brands markets several models
- Distribution is getting tough, as “shelves space” becomes crowded
- Small players drop out, either by closing or by selling out
Eureka Strategies and levers

Early in the game, selling to pioneering customers
- Marketing: establish your brand among the pioneers and the influencers (five)
- Product competitiveness: maintain parity in a fast progressing scenario
- Occupy distribution channels
- Structure your growth: capital, management, discipline

Late stage: getting in the emerging market leaders’ pack
- Invest in the brand and manage segmentation carefully
- Secure strong positions in the distribution channels
- Products: improve reliability, after sale services, segmentations
- Managing growth: proper pricing, controls, system, management
- M&A: stay focused, buying market shares, volume, good brands, capacity
A very special Eureka Game: pharmaceuticals'

A highly regulated environment: safety and efficacy
- Each molecule must go through a 5 to 7 year highly costly approval process
- Molecules are patented
- Only 1 in 5 candidates makes it, making it a highly risky businesses

Consequence #1: the emulation process is “very slow motion”
- Only two or three competitors will make it, each with one model
  - Limited number of analog molecules with the proper safety and efficacy
- The development process is public, and controlled by the regulator

Consequence #2: the high cost process demand a big markets
- Total development per approved drug: between $1 and $2 Billion
- The 20-years patent life leave only ~ 10 years of usable commercial life
- Significant sales and high margins are required to justify the investment

Now occurring: a division of labour between pharma’s and biotechs
When a market matures

New and Improved

*Tide, most consumer products, basic materials, equipment*

30% of GDP

Stability of the demand: experienced users

Innovation as the base for competing

- To differentiate the product
- Stealing customers from competitors
- To reduce cost

Mostly continuous improvements

- Products, processes and business models
- Sporadic (although rare) disruptions

A game that goes on for ever…
New and Improved: The Business Context

A segmented market, growing at 3% to 5% per year

- Almost all customers are experienced: the game is a market share one
  - Market typically segmented by price (Premium, main, low price)
- Well known competitors, facing each others all over the market place
  - A lower price segment with numerous second rate players
- Well structured: distribution, suppliers, business practices

A relatively stable product, with evolving and segmented offering

- Technological parity among the competitors
- New features usually introduced in the premium market segment
- Yearly introduction of new products (typically variants)

Continuous pressure on costs to meet profit growth objectives

- Capital investment, process improvements, outsourcing, procurements

Occasional, but rare, disruptive innovations (usually process)
New and Improved: Strategies and Levers

First, choose innovation as a strategic thrust (à la GE, P&G)

- Innovation to position the brand and differentiate products, support prices
- Innovation to lower costs, improve quality, grow profitability
- Part of the mission, values, positioning, celebration

Set up a culture of innovation throughout the organization

- Continuous improvement as a way of life: products, processes, objectives

Set up processes and systems to facilitate the management of innovation

- Annual objectives, experimental budgets, CIO support, techniques
- Widespread metrics tracking on-going innovations, results

Open innovation: reach out for ideas in the ecosystem

- Supply and distribution partners: collaborate on improvements
- Reward any innovative contribution: an attitude of respect and recognition
Emerging platform-based systems

Battle of architectures

Smartphones, Facebook, Google, Bixi

Platform-based systems
- Joint benefits: platform + modules (apps)
- Third-party suppliers for modules
- Two- and three-sided markets

Competition between emerging platforms
- Network effects: the more the better
- A race to expand market share
- The most popular win (not the best)

Critical ecosystems
- Third party module suppliers
- Distributors
A battle of architecture
The smart phone market game

1997: The « invention »: RIM combines e-mail et pager

■ 1997 -2002: Emulations, mostly by start-ups
■ 1999: the first Blackberry, with a scroll wheel (no pen)

2002: RIM adds a phone function, a breakthrough that allowed texting

2003 – 2007: Major mobile players enter the market
■ A major push in the consumer segment: Nokia, Samsung, Motorola, etc.

2007: The i-Phone broadens the market: a must-have tool

2009: Google launches the Androïd platform, which is now market leader

A continuous flow of improved products
Competing on design and marketing; relative technological parity
Patents have started to play a role only in 2011 (year 13th)
Battle of architecture: The Business context

A new type of platform emerging, with several competing ones

A core of proselytising early adopters who believe in its potential
- Their word-of-mouth is important to attract new users + new modules

Important network effects: more users ➔ a more attractive platform

Brutal and rapid concentration around a limited number of platforms (< 5)

Competition bears on platform features and on 3rd party modules
- New features is what gets users to switch and attracts new users
- Challenge #1: keeping suppliers/distributors happy as the platform evolves
- Challenge #2: dividing the pie and negotiating (limited) exclusivities
Battle of architecture: strategies and Levers

Vision of the future and the trajectories of the platform

Get in the leaders circles, to capture network effects

- Get quickly a simple competitive offering: time is the essence
- Marketing: invest out-front: low initial price + strong promotion to attract & attach users

Build a strong 3rd party community to develop modules (“apps”)

- Proactive Outreach programs: trade shows, one-to-one relations, partnering
- Open innovation philosophy trumps walled gardens
- Being the first platform is critical for short lived faddish applications

Critical factors: high initial investment, outreach, openness

- 3rd parties brings as much innovation as the platform owner
- The business model is developed and implemented progressively: advertising, membership, freemium, commission, etc.

Manage alliance of Partners: platforms, 3rd parties, content.
Open platform in mature market
Mass customization

*Wal Mart, retail chains, airlines, car manufacturers*

Mass market aggregator platforms
- Contributions by numerous suppliers
- Assembled and distributed under a brand

Customers personalize their purchases

Strong umbrella brands with clear segments

Sophisticated supply systems

High risks of complacency

*Global platforms and ecosystems*
Mass Customization: The Business Context

Large network delivering a complex offering to a mass market
- Each customers customize its purchase at the point of distribution
- The network’s umbrella brand attracts customers
- The offering is an aggregation of products coming from suppliers

In a market, several networks compete with similar offerings
- Wal-Mart,, Loblaw's, Toyota, GM, Honda, Ford, etc.
- Differentiated by their brand, positioning, pricing and exclusivities
- Competition force them to continually improve their offering

Orchestrators must continually improve their network and systems
- Improving customization, delivery, location, mix, etc., all within the brand
- Must deal with numerous network constraints and supplier commitments

Key factors: brand management, supplier relations, customer focus
- Steering the smooth evolution of a complex system: a culture challenge
Closed systems

System Breakthroughs

Microsoft, SAP & Oracle at their onset
Boeing’s Dreamliner, Dassault PLM

Starts with a determined customer

- Want to address a major bottleneck
- Deep pockets, eager to eliminate it
- Partners with technical experts

The breakthrough is rapidly copied

Complex sales, high risk projects

Project management is critical
System breakthroughs: strategies and levers

For the client: risk reduction strategies are paramount
- Defining the needs and the specs: balancing the known's and the unknowns
- The contract that tie the client and the experts: making room for uncertainties
- Project management: getting a “newly assembled team” to work well together
- Adapting the organization to the post-breakthrough realities
  - Major change management challenges: pre- (needs) & post-project (adaptation)
  - Getting a buy-in from those who will interact with the new system/product/solution
- Change management investment: as important as the breakthrough investment

Solution provider strategies
- Access to the intellectual property: part of the contract with the clients
- Accumulation of knowledge and expertise
- Competitive tenders (often used for large contracts): developing an edge
- Customer relation management: dealing with uncertainties, surprises, overruns
- Market development: navigating among clients who compete with each other
Closed systems, mature markets
Pushing the envelope

Tallest skyscraper, Millau’s Viaduc
Innovative computer systems

Ambitious customers
■ Who a seeking a competitive edge

Assembling a team of experts
■ Facing issues for the first time

Moving from one project to another
■ Accumulating expertise

Infrastructures, production equipment, IT systems
Pushing the envelope: strategies and levers

From the client perspective: achieving the ambition
- Ensuring a real link between the ambitious project and developing an edge
- Sometime, the dream takes a life of its own

Assembling the team of experts
- To work together, strong leadership is required → a project manager
- Getting the team of disparate experts to work together is often a challenge

Dealing with stakeholders affected by the project
- Inside an organization: workers whose jobs are being redefined
- “Neighbours”: accepting to live with a monster next door

Project management: dealing with uncertainty and tensions
- Two challenges: pushing the envelope and a freshly minted team
7. Strategies: common and diverse
Best practices
Winning the game: five common principles

**Deciding** to capitalize on innovation to compete

**Knowing** which game is being played
- Acquiring the required competencies

**Pushing on the right levers**
- What are the rules? Getting everybody to abide by them

**Open innovation:** Taping the best sources of ideas
- Customers, suppliers, workers: processes and attitudes

**Being the leader or a smart follower**
- Capitalizing on strategic advantages or Minimizing risks
Each game has its distinct winning business strategies

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<td>Marketing, Product management, Agility</td>
<td>Capturing network effects, Managing 3rd parties, Initial financing</td>
<td>Strong partnerships, Money, R&amp;D, Project management</td>
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<td>A culture of innovation, Processes Open to change</td>
<td>Brand positioning, Network &amp; System management</td>
<td>Ambition, Project management, The right experts</td>
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The innovators’ perspective
Four challenges to mainstream public policies

Innovation is very different from knowledge development
- It is a business opportunity,
- whereas knowledge production rests in the global commons

Discovery R&D is seldom the most critical factor behind innovations
- Critical: Product design and management, distribution and marketing
- Subsidizing R&D basically reduces the costs of a secondary factor
- One exception: projects that triggers system breakthroughs

Most innovations are product and process improvements
- The innovations are highly specific to a business setting
- Only sporadically are new products launched, triggering emerging markets

Stimulating innovation requires impacting business strategies
- Inducing business to rely more on innovation to compete: a complex task
Shooting from many angles
Assessing Canada’s innovation policies

Supporting industrial R&D: ~ $5 B (80% in tax credit)
- Tax credits inefficiency well documented by the Jenkins report
- ~ $1 B in project financing: IRAP, sector specific grants, soft loans
- Classic industrial support programs in a few sectors (low cost financing)

Supporting non commercial research: ~ $5 B
- Federal and Provincial efforts: intra-muros and universities, NRC,
- Oriented toward knowledge development rather than innovation

Supporting entrepreneurship: clusters, VC, incubators, etc.
- Knowledge transfers, university business collaboration, etc.
- No significant impact in emerging markets except in Waterloo

Other policies: IP, procurement, training, promoting S&T, etc.

Life Sciences combine them all : meagre industrial successes
Lessons from the “Game” Framework

What to do: some modest proposals

Mature sectors: where most of the 25% productivity gap lies
- Most of these sectors are low S&T intensity services
- No magic bullet: a cultural issue, about competing through improvements
- The basic thrust: encouraging innovation-based competitive strategies

Emerging markets: investing in ambition and in marketing
- “Clusters”: Creating rich ecosystems for start-ups and fast growth firms
- Building winners that stay in the game: a Canadian ownership policy
- Venture capital: limited impact (“growing corn in flower pots”)

Universities: priority to technically-oriented top-notch graduates
- For innovation, developing talent is more important than the research itself

Demand-Pull demonstration projects and industrial challenges
- Replacing tax credits by Darpa-like challenge grants
- « Let the market decides » : a relatively limited principle for innovation
Key levers and Scoreboard for public policies

- Recognize the diversity: beyond the R&D model
- Knowledge production and highly qualified manpower
- Fostering multiple S&T agglomerations
- Apply competition laws and pressures in mature markets
- Stimulate businesses to compete on innovation
- Innovation support for small and medium firms
- Encourage large firms to act as innovative buyers
- DARPA like public procurement
- Keeping tab with Scoreboards