

# Innovation in the Canadian Agri- Food Sector

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# Overview

- Definitions, Dimensions and Process
- Innovation and Policy
- Case Study
- The Future

# Innovation

“The introduction of something new”

“Something that deviates from established doctrine or practice... differs from existing forms”



# Dimensions of Innovation

- Two main categories
  - Technological
    - » Product/Service
    - » Process
  - Organizational
- Dimensions not independent – varying combinations of all aspects
- Measured along a gradient

# Dimensions – Technological Type & Degree of Change

## Types of Innovation

### Product

Product line extension

New Cancer Drugs

Genetically Engineered Crops

Branded organic products

### Product/Process

Enterprise Software Systems Genomic Research

GM crops on farms

### Process

Process modification

E-commerce applications

Reengineering

Incremental

Radical

# Dimensions - Organizational Degree of Internalization and Timing

Organizational Change and Innovation

Network

Supply Chain Management

Co-developed technology platform

E-commerce applications  
Biotechnology commercialization

Internal

Total Quality Management

Web based  
New process technology

*Timing relative to  
Product Process  
Innovation:*

*Precedes*

*Simultaneous*

*Follows*

**Managerial Innovation**

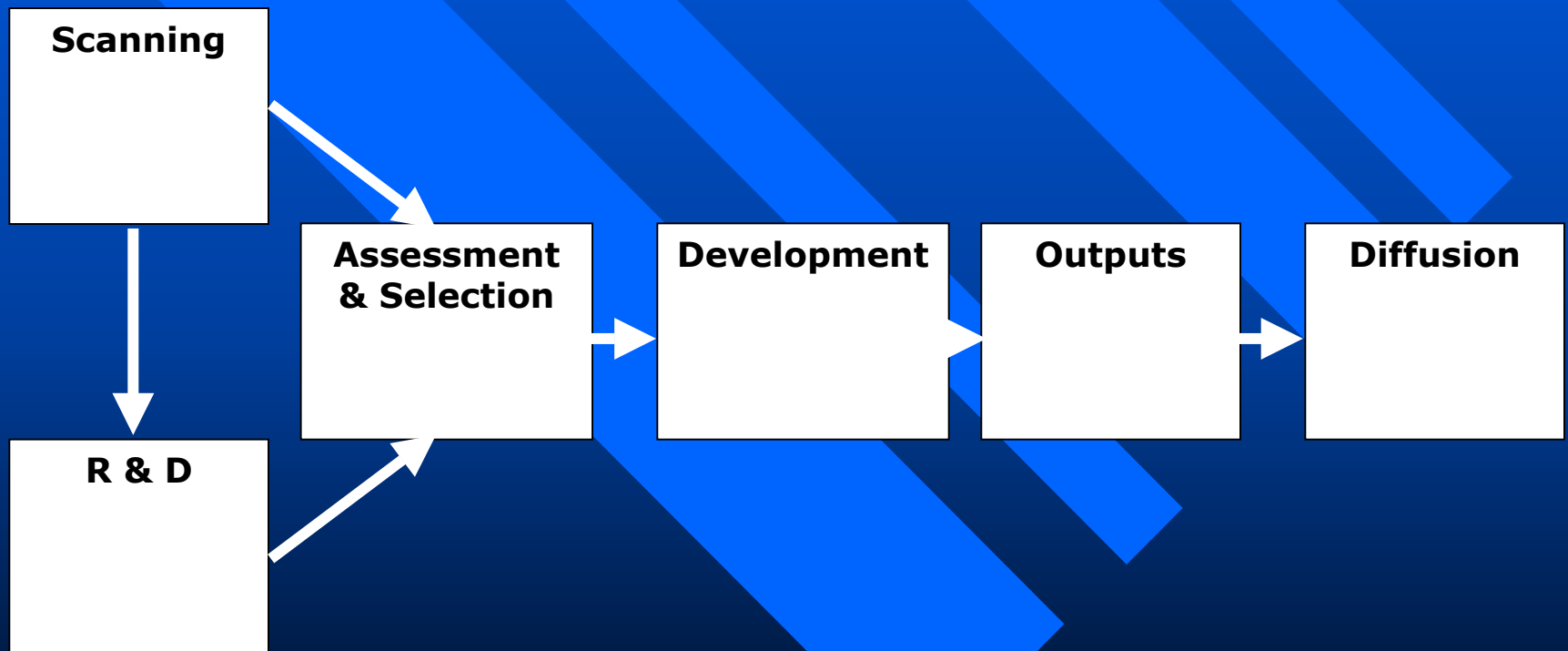
**Managerial Adaptation**

# Innovation Process

- Innovation models - evolved from linear, technology push models to more fluid, evolutionary models
  - Networks of innovation
  - Feedback loops between different activities
  - Market pull as well as technology push

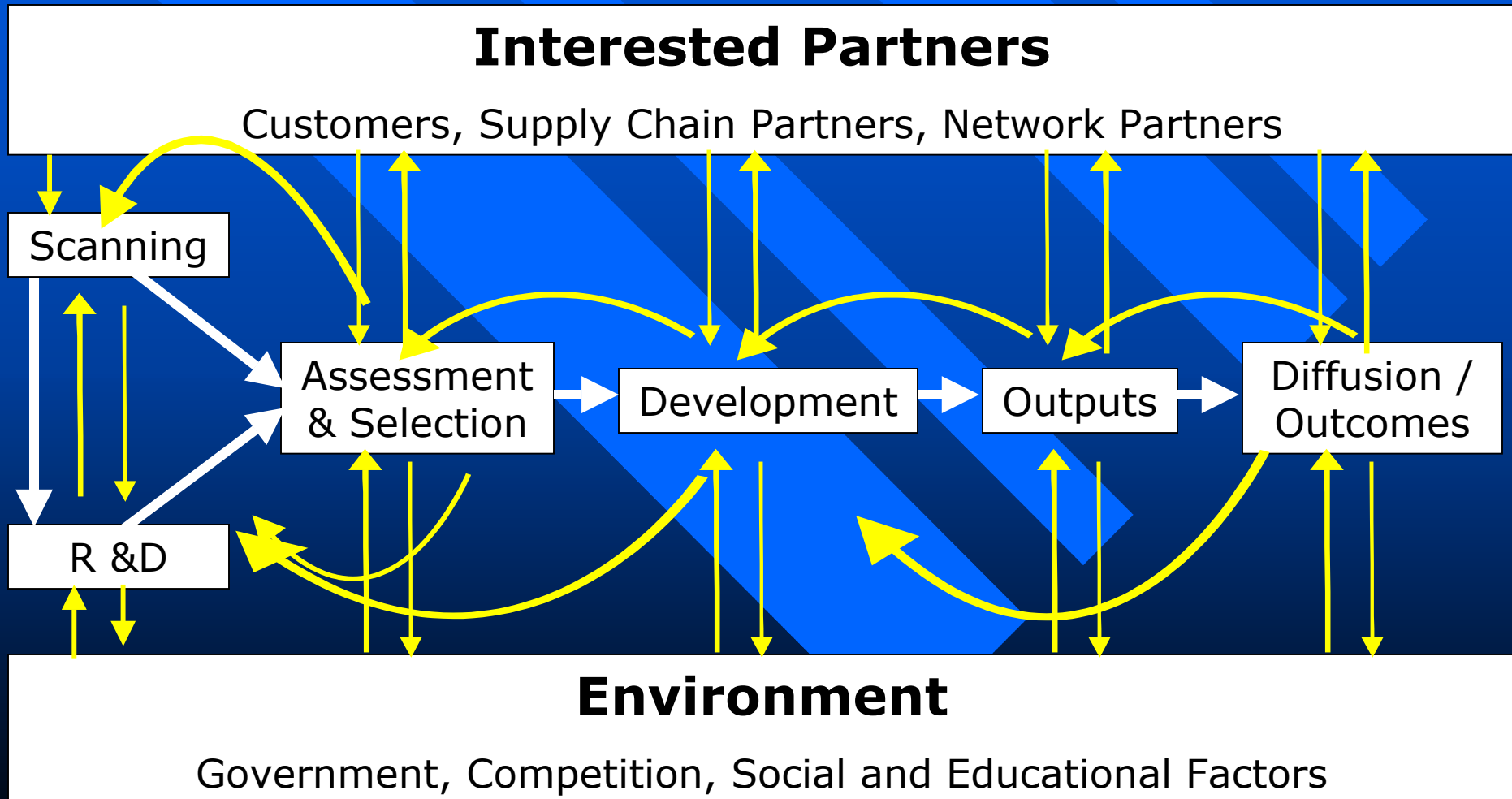
# The Innovation Process

## Linear Development Model





# Innovation Sphere of Influence



# National Systems of Innovation

- Lundvall, 1992
- Includes institutions, organizations and policies which impact a nation's innovative activities and their ability to capture the benefits of those activities
- Evidence that even in a global environment, national policies matter

# Innovation and Policy

- Objective - Improve well-being of citizens through economic and social policy
- Innovation is one contributor to economic performance
- Governments want to increase economic impact of innovation - not just innovation for innovation's sake.

# Progression of Policy Emphasis

Fiscal & Monetary  
Policy – 70-80's



**Focus = National Economies**  
Create the national conditions  
that enable industry and  
organizational success

Competitiveness  
Policy – 90's



**Focus = Industries**  
Create the industry conditions  
that enable organizational  
success

Innovation Policy  
– 00's



**Focus = Organizations/Networks**  
Support internal/network  
strategy processes to create  
foundations for success

# Canadian Incentives to Innovate

## OECD 1999 7 Innovation Indicators for G7

Measure	1999 Standing	Growth
External patent applications	5	1
Human Capital Devoted to R&D	5	1
Business Funded Expenditure on R&D	6	1
R&D Intensity	6	1
Technology Balance of Payments	5	6
National Patent Applications	5	4
Government R&D Expenditure	7	3

# Policies and Points of Impact

## Interested Partners

Customers, Supply Chain Partners, Network Partners

Scanning

Technical/market  
Evaluation

Cluster  
Formation,  
Funding

Technical Assistance,  
Taxation on Capital  
Spending

Assessment  
& Selection

Development

Outputs

Diffusion/  
Outcomes

R & D

Funding, Taxation,  
Direct R&D

Education and  
Training  
Strategies

IP Strategies

Trade,  
competition  
policies

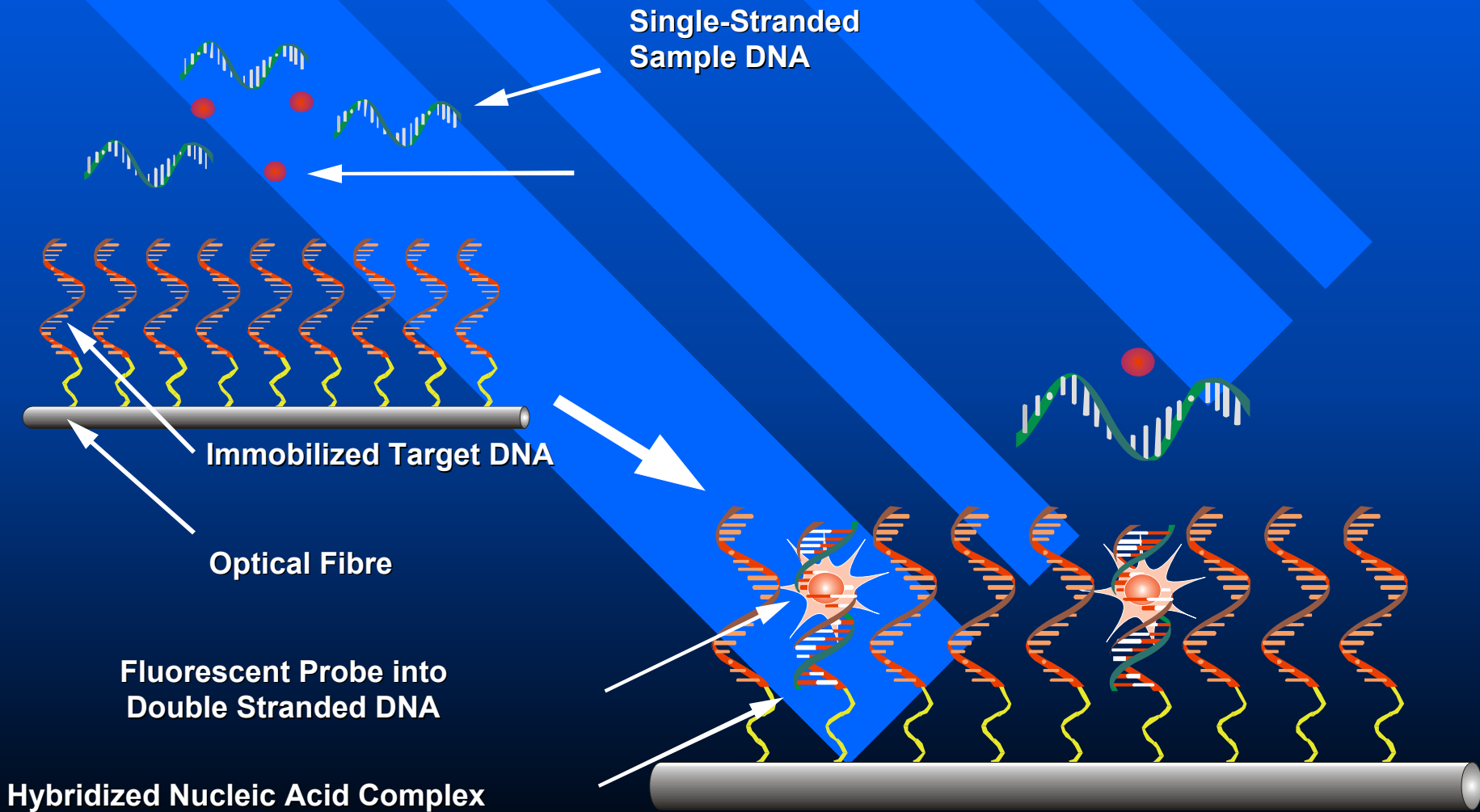
## Environment

Government, Competition, Social and Educational Factors

# Policy and Innovation Systems

- Policy decisions impact the general innovation system
  - IP, education, investment
- They can also target specific components or activities of the system
  - tend to be technology focused

# Case Study – FONA DNA Identification Technology and Policy Impact





# Policy Impacts on New Technology

- Idea Generation – R&D *mid- 1990's*
  - Created at U. of Toronto
  - Funded by National Science Research Council
- Transfer out of University
  - Encouraged by University policy
  - Licensed to small diagnostic firm
  - R&D funding by firm – refundable tax credit
- Patents initiated *1998*
- Search for partners through Agri-food Quality Cluster *1999*

# Industry R&D

- FONA - Hiring supported by Industrial Research Fellowship *2000*
- FONA scientists located at U of T
- Development research supported by grants and R&D taxation support
  
- Funding secured from firm partners
- Application partners sought – partner in food and environment – both provided funding
- Canadian VC funding environment and technology crash eliminated access to venture capital

# Sale to Technology Partner

- 2001 – FONA sold to instrumentation partner
  - Virtek Vision International Inc
  - Facilitated by taxation laws
- Virtek/FONA Development
  - Supported by R&D taxation laws
  - Continuing relationship with U. of T. research team
  - Reach forward to application partners – driven partially by funding opportunities
    - » Applications in environmental testing and genomics
    - » Separate funding initiatives, partners and applications - common core

<b>Technology component</b>	<b>Innovation</b>	<b>Responsibility</b>
<i>Fibers and Chemistry</i>	Radical, incremental dyes	FONA, U. of T.
<i>Laser Reader</i>	Incremental to ChipReader	Virtek, contract scientists
<i>Sample preparation</i>	Incremental to existing kits, Radical	FONA, Virtek, microfluidics partner & testing lab partners
<i>Application development</i>	Incremental in target selection	FONA/Virtek and testing partners
<i>Diffusion to testing labs</i>	Radical, organizational	Distribution partner, customers

# Dimensions – Product/Process and Incremental/Radical

Type of Innovation

Product

Product/Process

Process

ChipReader

DNA Fibres

Dye Chemistries

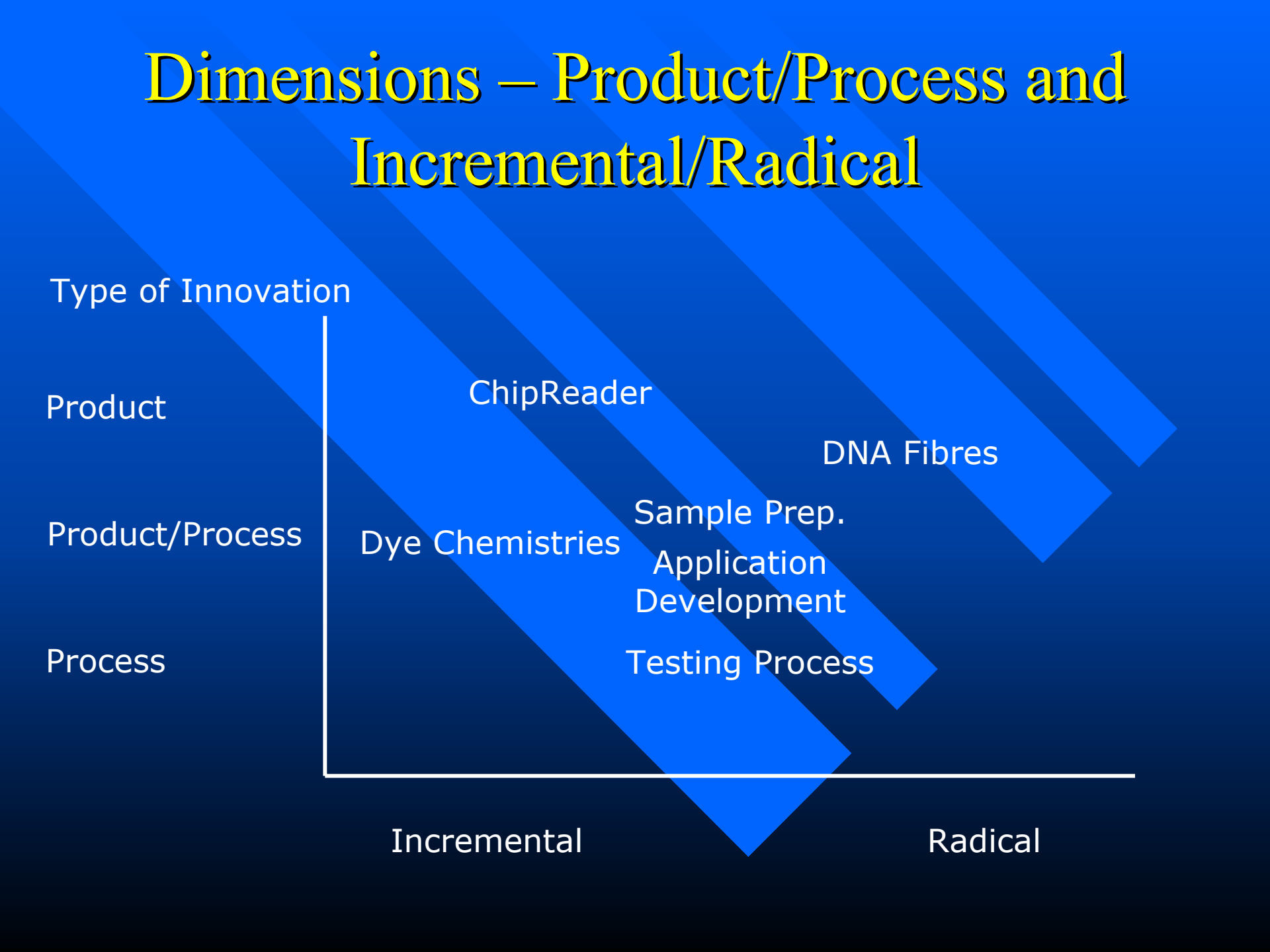
Sample Prep.

Application  
Development

Testing Process

Incremental

Radical



# Innovation and Organizations

## - Timing and Degree of Internalization

Organizational Change and Innovation

Network

Application  
development  
partnerships

Testing in water  
treatment plants

Internal

Biotech unit  
spin-out

*Timing Relative To  
Product Process  
Innovation:*

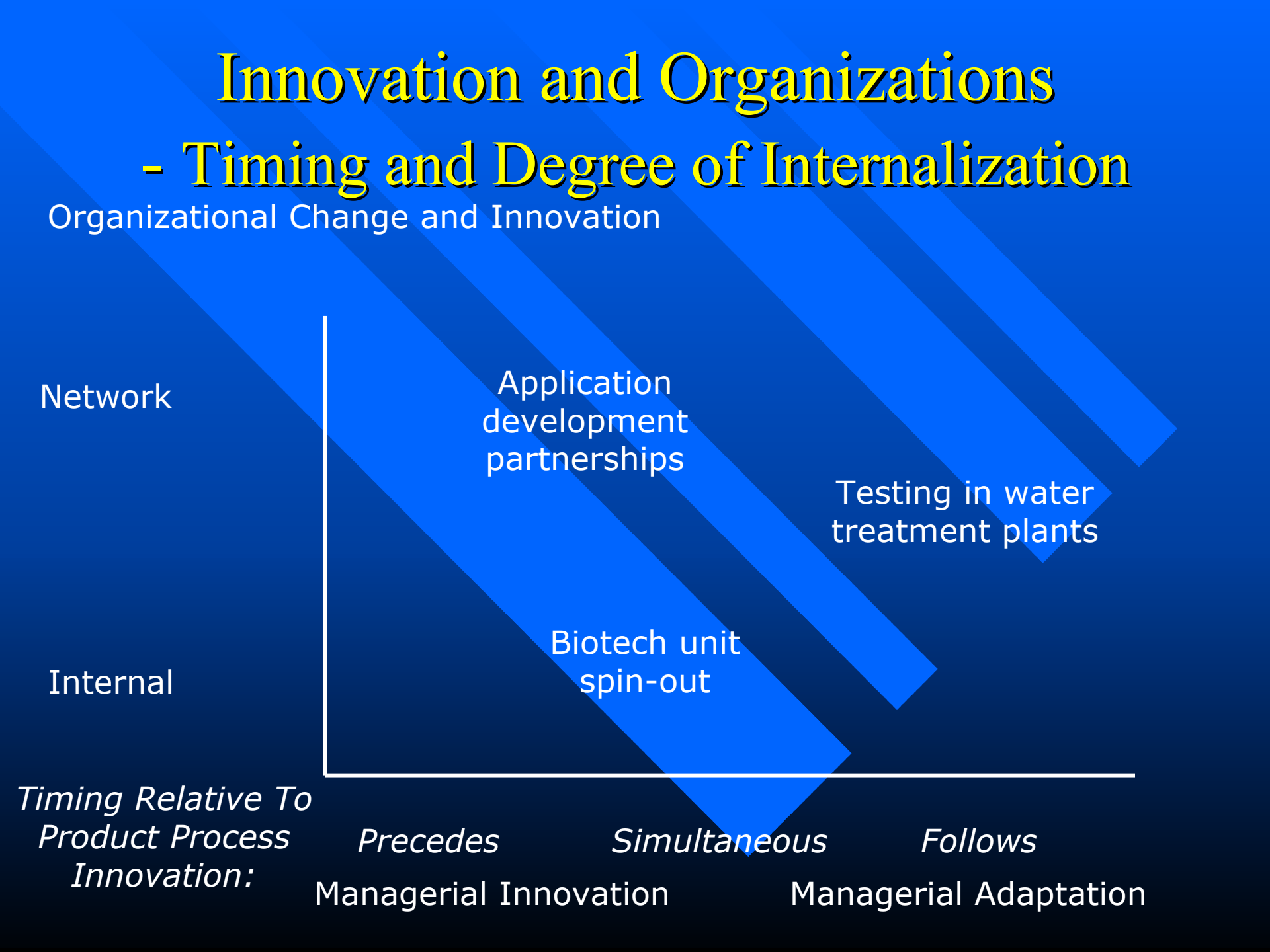
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Managerial Innovation

Managerial Adaptation



# Conclusions

- Innovation is complex activity requiring internal and external resources
- Issues around managing knowledge transfer between organizations
- Support policies differ for
  - innovation leadership vs diffusion
  - organizational vs technological
  - different industry segments and levels of the supply chain
  - different competitive priorities
- Innovation process can be learned – how do we transfer what we learn

# Future for Agri-Food Innovation Policy in Canada

- Canadian White Paper on Innovation
- National Forum on Innovation Management in Canada – Nov. 2002
- Agribusiness Input – Workshop in September
  - Identify priority areas
  - Identify special needs for agri-food
  - Set research agenda