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Decima Research

Significantly Different

Research Report

Canadian Biotechnology Secretariat

Public Engagement on the Future Government of Canada Role in Biotechnology

Industry Canada

June 2006

Aussi disponible en français

Contract #: U2155-061062/001/CY

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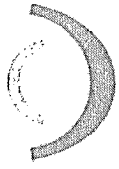

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Introduction

Decima Research Inc. is pleased to present the following report of findings from extended focus groups conducted in three cities across Canada (Montreal, Halifax, Vancouver) with *Involved Canadians* about issues surrounding biotechnology, on behalf of the Canadian Biotechnology Advisory Committee (CBAC).

The Canadian Biotechnology Strategy (CBS) was established in 1998, following extensive public consultations, to ensure Canadians have access to, and benefit from, safe and effective biotechnology products and services that are developed in an ethically and environmentally responsible way. The Canadian Biotechnology Secretariat (CBSec), which works in collaboration with federal departments and agencies and supports CBAC, has a strong role to play as a facilitator of informed discussion on biotechnology. In this capacity, the CBSec coordinates CBS funding and commissions research on public opinion attitudes towards biotechnology for the federal government community.

In the upcoming year, CBSec will lead the transition of the existing CBS to a renewed and updated strategy that will encompass the evolving scientific, policy, economic and social contexts in biotechnology in Canada, the United States and overseas. In preparation for this transition, CBAC is providing advice on a renewed national strategy on biotechnology that is informed by input from the expert stakeholder community and citizens.

CBSec and CBAC commissioned Decima Research to conduct qualitative research to aid in the process of renewing the government's strategy for biotechnology. To that end, focus groups were conducted with *Involved Canadians* in eastern, central and western regions of the country. The groups gathered in-depth information on the drivers of public support, acceptance and concern towards biotechnology that was then presented at three expert roundtables that CBAC organized between April and June 2006. The intent was to inform CBAC's expert consultations, which were run in parallel with the focus groups, about the future role of government in this field.

The three extended focus groups in Halifax (May 16, 2006), Montreal (May 17, 2006) and Vancouver (May 31, 2006) lasted three hours with 12-15 participants in each session. The groups included *Involved Canadians*, Decima's proprietary segmentation of those within the Canadian public that tend to be more engaged in their communities and in public affairs issues. Participants at the discussions were informed by a brief discussion paper, authored by Decima, that outlined key issues and considerations for discussion.

This discussion paper, titled "A Biotechnology Strategy for Canada: Issues and Considerations," was distributed to participants prior to the focus groups. The paper provided some definitions of key concepts that were discussed in the groups and summarized the current strategy and the strengths and weaknesses of biotechnology in Canada. The paper also outlined elements that might be considered in a renewal of a national biotechnology strategy. The discussion paper helped ensure that all respondents possessed a basic knowledge of biotechnology and its various applications and allowed for more time to be dedicated to the discussion of some of the issues and potential concerns surrounding biotechnology.

The focus groups were also informed by experts, who acted as sources of information for participants. The expert role was strictly an "information sharing" role, and experts were advised not to express their point of view on key issues.

For the purposes of this report, it is important to note that focus group research is a form of scientific, social, policy and public opinion research. As structured group interviews that proceed according to a careful research design and attention to the principles of group dynamics, focus groups should be distinguished from "discussion groups", "problem-solving groups", "buzz groups", or "brainstorming groups". They are not designed to help a group reach a consensus or to make decisions, but rather to elicit the full range of ideas, attitudes, experiences and opinions of a selected sample of participants on a defined topic. Because of the small numbers involved, however, the participants cannot be expected to be thoroughly representative in a statistical sense of the larger population from which they are drawn and findings cannot reliably be generalized beyond their number.

Decima Research designed and directed all elements of the research including design, recruitment, moderation and analysis. Any questions regarding this report can be directed to:

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Executive Summary

This report presents the findings of qualitative research conducted with *Involved Canadians* in Halifax, Montreal, and Vancouver. The research findings suggest the following:

1. **There is a lack of public understanding about the applications and the issues that biotechnology touches.** There was a clear and pervasive view that Canadians lack the appropriate level of knowledge and understanding of this field, given its broad scope and its implications for society. Some felt that this lack of public understanding could be a limiting factor to public willingness to allow these technologies to evolve. Others felt that it was a challenge in that they feared that some issues were being purposely kept from the public, and several cited the lack of labeling of GM food as an example of information being kept from Canadians.

2. **The groups expressed a clear consensus that the federal government needs to have a role, stronger than it has now, in biotechnology.** While some felt that certain roles should be given more emphasis than are currently given, there was a virtually universal consensus that government has a crucial role in this area, and this role contains a number of elements.

   Three areas were cited as priorities:

   - **Public education and outreach.** There was a clearly articulated emphasis from these sessions that government and other key stakeholders need to provide Canadians with more information about this technology and all of its areas of inquiry, as well as information about systems of regulatory and ethical governance, their main elements, and measures undertaken to consider long-term potential impacts of these technologies. Many say that their level of comfort with these technologies going forward is going to be predicated on knowing more about how they work, and what measures are in place to address safety and ethical issues. Most importantly, people are looking for information from government, not advocacy.

   - **Regulatory supervision/long-term research.** Participants expressed a strong interest in seeing more investment made into this sphere, in scientific capability, with a long-term testing/research focus, and with clear insulation from politics and industry interests.

   - **Larger strategic investments in research, focusing mostly on health applications of the technology**. Participants felt that there is a continuing need for government to play a role in funding research in this sphere, through its funding agencies and research institutions, to support basic and applied research that can lead to further commercial activity. Some participants expressed hope that this funding would be allocated based on pursuing specific areas of pre-existing strength, so as to avoid diluting the available funding.

3. **Canadians believe that more funding is required in order for Canada to execute a credible and effective strategy.** The investment level that government makes in this area ($750 million) was felt to be a *"drop in the bucket"* compared to the scope of the field and the scope of the need in terms of the government role.

Research Findings

First Impressions

To begin the discussions, participants were asked to step back from this process for a moment, to before they had read the discussion paper, and provide a sense of what they knew or perceived about the field of biotechnology.

In general, when thinking about this field, people make connections with specific applications, or categories of applications, rather than the word "biotechnology" itself. So while awareness of the field is actually quite high when people engage in a discussion, they do not always make a connection to the word "biotechnology" when initially asked about it. Indeed, more are likely to connect this field to the phrase "GM" than biotechnology.

In most cases, people know the field through one or two applications, so the depth of familiarity with the specific issues investigated in this research is fairly low. In addition, it is clear that first impressions are very strongly influenced by the applications they know most. In some of the locations, such as Vancouver, the dominant application people know is GM food, and this has a clear (negative) impact on initial sentiments about the technology.

For the vast majority of participants, food and health applications are the ones that people have heard of. Other applications are generally not widely known in the population at large. Worth noting, however, is that in Vancouver, there were several respondents who cited research and applications being developed in B.C., specifically health applications through the University of British Columbia.

Few participants had any sense of the size or scope of the biotechnology sector, or biotechnology research in Canada. Most suggest that the sector is likely larger in terms of contribution to GDP or jobs than it currently is.

Across these discussions, there was a clearly expressed sense of inevitability about biotechnology, a sense that it is going to grow massively and globally. In concert with this view, there was a sense that this field of technology will affect peoples' lives in many ways, some positive, some negative. In the Montreal session, there was a clear expression of concern from the outset that technology may be outpacing our ability to manage its potential negative affects on society and on people.

First Impressions after Reading Discussion Paper

The discussion then turned to inviting participants to talk briefly about the discussion paper they had read, with a specific focus on discussing anything that they came across in the paper that differed from what they had perceived before reading the paper.

From this discussion, three key issues emerged, that proved to become core threads throughout the rest of the discussions:

- **Participants tended to see the field as being much more vast than they may have initially perceived.** Most had not realized the scope of potential application of biotechnology. In general, this turned out to have a net positive impact on most participants, in that they saw that there were more areas of inquiry that might be of benefit to them or to society than the ones they had "top of mind" knowledge about. However, for some, this tended to have the opposite effect, in that it made them feel somewhat overwhelmed by the scope and scale of the technology, and the potential uses of the technology. For virtually all, this "revelation" tended to give them a sense that they should know more about the technology and its implications.

- **There was a sense that there might not be enough focus on addressing safeguards.** Again, flowing from a perception that the scope of the field is much broader than they know, in each of the groups some participants made mention of the level of government ability/investment in safety and regulatory systems for these technologies. There was a sense that not enough is being done to address safety issues, or fears that some stakeholders may have undue influence over the acceptability of these technologies from a regulatory perspective.

- **Biotechnology is seen as an important field of inquiry, one that they believe is going to change the world, and potentially their own lives.** And in this way, there was a clear desire expressed to see if there are ways to work toward obtaining the benefits that these technologies can bring, within lucid limits of acceptability. That perception had an apparent affect on the way in which they addressed the subsequent questions in the discussions.

Should Biotechnology Be a Priority for Canada?

There was a fairly broad consensus in the three sessions that this field is important enough to be made a priority for Canada . This was slightly less true in the Montreal session than in the other cities, but overall, a significant majority of participants felt that this area needed to be a priority overall and, more specifically, a priority for government. One of the issues that was mentioned in several of the groups was that the investment level government makes in this area ($750 million) was felt to be a *"drop in the bucket"* compared to the scope of the field and the scope of the need in terms of the government role.

That said, the way in which people interpreted the idea of making biotechnology a priority differed between individuals. Some talked about making it an economic and a safety/regulatory priority, others were mostly talking about making it primarily a safety/regulatory priority (which is why so many linked the idea of government and making it a priority so closely).

Several core reasons were expressed as to why biotechnology should be a priority for Canada, as follows:

- A perception that important and positive impacts on the health of Canadians would result from biotechnology research.

- A sense of greater comfort that appropriate measures would be taken to deal with regulatory and ethical considerations in Canada than would likely be the case in other countries. As mentioned above, there is a sense of inevitability about this field of technology — people generally believe that it is going to evolve somewhere and, knowing that, there is a strong and widely held view that Canada should be involved and be a leader.

- A sense that Canada may likely possess natural abilities in certain areas that should bode well for success, whether in terms of scientific capacity or in terms of natural resources, or both, for example, crop experts.

- A perception that biotechnology is a leading edge technology that will bring with it high-value employment and economic benefits.

However, virtually none of the participants were prepared to offer a "blank cheque" of support to make biotechnology a priority. Almost to a person, numerous caveats and provisos were tabled if this field were to be made a priority. Specifically, those caveats and provisos revolved around the following ideas:

- Safety/regulatory stringency; and
- A credible system of ethical governance.

Challenges for Canada in Biotechnology

Participants were invited to express their views on the major challenges that Canada faces in the sphere of biotechnology. They identified a number of key challenges, and, while the level of priority assigned to each challenge differed slightly across the different cities, the key challenges themselves were highly consistent.

The most significant challenges that participants felt that Canada faces are as follows (in order of importance):

1. **A lack of public understanding about the applications and the issues that biotechnology touches.** There was a clear and pervasive view that Canadians lacked the appropriate level of knowledge and understanding of this field, given its broad scope and its implications for society.

   Some felt that this lack of public understanding could be a limiting factor to public willingness to allow these technologies to evolve. Others felt that it was a challenge because they feared that some issues were being purposely kept from the public, and several cited the lack of labeling of GM food as an example of information being kept from Canadians. Indeed, some expressed a belief that private companies might be using undue influence with government to keep information from the public.

   In the sessions, there was a clear inference (if not direct statement) that without a clearer sense of what kind of research is occurring, how well it is being managed in terms of safety, and to what extent ethics are governed, it would be difficult for them to be more supportive of this field.

2. **Regulatory governance issues.** Specifically, challenges were seen to lie in the extent these technologies are tested for health and environmental safety, the rigour of that testing, and the extent to which long-term research is done in order to ensure safety. In discussions, participants noted that only a small proportion of the investment in biotechnology appears to be allocated to regulatory governance, and this amount of investment seemed to be lacking given the scope and speed of the field's evolution.

   A related challenge concerns the ability of government experts to "keep up" with developments in these fields, i.e. to keep up with the evolution of the technologies in order to properly assess them. This was seen as a current and ongoing challenge.

   In several of the discussions, participants raised concerns about the extent to which government scientists are isolated from influence from political and from industry interests.

   In addition, many participants linked regulatory governance with the first issue listed, i.e. public understanding, and expressed a view that it was a lack of information in this sphere that was most disconcerting to them, and that redressing this knowledge gap was a key challenge.

   Finally, one of the issues that was raised and discussed in some detail in two of the sessions concerned how GM products would be treated in terms of safety evaluations. With expert assistance, participants were given a brief overview of how the current system works, that is, the regulatory system treats the products' novel character not whether the product has GM ingredients or not. Many people did not feel comfortable with the current system, and some felt that it made more sense to assign a specific category of assessment to GM products. Concern over this issue was also raised as a challenge to Canada going forward with regard to regulatory/safety governance measures.

3. **Developing a stronger R&D Culture.** Many participants felt that Canada does not possess a strong R&D culture — some suggested companies do not do enough to invest, while others said scientists do not have as much drive to develop products as they do for research, and a handful of people mentioned a lack of investment capital for the kind of R&D necessary to establish a strong biotechnology sector. These factors were seen as a significant challenge Canada faces as it seeks to consider its direction in the sphere of biotechnology.

   On a related point, some felt that Canada may be too late in prioritizing about biotechnology and that other countries appeared to be passing Canada in key fields like health and agricultural research. Given concerns about the prevailing R&D culture, they felt that it just might be too wide a gap to close.

   Another point raised in terms of challenges was a sense that Canada may spend its money in too diffuse a fashion, without really focusing in areas where we have comparative advantage or opportunity.

4. **Human Resources.** Participants in some groups, particularly in Vancouver, felt that Canada might be challenged by its lack of skilled labour to fulfill the needs of a burgeoning

biotechnology sector. This concern raised questions about immigration, and the limits that the current immigration system places upon the ability of Canada to bring in skilled workers to fulfill needs in this sector.

5. **Ethical governance issues.** Three major challenges were raised with regard to ethical governance, as follows:

   - A lack of public knowledge about what kinds of research are, and are not, allowable on ethical grounds in Canada, as well as about what areas are, and are not, covered under the auspices of ethics boards. In the absence of knowledge about these kinds of bodies or measures, most participants tend to assume that there are no (or few) measures in place, which tends to drive people toward putting stricter limits on research and application development.

   - How to place future limits on what should be allowable, and what should not be allowable in the sphere of biotechnology moving into the future. People were fairly clear that they are uneasy about government "imposing" ethics on Canadians beyond those areas where there is broad public consensus, such as human cloning.

   - Sorting out who will play a role in society in making decisions about ethical questions.

6. **Working with other jurisdictions on key issues.** In the Halifax and Vancouver sessions, there was a strong emphasis on finding ways to establish international systems of collaboration and cooperation in terms of governance of biotechnology. People see these technologies as global in character, and they perceive Canada as being a relatively small fish in this sphere, which leads many to advocate the idea of working in concert with others in other jurisdictions on key issues. At the same time, people recognize the difficulty of establishing these kinds of collaborative regimes, so they see this as a challenge for Canada.

The Current Biotechnology Strategy

Next, the discussions moved to focus specifically on the current and future role of government in the field of biotechnology, with a direct focus on some of the elements of the current biotechnology strategy that participants read about in the discussion paper.

Major impressions of the current biotechnology strategy were as follows:

- Most felt that the government was doing more in the sphere of biotechnology than they expected, although not as much as they felt was probably necessary. On the positive, many were pleasantly surprised at the level of investment that government makes into basic scientific research in this field.

- However, as identified in the section above, the level and proportion of funding allocated to public education and outreach, as well as regulatory/safety systems, were not deemed to be at a level commensurate with the potential need. As a result, respondents generally did not feel the strategy had been fulfilled to a level they would like to see.

- As mentioned earlier, most felt that the level of investment being made at this time, $750 million in total, was a relatively small amount of money considering the size and scope of the field.

That said, people had difficulty making any significant judgements about how well or poorly the government had done with its Biotechnology Strategy, simply because they had not heard anything about it before reading the discussion paper, and felt that they would need more information from more sources before making any judgements.

However, people did feel able to express views about the Vision Statement and the Ten Themes of Action.

Vision statement:

> To enhance the quality of life of Canadians in terms of health, safety, the environment and social and economic development by positioning Canada as a responsible world leader in biotechnology.

In general, most felt that the vision statement was a "motherhood" kind of statement that sought to include such a broad range of elements that it rendered the statement as a whole unclear, and generally difficult to assess in terms of its utility.

A couple of respondents said that this is what they would expect government to put forth as a vision statement in this area. That is, something that would be "all things to all people" but not necessarily something that clearly shows a direction. It was apparent from the groups that a clearer sense of purpose and direction would be more appealing.

Ten Themes of Action:

> * Building public confidence and awareness, and communicating accurate, balanced, easy-to-understand information to Canadians;
> * Further expanding Canada's R&D and science base to support Canadian competitiveness in biotechnology as well as the regulatory system;
> * Regulating to protect health and the environment;
> * Promoting the use of biotechnology for public health and safety;
> * Modernizing Canada's intellectual property laws;
> * Facilitating measures to help accelerate the application and commercialization of new technologies;
> * Demonstrating responsible world leadership to improve market access and acceptance as well as stewardship in developed and developing countries;
> * Developing human resources;
> * Improving policy-relevant data collection and analysis; and
> * Building sector strategies and action plans.

Most participants felt that, as with the vision statement, the ten themes covered off the major issues and were generally oriented in an appropriate direction, but did not convey a strong sense of purpose, as the participants could not pinpoint how these themes of action translated into a strategy.

The only exception was the first theme of action, i.e. "*Building public confidence and awareness, and communicating accurate, balanced, easy-to-understand information to Canadians.*" People felt that this theme took an approach to public education that emphasizes advocacy of the technology, rather than the provision of relevant, balanced information about the technology and the issues that surround it. Participants generally did not like the tone of the approach in the themes for action, preferring a focus that highlights the provision of balanced information in public information, rather than advocacy.

There was some discussion in two of the groups, including both Halifax and Vancouver, that the vision, goals, and themes of action outlined as part of the strategy were not necessarily a strategy in the way they understood it, but rather a list of all the things that could or should be pursued in this sphere. In this way, there appeared to be a disconnect between what participants believe a strategy entails, which connotes more of a focused plan that has a certain (though usually small) list of objectives and key elements or tactics to pursue the objective(s) and what the strategy outlined in the discussion paper includes.

The Future Role of Government

The groups expressed a clear consensus that the federal government needs to have a role—a stronger role than it has now— in biotechnology. While some felt that certain roles should be given more emphasis than are currently given, there was a virtually universal consensus that government has a crucial role in this area, and this role contains a number of elements.

Of note, those who expressed the most skepticism about the technology tended to advocate a significant role for government as strongly as those more willing to embrace the technology.

This sentiment is driven by:

- A belief that the field is very large in scope and importance and, as such, Canada has a strong self interest in being a player at the table in this sphere because of the benefits it can bring. Related is a pervasive sense that the funds allocated now by government is small, particularly in relation to this scope.

- A belief that there are major issues, particularly in the safety and regulatory sphere, that government must tackle in a more aggressive manner if Canadians will be able to safely employ these technologies and reap the benefits from them.

- A sense that other countries are committing to this field in a more serious way than Canada does now, with strategies that have clear targets and the resources in place to meet those targets.

- A sense that Canada likely has the ability to do more than it does now, given its strong scientific base.

A Government Strategy and Strategic Priorities

There was a clear expression of sentiment in these sessions that a continuing strategy for biotechnology is needed. This sentiment was as strong or stronger among those who had the most trepidation about the field.

The reasons as follows were varied, but clear:

- Because the field is diverse, and continues to evolve, which requires constant monitoring and evolution in governance, which in turn requires considered and well executed actions.

- Because the roles of government are diffuse and cannot be easily managed without a strategy. People recognize that government has a role as a research funder, as a regulator, and as a catalyst in certain spheres of economic development (like helping human resource development), and managing those three roles requires strategic thought and strategic action.

- Because it is clear that careful thought must be put into what investments are made, as with finite resources making the right choices is important. Without a strategy, people believe there is little likelihood of this occurring.

- Because the risks are high, and safety and ethical issues are of significant concern, people do not want some aspects to "fall through the cracks." Currently, many people that this is occurring, and they would like those cracks to be filled.

- Because the strategy is considered to be the government's "business plan" for this sector. Indeed, participants in all groups raised the point that most businesses would not expand without a plan and, as such, the government needs to have a plan or strategy in place to be successful in this sector.

Nonetheless, there is a degree of skepticism that prevails about what can be accomplished by government in this sphere that owes in some part to a general sense of malaise about government, and in some part to a perception that the field is moving so quickly and so globally that it will be very difficult to keep up. However, given the sense of inevitability that people have about this technology, the prevailing view is that there is no choice but to develop and execute a strategy that has some well defined parameters and major areas of priority.

Strategic Priorities

In all of the groups, participants were asked at the conclusion of the session to set forth priorities for a renewed strategy for government. The results were remarkably consistent. Three areas were cited as being at the top of the list, as follows:

1. Public education and outreach

   - There was a clearly articulated focus on providing Canadians with more information about biotechnology and all of its areas of inquiry, as well as information about systems of regulatory and ethical governance, their main elements, and measures undertaken to consider long-term potential impacts of these technologies. Most importantly, people are looking for information from government, not advocacy.

2. Regulatory supervision/long term research

   - Participants expressed an interest in seeing more investment made into this sphere in scientific capability with a long term focus, and with clear insulation from politics and industry interests.

3. Larger strategic investments in research, focusing mostly on health applications of the technology.

   - Participants expressed a belief that there is a continuing need for government to play a role in funding research in this sphere (through its funding agencies and research institutions), to support basic research that can lead to further applied and commercial work. Some participants expressed hope that this funding would be allocated based on pursuing specific areas of pre-existing strength, so as to avoid diluting the available funding.

   - When participants were asked about how to balance basic and commercial funding initiatives, there was an emphasis on the basic and applied side of the equation rather than commercially oriented research. People generally felt that this is the kind of research that is most appropriate for government to focus on.

   - While few knew how this might be implemented, there was a clearly expressed interest in finding ways to advance the human resource development needs of the sector by ensuring that funding is available for students wishing to pursue advanced work in this area, or for universities wishing to open up spaces for high-level work in these areas.

Appendix A – Citizen Focus Group Background Paper

A Biotechnology Strategy for Canada: Issues and Considerations

Prepared by: Decima Research Inc.

May 2006

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This Project

As we all can observe in newspapers and on television, biotechnology is not only an economic sector undergoing rapid evolution, but also a sector in which Canadians are playing a significant role in its advancement. That is why the Canadian Biotechnology Advisory Committee[1] (CBAC) is seeking your views on public support, acceptance, and concern towards biotechnology and on the issues that you believe are important to consider so that Canada can take advantage of the promise of biotechnology while effectively managing its risks.

To achieve this dialogue, CBAC is convening a series of discussions that will take place between April and June 2006. During this period, three public opinion focus groups and three expert groups will meet in Montreal, Halifax, and Vancouver. The results of these engagements will inform CBAC's advice to the Government of Canada on the Canadian Biotechnology Strategy (CBS).

You are one of the participants in these focus groups.

[1] CBAC is an independent, expert committee charged with providing the federal government with impartial advice on important policy issues associated with the ethical, social, regulatory, economic, scientific, environmental and health aspects of biotechnology.

What is Biotechnology, and why are people talking about it?

Biotechnology is one of the central elements of the new knowledge economy. Like information technology and other emerging fields (e.g. nanotechnology), it represents one of the fields of scientific advance that many say has the potential to improve quality of life and create significant economic opportunity, in North America, and worldwide.

> Biotechnology is a body of technical knowledge about living organisms or their constituent parts.
>
> Applied biotechnology is the use of this knowledge to make products and drive processes that serve social, scientific or economic purposes.

In Canada, and the rest of the industrialized world, governments, industries, as well as the public at large are being challenged by the scope of change that new technologies such as biotechnology present, and the implications they will have on our long-term economic development and social well-being.

Research suggests that one of the key reasons why there has been debate about biotechnology is because of its basis in the very nature of life (genetic material), in particular our understanding of genetics and biological development. Biotechnology advances build on recent scientific achievements like the Human Genome Project as well as research in areas of embryo development and tissue regeneration, which have engaged both the expertise and interest of Canadians.

Today, biotechnology affects many scientific disciplines and technology sectors, but historically biotechnology can be traced along two pathways. One pathway, referred to as traditional biotechnology dates back thousands of years, to early agrarian societies in which people collected seeds of plants with the most desirable traits for planting in subsequent years. Today these practices have evolved into sophisticated methods of *selective breeding* and *biodiversity prospecting.* They use DNA and cell manipulation tools that have provided the foundation for modern, molecular biotechnology introduced in the late 1970s. This second pathway of biotech development enables the manipulation of genes from any living organism, in more precise and controlled ways than earlier traditional biotechnology. Such manipulations include refining the expression triggers of specific genes within an organism to produce a certain trait, and also transferring certain genetic traits from one species to another.

Currently, molecular biotechnology techniques are being used to upgrade traditional technologies that address areas such as food, agriculture, health care, forestry, as well as the environment. The latter includes renewable energy, and the recovery of minerals, oil and gas. Summarized below are some of the ways that modern biotechnology techniques have been applied in these areas.

Food and Agriculture

One of the most extensive applications of biotechnology has been in agriculture. Biotechnology techniques have been used to develop plants and animals with enhanced or novel traits. Novel plant traits include herbicide tolerance and pest, insect and virus resistance as introduced into crops like corn, soy, and canola. New applications in food and agriculture promise to provide foods with enhanced nutritional benefits. Some people are concerned about the potential impact of Genetically Modified (GM) crops on biodiversity, environment and health.

Health Care

To date, applications of biotechnology in health care have focused on fighting diseases using the human body's own 'weapons'. Biotechnology-based medicines and therapies involve or target trigger proteins, enzymes, antibodies and other substances that occur naturally in the human body, to fight infections and diseases. However, biotechnology also uses other living organisms (i.e. plants and animals) and their cells, and viruses as well as bacteria and yeasts to help produce human medicines.

There are several areas in the health care sector where biotechnology is currently being used. They include the following: treatments for diabetes and immunologic disorders; vaccines and antibiotics to prevent disease (e.g., hepatitis B, HIV); and diagnostic tests to identify disease (e.g. chlamydia, gonorrhea, and herpes). Health researchers are studying the use of gene therapy, a technique to correct defective genes responsible for disease development, as a potential cure for common illnesses such as cystic fibrosis and more complex diseases such as arthritis, psoriasis and coronary heart disease. While the promise of biotechnology benefits are apparent, concerns have been raised about ethical issues such as protecting the privacy of genetic information, and the long-term health impacts of biotechnology applications.

Environment

Biotechnology applications in the environment focus on using living organisms to treat waste and prevent pollution. Examples of these applications include bio-filtration and bio-remediation. Bio-filtration refers to the use of micro-organisms to remove pollutants from air emissions and waste water discharges related to various human activities including manufacturing processes. Bio-remediation refers to a number of processes that use living micro-organisms to turn toxic waste into harmless by-products such as water, carbon dioxide and other materials. One example of a bio-remediation process is bio-stimulation, a technique that involves introducing nutrients to stimulate the growth of "waste-eating" micro-organisms already present in the environment at a waste site. With these kinds of applications, the main concerns that people raise revolve around potential impacts of biotechnology applications on surrounding eco-systems.

In recent years, it has become clear that biotechnology is one of the most intensely competitive sectors of the economy, with many small start-up companies working to compete with (and sometimes to sell to) large multinationals companies, and governments working actively to compete for biotechnology investment and the high, value-added jobs that go with it. Recent experience shows that government policies can have a profound influence on the location of R&D expenditure by biotechnology companies, for example in areas where governments have made significant investments in basic research at the university level.

Today, the Canadian biotechnology sector is primarily comprised of many small companies with innovative ideas but not much capital, and this circumstance has important implications for the current and future potential of this industry in Canada.

Canadian Biotechnology Strategy

In 1998, the Government of Canada introduced a strategy for biotechnology, with a view to fostering the responsible development of biotechnology to improve quality of life for Canadians while protecting health, safety and the environment.

Since then, there have been many important developments in a number of areas:

- **World-class biotechnology research.** The establishment of research institutes and scientific funding agencies like the Canadian Institutes of Health Research, Genome Canada, Canada Research Chairs, and the Canada Foundation for Innovation.

- **The establishment of CBAC.** CBAC is an expert committee charged with providing government with independent, impartial advice on important policy issues associated with the ethical, social, regulatory, economic, scientific, environmental and health aspects of biotechnology.

- **Major advances in key fields.** Canadian scientists and biotechnology companies have made important advances in key areas:

    - A team from the Faculty of Medicine at Centre hospitalier universitaire de Québec at Université Laval recently discovered a natural defense mechanism the body deploys to combat nerve cell degeneration observed in people with Alzheimer's disease. The discovery could lead to a new therapeutic approach to Alzheimer's disease.

    - University of Toronto biomedical scientists have pioneered the genetic mechanisms for several diseases, and more recently bioengineers discovered a way to increase the yield of stem cells from umbilical cord blood by removing unwanted cells that inhibit stem cell growth. If the team can grow blood stem cells from umbilical cord blood (usually only containing enough blood stem cells to treat children), they could treat adult diseases with this method, rather than the current method, which requires bone marrow transplants.

    - Scientists at McGill University recently discovered a gene that controls the speed at which patients develop tuberculosis, providing a new view of the mechanisms underlying the development of tuberculosis and possibly leading to public health efforts aimed at containing the disease. The gene, NRAMP1, is involved in many other illnesses, including leprosy and rheumatoid arthritis. Variants (alleles) of NRAMP1 are now known to control the speed at which tuberculosis develops. This is a break though in understanding how a gene can control the time frame between initial infection and the disease.

    - A BC neuroscientist developed the world's first diagnostic blood test to detect diseases such as Alzheimer's, Parkinson's, Lou Gehrig's, and mad cow disease. This test could be available in as few as two years.

- University of Toronto researchers have designed a chemical screening tool that lights up when dangerous pathogens and disease-causing agents in air, water and bodily fluids are present. The technique using DNA to detect target DNA, could one day be used in clinical care situations to quickly detect diseases such as AIDS and hepatitis, and it could act to constantly monitor the environment and sound an alarm if harmful agents were to appear.

- In the area of environmental bio-remediation, an international team led by three University of British Columbia microbiologists recently completed the mapping (or sequencing) of the genetic makeup of a soil bacterium called Rhodococcus sp. RHA1. It is the first organism of its kind to be completely sequenced. This work contributes to our understanding of how this soil organism breaks down PCBs and other toxic wastes and adapts to the environment around it.

A Brief Overview of the Canadian Biotechnology Strategy

Origins

In 1983, the federal government launched a National Biotechnology Strategy (NBS) which focused on scientific research and development and human resources development. The NBS was broadened to address regulatory, social and ethical issues which underpinned the launch of the CBS in 1998.

The CBS, a multi-departmental strategy involving Industry Canada, Health Canada, Environment Canada, Fisheries and Oceans Canada, Natural Resources Canada, Agriculture and Agri-Food Canada, and International Trade Canada, explicitly recognizes the social and ethical dimensions of biotechnology along with its economic potential.

Vision of the CBS

To enhance the quality of life of Canadians in terms of health, safety, the environment and social and economic development by positioning Canada as a responsible world leader in biotechnology.

Ten CBS Themes for Action:

- Building public confidence and awareness, and communicating accurate, balanced, easy-to-understand information to Canadians;
- Further expanding Canada's R&D and science base to support Canadian competitiveness in biotechnology as well as the regulatory system;
- Regulating to protect health and the environment;
- Promoting the use of biotechnology for public health and safety;
- Modernizing Canada's intellectual property laws;
- Facilitating measures to help accelerate the application and commercialization of new technologies;
- Demonstrating responsible world leadership to improve market access and acceptance as well as stewardship in developed and developing countries;
- Developing human resources;
- Improving policy-relevant data collection and analysis; and
- Building sector strategies and action plans.

The Three "pillars" of Biotechnology:

Based on these 10 themes, the CBS rests on three "pillars", which represent the broad areas of interest for the federal government in achieving the vision for the CBS and provide an organizing framework for federal involvement in biotechnology.

- **Stewardship:** ensuring effective stewardship of biotechnology in the areas of health, safety and the environment.

- **Benefits/Innovation:** maximizing the social, economic and environmental benefits associated with biotechnology products and applications.

- **Citizen Engagement:** engaging a wide spectrum of Canadians on biotechnology and its role in society.

Federal Programs and Spending on Biotechnology Today

The annual federal biotechnology investment is about $750 million.[2]

- Approximately 85 percent of this total amount is spent on research and development (90 percent of this for research outside government);
- 6 percent on the regulatory system;
- 5 percent on policy development activities;
- 1 percent on commercialization; and
- 1 percent on communications and public awareness.

[2] Based on a 2004 Expenditure and Management Review conducted by the Treasury Board Secretariat (unpublished report).

Canada's Biotechnology Performance

Various aspects of Canada's performance in biotechnology have been assessed in recent years. Canada has significantly improved its performance in basic research (notably in genomics[3] and proteomics[4]).

I. Innovation

Research and Development

Research and development and the innovation it spurs are at the heart of the future impact of biotechnology, not just in Canada, but worldwide. Scientific discovery and innovative research and development are what drive this industry.

The federal research granting councils (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council and the Social Sciences and Humanities Research Council), in addition to two arms-length federally funded research organizations (Genome Canada and the Canada Foundation for Innovation) are the main instruments for building research excellence, talent and infrastructure in Canada through our universities. Federal departments and agencies conduct biotechnology research in support of their own programs, and, in particular, the science that underpins regulation of biotechnology products.

The Conference Board of Canada states, "the government's performance in creating an enabling environment for biotechnology has been moderate".

> *"While the government's overall performance has been assessed as moderate, the specific performance of underlying factors varies. The Canadian public's confidence in the regulatory process is high – just behind confidence levels in Australia and the United States. Canadians are increasingly receptive to the development and use of aspects of biotechnology, a factor that may prove to be advantageous for companies deciding where to locate operations.*
>
> *While the regulatory approval process in Canada is longer than in comparator countries, and is not considered to be sufficiently harmonized with those of other key nations, the system regulates based on the novelty of the technology and is well respected by Canadian residents.*
>
> *The federal government has more than doubled its spending commitments to academic research in life sciences (biotechnology) over the past five years, indicating a positive trend. However, this is*

[3] Genomics is defined as the study of the entire genome (including chromosomes, genes and DNA) and how different genes interact with each other. Genomics and molecular biology form the basis for modern biotechnology and, more specifically, pharmacogenomics, or the application of genetic analysis to identify potential targets for therapeutic products (drugs, vaccines).

[4] Proteometics is defined as the study of the protein products of genes, protein-protein interactions and protein sub-cellular localization. Examples could include engineering of new systems to sequence proteins or study protein interactions with other proteins or DNA, developing faster and cheaper detectors, such as high-density capillaries or high throughput mass spectrometers, and developing centres with expertise and accountability for protein analysis, such as 2D protein databases.

considered by many to be insufficient, as the investments made by other nations are much more aggressive.

Government research institutes are also major players in the performance of basic research in biotechnology. The challenge is to connect this research to the business community in order to help Canadian companies survive and grow in this increasingly competitive field. Canada also has a favourable tax treatment for R&D expenditures, but this advantage is waning as other nations respond with their own models."[5]

Many of the issues and challenges in the biotechnology sector are representative of those found in the science and innovation sphere generally. These have been summarized in the National Research Council of Canada's Foresight Consolidation Report[6] that states:

"There is good evidence that Canada's science and technology expertise is world-class and productive. We also have effective and generous tax-credit regimes that support innovation. Canada's R&D community is busy, complex but unfocused as we do not have a clear, explicit strategy for science and technology. In addition, Canada does not have innovation practices that enable increased private sector R&D investment, and support the flow of venture capital.

Canada has weak coordination among the players in innovation policy, both provincially and federally. There is a lack of focus in innovation policy, strategy and execution – too many players working with different and sometimes opposing plans and policies. In the fast-growing innovation economies (e.g. Finland, Japan), integration, convergence and focus are keywords representing action. They need to be made real in Canada, and some limited progress is now slowly being made."

Building a Strong Biotechnology Sector

According to the Conference Board of Canada, Canada's biotechnology sector is struggling financially. Of the 500 or so biotechnology companies in Canada, 10 companies account for 70 percent of total biotechnology market capitalization. The majority are small- to medium-sized enterprises, with no major products on the market, fewer than 50 employees and less than two years operating cash on hand. The major challenges for Canadian biotechnology companies remain access to capital to sustain them during the long period between proof of concept to actual revenues and the lack of larger Canadian firms that can act as lodestars for the juniors. Investor confidence is weak, with a focus on short-term returns. In addition, Canadian firms have difficulty recruiting the scientific talent and the marketing, management, and sales expertise required to succeed internationally.

[5] National Research Council of Canada, *Looking Forward: S&T for the 21st Century*. Foresight Consolidation Report, NRC Renewal Project, (August 2005): www.nrc-cnrc.gc.ca/aboutUs/ren/nrc-foresight_18_e.html.
[6] Conference Board of Canada, *Biotechnology in Canada: A Technology Platform for Growth*, (Dec. 2005).

Commercialization

(Activities specifically oriented to developing new biotechnology products for sale in global markets)

There is neither a biotechnology-specific commercialization policy nor a general commercialization plan in Canada. About one percent of annual federal biotechnology expenditures are invested in financing and pre-commercialization initiatives, which provide support for new technologies, including biotechnology. Many experts are concerned about what they observe to be poor performance in developing products in Canada.

Biotechnology Human Resources

Funded in part by the federal government, the Biotechnology Human Resources Council designs, distributes and promotes programs and services of value to Canada's biotechnology industry for attracting, developing and retaining a highly-skilled Canadian workforce essential for its sustainable growth and international competitiveness.

The Canadian innovation system is challenged by shortages of highly qualified people in all stages of the innovation process, affecting economic progress. Canada ranks 14th in Organisation for Economic Co-operation and Development countries in management (company operations and strategy geared toward improving entrepreneurship and productivity), has fewer science and technology workers than many other advanced economies and lacks experienced venture capital fund managers.

Consequently, attracting and retaining scientific, engineering and technical workers will be especially challenging as labour market alternatives for graduates in science and engineering are neither extensive nor varied, largely due to the low level of research and innovative capacity in the Canadian private sector.

II. Regulation

Regulation is a tool government uses to protect the health, safety and well-being of Canadians as well as Canada's natural environment. Biotechnology regulation involves the supervision of safety issues associated with biotechnology, and the approval processes associated with bringing a new biotechnology product to market. Regulatory agencies are the agencies or government departments that have responsibility over the legislation (acts and regulations) for a given sector of the industry.

Regulation is of international importance. As scientific advances increase the complexity of products being developed using biotechnology, time and effort is required to improve international cooperation, co-ordination, and development of new regulatory tools and processes. For example, the consideration of ethical issues has been raised as an important element of the process.

The Federal Regulatory Framework for Biotechnology (1993) provides guidance for regulating products of biotechnology as follows:

- Maintains Canada's high standards for protecting the health of Canadians and the environment;
- Uses existing laws and regulatory departments to avoid duplication;
- Develops clear guidelines for evaluating biotechnology products that are in harmony with national priorities and international standards;
- Provides a sound, scientific knowledge base on which to assess risk and evaluate products;
- Ensures the development and enforcement of Canadian biotechnology regulations are open and include consultation; and
- Contributes to the prosperity and well-being of Canadians by fostering a favourable climate for investment, development, innovation and the adoption of sustainable Canadian biotechnology products and processes.

Regulatory departments/agencies implement regulatory responsibilities as follows:

- Health Canada regulates biotechnology-derived products that are subject to the *Food and Drugs Act*. Health Canada and Environment Canada share the responsibility for regulating bioproducts relevant to *Canadian Environmental Protection Act*, 1999 (CEPA);
- Environment Canada regulates biotechnology-derived products subject to the CEPA which provides the federal benchmark for notification and assessment of environmental and human health risk (conducted by Health Canada) from new (as well as existing) biotechnology products;
- The Canadian Food Inspection Agency (CFIA) regulates biotechnology-derived products including novel plants, animal feeds and animal feed ingredients, fertilizers and veterinary biologics, and conducts all federal inspection and enforcement services related to food; and
- Fisheries and Oceans Canada is responsible for regulating potential environmental release of transgenic aquatic organisms.

Experts have commented on the regulatory system indicating that there has been progress in this area, but that outstanding issues remain.

In a 2004 report, the External Advisory Committee on Smart Regulation (EACSR)[7] built upon previous recommendations by the Royal Society of Canada[8] and by CBAC.[9] It urged the federal government to pay particular attention to the regulatory system for biotechnology and specifically recommended that the government should make it a priority to develop and implement a comprehensive, government-wide biotechnology regulatory strategy.

In a recent advisory memorandum on regulatory reform, CBAC has further observed:

"The lack of a comprehensive regulatory system for products of biotechnology is impeding the development of niche industries in Canada and consequently the potential for consumer and economic benefits. Regulators are justifiably concerned about being able to apply the appropriate risk analysis to new applications of biotechnology ... At the same time, Canadian firms need to

[7] External Advisory Committee on Smart Regulation, *Smart Regulation: A Regulatory Strategy for Canada* (2004): www.smartregulation.gc.ca.
[8] Royal Society of Canada, *Elements of Precaution: Recommendations for the Regulation of Food Biotechnology in Canada*, (2001): www.rsc.ca/foodbiotechnology/GmreportEN.pdf.
[9] Canadian Biotechnology Advisory Committee, *The Regulation of Genetically Modified Foods*, (August 2002): www.cbac-cccb.ca.

know what the rules are so they can decide whether to invest in Canada or elsewhere. With respect to some of these emerging industries, such as plant molecular farming, Canada may already have missed the opportunity.

Canada is the leading developer of many of these new products. We should also be leading the way in developing appropriate regulation. Our scientific community has the greatest potential to manage the safe introduction of these products. Yet our apparent inability to act disenfranchises us from the international management of our developments. Canada's standing in and contribution to the international debate about regulation could be jeopardized while our production and export of high-knowledge products could be threatened.

Ultimately, delays in filling the gaps in the regulatory system threaten the research, development and commercialization in Canada of socially beneficial biotechnology."[10]

III. Public Information and Engagement

Public information is the provision of information to the population at large. There is no single definition of public engagement, but the one most appropriate for these purposes encompasses "individual and collective actions designed to identify and address issues of public concern". It can include efforts to understand and address public concerns about certain issues, or it can include efforts to directly address an issue, work with others in a community to solve a problem or interact with the institutions of representative democracy.

The federal government tracks public opinion on biotechnology and its applications. The results are made publicly available on the BioPortal (www.biotech.gc.ca).

The BioPortal is an Internet-based, one-window access to comprehensive information on biotechnology and its applications for consumers, industry, scientists and educators. The BioPortal brings together resources from all federal departments and agencies, including government policy and research activities; business support programs and market intelligence; a virtual library of educational resources; and regulations on biotechnology research and applications.

CBAC has sponsored the development of a "Dialogue Tool" designed to provide a structured methodology for the discussion of contentious issues. This tool was developed in the context of GM food but has been revised for broader applicability. It is available at (http://cbac-cccb.ca/epic/internet/incbac-cccb.nsf/en/h_ah00350e.html)

Without exception, the critical role of public engagement in policy development concerning biotechnology is emphasized in all countries. Also recognized is the need to invest significant resources in this area in order to meaningfully and systematically reach and engage the public. Initiatives such as the U.K.'s GM Nation have been on the one hand lauded for innovation at seeking to engage thoughtful

[10] Canadian Biotechnology Advisory Committee, *The Regulation of Genetically Modified Foods*, (August 2002): www.cbac-cccb.ca.

engagement of the public, but have also been criticized for being insufficiently resourced in terms of time, money and expertise.

In the context of Canada's regulatory system, the need to provide the public, with information on risk management analysis has been highlighted consistently, as has been the importance of opportunities for the public to engage in dialogue with industry and governments in order to increase understanding of various perspectives.

The EACSR states, "In light of its significant ethical, social, environmental and economic implications, biotechnology is an area where government should be particularly active in engaging citizens and stakeholders and in encouraging public debate".[11]

IV. Social, Ethical and Legal Aspects of Biotechnology

Social, ethical and legal aspects of biotechnology involve the investigation of the complex issues that society must consider as applications of biotechnology evolve. Issues like cloning, privacy of our genetic information, gene patenting, and certain forms of stem cell research are examples.

The social and ethical dimensions of biotechnology have received significantly more attention since the early 1990s. They have been addressed by a variety of means, for example, by including them in the terms of reference of all studies conducted by CBAC, as a topic for framework development by interdepartmental working groups, in public dialogue, in major conferences and background studies (e.g. privacy, biobanks). Federal government funding for initiatives to explore the social and ethical dimensions of biotechnology has also been provided to Genome Canada.

Much work remains in this emerging area of biotechnology and includes efforts to connect research to policy development, develop new frameworks or modify existing ones to ensure that methodologies incorporate social and ethical considerations systematically. Some call for a public engagement strategy that is inclusive and sustained so that the public is informed and meaningfully connected to the policy development process.

[11] Conference Board of Canada, *Biotechnology in Canada" A Technology Platform for Growth.* (2005) www.conferenceboard.ca.

Developments in Other Countries

Recognizing the transformative nature of biotechnology, its powerful contribution to economic growth and to progress in solving long-standing global challenges, governments around the world are taking decisive steps to advance their competitive advantage in biotechnology and to address areas of weakness.

The U.S. holds the lead with respect to the commercialization of biotechnology products and applications. This lead is considered to be as a result, in part, from its early beginning in this field (e.g., commercialization of biotechnology products and services in the U.S. began in the mid-1970s, while Japan, the United Kingdom, France and Canada didn't really enter the market until the early 1980s).

The U.K. is the European leader in the bioscience industry, and number two in the world after the U.S. The U.K. biotech sub-sector (as defined by Ernst & Young) includes over 400 companies with over 25,000 employees and with £3 billion in revenues.

Among developed countries, the European Union, Japan, New Zealand and Australia all have specific national biotechnology strategies. In the U.S., although there is no national strategy, most states have biotechnology programs as part of their economic agendas. Among developing and middle power countries, India and Chile have placed a special focus on biotechnology, along with other countries such as Singapore, Cuba and South Korea.

Many of Canada's competitors in the U.S., Europe, and the developing world are prioritizing their research funding in areas of strategic or national importance, with biotechnology as a key element.

Economic Tools: R&D Tax Incentives

Some countries offer R&D tax incentives or other tax relief to encourage basic research. These incentives are relevant, although not specific, to biotechnology. Japan and Canada give tax credits for basic research conducted by the private sector. Japan also offers direct tax relief for companies performing or financing basic research.

Another common tactic is to stimulate more collaborative research between industry and public research institutions and universities through the design of R&D tax incentives. Japan and the United Kingdom, for instance, provide tax incentives for industry R&D projects contracted to universities and public research institutes. Japan has made substantial progress since 2001, with its government investing in incentives that will help attract foreign companies into the biotech market. For example, 12 percent of overall R&D spending is now tax deductible.

Economic Tools: Bioclusters

Unlike Canada, a number of its competitors have implemented specific biocluster policies (e.g., U.K., France, and Japan). In the U.K., fostering clusters in the health/pharmaceutical sector is considered a key mechanism for supporting biotechnology commercialization. In France, government investment is shifting to support biotechnology clusters and networks. In Japan, the fostering of bioclusters is seen by government as a key tool in the achievement of national development in biotechnology.[12]

In China, government efforts toward biocommercialization began in the late 1990s with the establishment of the China National Center for Biotechnology Development, which plays a key role in supporting innovation in biotechnology.

According to the Conference Board of Canada, it is generally agreed that the U.S. has an efficient technology transfer system that links basic research with companies and investors, that there is sufficient venture capital, and that there exist many clusters of biotechnology activity. For example, the U.S. indicates that it has 51 bioclusters; by comparison, the United Kingdom has nine, and Canada, France and Japan each claim to have eight.

[12] Conference Board of Canada, *Biotechnology in Canada: A Technology Platform for Growth*, (2005): www.conferenceboard.ca.

Appendix B - Moderator's Guide

CBAC Research on the Future of Biotechnology

Prepared by Decima Research Inc.
May 15, 2006

Introduction and Warm-up

The moderator will take a few minutes to go around the table and ask respondents to introduce themselves, and will outline a few ground rules for the discussion:

- *Want to ensure that people share their views openly and honestly*
- *Ensure that everyone participates*
- *Want people to talk about their views, not "other people's views",*
- *No right or wrong answers*
- *Everyone's views are valid*
- *The moderator's job is to ensure that we hear from everyone, and that we stay on topic. Reinforce the message that the moderator has no stake in the results.*

The moderator will also point out that there is a one-way mirror, observers in the back, and audio/video taping, but ensure that all discussion is entirely confidential.

Overview/First Impressions

Thank you for agreeing to take a bit of time to review this document in advance of this discussion. By doing so, it will enable us to accomplish much more in this session than if we handed it out now.

For those who have not been to a focus group before, this is an exercise that is slightly different than a typical focus group. Usually people are not given advance notice of the subject or information about that subject. In this case, we are providing information that will hopefully enable us to take the discussion further than might be accomplished in a normal group. In addition, this group is longer than a typical group, 3 hours in total rather than 2. We will have a short break at around the 1:45 mark or so, and then press on from there.

The other major difference between this session and typical focus group sessions is that we have an expert(s) here that you can use as a resource, if necessary. So if there is an issue that requires some form of clarification, or explanation, that resource can be drawn upon. We will refrain to the extent possible from our expert(s) expressing a point of view on the issue, because we don't want their views to be highly influential on your views, but we will work hard to ensure that this role is a helpful one.

Biotechnology as a Focus for Canada

Is biotechnology an important field? Compared to the fields we could actively pursue, should this be a priority?

What are the major considerations that you think of when you think about this question? (Write list on board, get people to priorize.)

What are the main challenges for Canada that will influence how we approach biotechnology and its development in our society?

Role of Government in Biotechnology

We currently have a Canadian Biotechnology Strategy that is summarized in the Background paper you received. Would you say you were surprised or not surprised about the roles and responsibilities of the federal government in biotechnology? Was the information something you expected/did not expect?

Is the role government plays now more/less extensive than you thought?

From what you could gather, do you feel government has done a capable job in this area, or not? Why?

What was the most surprising information in the discussion paper to you? Was it good/bad?

Now, forgetting for the moment the information that you read in that document, what are your views about the preferred role for government in this kind of field? What ***should*** government be doing/not doing in a sphere like this? Why?

In future, is it your view that there will be more/less of a need for government to play a role in this area? Why?

If you were to describe the ideal government role in biotechnology, what would it look like?

Vision, Themes, Goals

Vision

I would like get your impressions of the vision that has been pursued by federal government in biotechnology

HAND-OUT: Vision Statement

What does this vision say to you? Do you think it is the right approach? Is there something missing from the vision you believe is important ? Why do you say that?

Ten Themes of Action

I would like to get your impressions on the themes of action or priorities that have been pursued by government.

I would like you to do 2 things with this hand-out. First, please indicate, using a scale of 1-5, where 1 is not at all important and 5 being extremely important, how important you believe each of these themes are for an ideal government approach to biotechnology. Second, please indicate your top 3 priorities (out of the 10).

HAND-OUT: Ten Themes of Action

Discussion:

Each respondent will be asked which themes were ranked most highly, and why. Make notes for group to see which themes ranked most highly overall.

Were there any that you thought were irrelevant/unnecessary?

Were there some that you think ought to be on this list that you don't see?

Are these ten themes relevant?

Do they reflect Canadian values?

Are they right for government to pursue? Are there some that are not right for government to pursue?

Goals

Hand-out goals. These nine goals were set out in 1998.

Do they tell you what Canada stands for in the biotechnology field? What do they say to you?

Do they seem right to you today?

Specific Aspects of the Government Role

I would like to discuss a number of specific aspects of potential direction for Canada in this area.

NOTE: Respondents will be provided with a sense of policy options in each area below in order for them to have a more constructive discussion. Each category will be asked about in an open-ended format, followed by a detailed discussion of policy directions.

1. Research funding. Does this field need more research funding, less, or the same as it receives now? Why do you feel this way?

How do we determine the proper financing structure and balance of funding emphasis among pure research, applied research, and support for commercialization?

- Some say that basic research is the most important and most appropriate role for government to fund, and it should mostly stay out of other areas, which are best left to the private sector.

- Others say that government has to be more involved in funding/financing applied and commercial research because there isn't enough private financing available to enable Canada to be competitive with other countries, and that most of the funding already goes toward basic research.

What do you think?

2. In your view, should there be a focus on supporting the development of the biotechnology industry in Canada?

   - Some take the view that the market should decide which companies succeed or fail and that government should not intervene.

   - Others take the view that the biotechnology industry is unique because of its heavy reliance on research, its long development times to product and the high degree of regulation associated with the industry. For these reasons, they take the view that there is a case to be made for specific government intervention.

3. How can we strengthen venture/risk capital attraction to the biotechnology field? What should be the basis for incentives in biotechnology trade and foreign investment?

   Below are some specific ways in which this might occur:

   - Higher tax credits
   - Extending tax credits
   - More venture capital to BDC
   - Better tax treatment for those who invest in biotechnology companies

4. What is your impression of regulatory/safety systems for biotechnology? Does this aspect need more funding, less, or the same as it receives now? Why do you feel this way?

   What aspects of the regulatory process affecting biotechnology most need investment and/or improvement?

   - Recognizing the rapid pace of science in this area, some people are suggesting that Canada should cooperate more with other similar countries on regulation because this could make products available to Canadians more quickly and would be good for industry. How do you feel about this view?

   - Some people want to have more information about how Canada regulates biotechnology products and also want to know more about how regulatory decisions are made. Is this something you would consider a high priority?

5. Should more be done to acknowledge and explore compelling social and ethical issues that arise? If yes, in what areas?

   - Some object to certain aspects of biotechnology on ethical grounds, others want to see the technology developed in Canada but with conditions to avoid potential negative impacts, and still others think we need to be more aggressive in promoting biotechnology. How do you suggest we reconcile these different points of view?

   - Do you think that we are doing enough in Canada to understand and address the ethical issues that biotechnology raises? What kinds of things should be done to address these issues?

6. What areas of biotechnology are least understood and/or accepted and how do we improve public awareness and understanding in these areas? What areas do you need to know more about?

7. What is the responsibility of government to link to citizens as this field develops and how do we enable that linkage? What mechanisms do we need to enable pubic engagement on issues of concern?

Overall Strategy

So is there a case to be made for developing a Canadian strategy that is focused specifically on biotechnology? Why?

- One point of view is that Canada needs a specific plan or strategy for biotechnology because this technology is likely to have a great impact on our economic development and social well-being.
- Another view is that we can address issues that biotechnology presents for the country without a specific plan or strategy, that the best way to let it evolve is to let it grow on its own in whatever fashion the market dictates.

What do you think?

What would be the benefit of such a strategy? What would happen if we didn't have one?

Do you believe government can fulfill a strategy in this area? Why/Why not? Where do you think the areas are that government can do best? What are your concerns that government will not be able to accomplish?

Where is federal leadership fundamental and in which areas should the federal role change?

The current strategy involves having an expert body (CBAC) as a means for providing third-party advice. Is this appropriate going forward? Are there others you would suggest? Should they be strengthened?

International responsibility

What responsibilities do we have to meet the needs of developing countries, both from an investment and responsible development and use perspective?

What is our responsibility to people and countries in terms of the biotechnology applications we develop?

- Some believe that biotechnology will be a solution to hunger in developing countries.
- Others believe investments in this technology distract from the real underlying problems like availability of clean water.

What do you think?

- How would you want Canada to be seen internationally in the field of biotechnology? What does being a responsible world leader in biotechnology mean to you?

Appendix C - Recruitment Screener / Spring 2006

CBAC Research on the Future of Biotechnology

Prepared by: Decima Research Inc.
May 15, 2006

Questionnaire #_____

Date of Last Group_____
# of previous groups_____

City: Montreal (French) **Wednesday, May 17** Group #1: Involved Cdns	@5:30pm – 8:30pm	1	$100.00	Honorarium: **$100.00** Study # **90035** LD Code: Group #1 through to #3 Recruit 16
City: Halifax (English) **Tuesday, May 16** Group #2: Involved Cdns	@5:30pm – 8:30pm	2	$100.00	
City: Vancouver (English) **Wednesday, May 31** Group #3: Involved Cdns	@5:30pm – 8:30pm	3	$100.00	
Respondent's name: _____				Interviewer:_____
Respondent's phone #: _____(home)				Date:_____
Respondent's phone #: _____(work)				Validated: _____
Respondent's fax #: _____sent?_____or				Quality Central: _____
Respondent's e-mail : _____sent?				On List: _____
Sample source *(circle)*: random referral				On Quotas: _____

Hello, my name is _____. I'm calling from OSI Focus Search, a national public opinion research firm. We're organizing a couple of discussion groups among residents to explore public opinions regarding current issues. **EXPLAIN FOCUS GROUPS.** About sixteen people like yourself will be taking part, all of them randomly recruited by telephone just like you. But before we invite you to attend, we need to ask you a few questions to ensure that we get a good mix and variety of people. May I ask you a few questions?

Yes **CONTINUE**
No **ASK IF ANYONE ELSE IN THE HOUSEHOLD MIGHT BE INTERESTED**

If NOT THANK AND TERMINATE

Participation is voluntary. We are interested in hearing your opinions, no attempt will be made to sell you anything or change your point of view. The format is a "round table" discussion lead by a research professional.

1a) Do you or any member of your household work for....

The federal or provincial government	1
A media outlet, like a newspaper, radio or TV station	3
An advertising, public relations or market research firm	4

IF "YES" TO ANY OF THE ABOVE, THANK AND TERMINATE

1b) Are you a Canadian citizen at least 18 years old?

Yes	1	**CONTINUE**
No	2	**THANK &TERMINATE**

1c) **DO NOT ASK – NOTE GENDER (target a 50/50 split in all groups)**

Male	1
Female	2

2) I'd like to ask you some questions about your level of involvement in current issues, if you don't mind. For each of the following, I'd like you to tell me, with a yes or no response, whether you have done this in the last year.

	Yes	No
a. Made a speech to a public audience	1	2
b. Written an article for a publication	1	2
c. Served as an officer of a club or organization	1	2
d. Written a letter to the editor	1	2
e. Called a television or radio talk show	1	2
f. Served as an officer of a non-governmental organization?	1	2
g. Written to an elected representative?	1	2
h. Been a member of or worked for a political party?	1	2
i. Expressed your views on an important issue through a website or blog?	1	2

- **Involved Canadians will say yes to at least 3 of the nine questions**
- **Take those who say 2 on hold for the Involved groups**

3a) And how old are you? Are you ... **READ LIST**

Under 18	0	**THANK & TERMINATE**
18-24	1	
25-34 years	2	
35-44 years	3	***WE NEED A MIX***
45-54	4	***OF AGES IN***
55-64	5	***EACH GROUP***
65 years and older	6	
Refuse	9	

3b) Could you please tell me what is the last level of education that you have completed?

Some high school only	1	
Completed high school	2	
Some College/University	3	**MIX IN EACH GROUP**
Completed College/University	4	

4a) Are you currently ...

Married/common law	1	**MIX IN EACH GROUP**
Single/divorced/separated/widowed	2	

4b) And what is your occupation? _____

TERMINATE IF OCCUPATION IN Q1a

IF MARRIED ASK Q4C)

4c) What is your spouse's occupation?_____

TERMINATE IF OCCUPATION IN Q1a

5) And is your total family income ...

Below $30K	1	
Between $30 – 49,999K	2	
$50K – 100K	3	**MIX IN EACH GROUP**
Over $100K	4	
RF/DK	9	

6a) The next couple of questions deal with your imagination. Have a little fun with these questions and feel free to answer in any way, as there are no incorrect answers.

Please give me three things you can do with a paper clip besides the obvious.

If you could meet anyone in the past or present, who would you like to meet and why?

_____

_____

_____ANSWERS SPONTANEOUSLY
_____VERY SURE OF HIMSELF/HERSELF
_____ENTHUSIASTIC
_____CARRIES ON A GOOD CONVERSATION

NOTE: PAY EXTRA ATTENTION TO RESPONDENT'S ANSWERS. LOOK FOR A COMPLEX ANSWER. ANSWERS SHOULD ALSO BE CREATIVE AND NOT JUST ANSWERS. LOOK FOR IMAGINATION AND A SENSE OF CREATIVITY/PARTICIPATION.

7a) Participants in group discussions are asked to voice their opinions and thoughts, how comfortable are you in voicing your opinions in front of others? Are you (read list)

Very comfortable.....	1 - min. 4 per group
Fairly comfortable.....	2
Comfortable..... ..	3
Not very comfortable..	4} terminate
Very uncomfortable...	5} terminate

7b) Have you participated in a focus group? A focus group brings together a few people in order to know their opinion about a given subject.

Yes	1	**ASK Q7C AND Q7D**
No	2	**SKIP TO Q8**
DNK / DNA	9	**THANK AND TERMINATE**

7c) When did you last attend one of these discussions?

_____terminate if within the last six months

7d) Would you please tell me which topics you discussed when you attended the focus group or interviews?

_____

IF MENTIONS ANYTHING RELATED TO BIOTECHNOLOGY – THANK AND TERMINATE

7e) And how many of these sessions have you attended?

_____

IF Q7E>3 THANK AND TERMINATE. OTHERWISE CONTINUE

As I mentioned earlier, the group discussion will take place the evening of, **Day, Month, Date @ Time for 3 hours** and participants will receive **$100** for their time. Would you be willing to attend?

Yes	1	**CONTINUE**
No	2	**THANK AND TERMINATE**

That's great! Do you have a pen or pencil; I will provide you with some additional information.

City: Montreal (French)			
Wednesday, May 17, 2006			
Group #1: Involved Canadians	@ 5:30pm - 8:30pm	1	$100.00
City: Halifax (English)			
Tuesday, May 16, 2006			
Group #2: Involved Canadians	@ 5:30pm - 8:30pm	2	$100.00
City: Vancouver (English)			
Wednesday, May 31, 2006			
Group #3: Involved Canadians	@ 5:30pm - 8:30pm	3	$100.00

PLEASE READ: This group is slightly different than usual as it will have experts present to participate in the discussion and answer your questions and it will run for 3 hours. You will be paid $100.00 for your participation in this group. In preparation you will be asked to read through some material that we will send to you via email or fax (or mail if necessary). May I please have your email address or fax number so that we can send you the material?

Fax_____

E-mail_____

Mailing address: (If no fax or email available): *do not forget to record the postal code and apartment number*

Address: Apt#

City:

Postal Code:

Please be sure to inform the respondent that we need to send them some material to review before the group and record their email, fax or mailing address

Invitation:

Do you have a pen handy so that I can give you the address where the group will be held? It will be held at:

Halifax: Omnifacts Bristol Research Address: 2000 Barrington Street, Cogswell Towers, Ground (G) Level, Halifax Directions: Cogswell Tower is adjacent to Delta Halifax (Downtown) Parking: Parking is accessible from Barrington St. or from Market Street.
Montreal: OSI FocusSearch Address: 1080 Beaver Hall Hill, Suite 400, Montreal Directions: Located on Beaver Hall Hill between Blvd. René Levesque O. and De La Gauchetière streets. Take Blvd. René Levesque O. street eastbound until you hit Côte du Beaver Hall. Turn right onto Côte du Beaver Hall. Parking: Street, municipal and attached parking.
Vancouver: PFI Research Inc. Address: 1550 Alberni Street, Suite 420, Vancouver Directions: Travelling north on Granville, take the Seymour ramp coming off the Granville Bridge, turn left on Robson. Turn right on Cardero. Drive 1 block to Alberni (at Cardero) and park in lot on corner. We are located at Cardero and Alberni. Parking: Street, municipal and attached parking.

We ask that you arrive fifteen minutes early to be sure you find parking, locate the facility and have time to check-in with the hosts. The hosts may be checking respondent's identification prior to the group, so please be sure to bring some personal identification with you (i.e. driver's license). Also, if your require glasses for reading, please bring them with you. The group will last no more than **3 hours** and for your time you will receive a cash honorarium of **$100.00**.

As we are only inviting a small number of people, your participation is very important to us. If for some reason you are unable to attend, please call so that we may get someone to replace you. Please **do not** send someone in your place. You can reach us at **1-800-363-4229 ext 5068** at our office. Please ask for **Carol Smith**. Someone will call you the day before to remind you about the discussion.

So that we can call you to remind you about the focus group or contact you should there be any changes, can you please confirm your name and contact information for me? **[READ INFO WE HAVE AND CHANGE AS NECESSARY.]**

First name_____
Last Name_____
Email:_____
Day time phone number_____
Night time phone number_____

If the respondent refused to give his/her first or last name or phone number please assure them that this information will be kept strictly confidential in accordance to the privacy law and that it is used strictly to contact them to confirm their attendance and to inform them of any changes to the focus group. If they still refuse THANK & TERMINATE