Meeting the Public's Need for Information on Biotechnology

Prepared for

The Canadian Biotechnology Advisory Committee
Project Steering Committee on the Regulation of Genetically Modified Foods

By

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October 2000

This publication is also available electronically on the World Wide Web at the following address: cbac-cccb.ca

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Aussi disponible en français sous le titre *Répondre aux besoins d'information du public en matière de biotechnologie*.

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EXECUTIVE SUMMARY

Meeting the Public's Information Needs on Biotechnology

E.F. Einsiedel, K. Finlay, and J. C. Arko

Information about any technology which exerts profound impacts on our health, on how our food is produced and what we eat, on environmental sustainability, on our conceptions of nature, identity, ownership and control over life, has great social and political importance. This information base – what it is, how it is distributed, its accessibility, its equitability – has implications, in turn, on the public's ability to participate more fully in decision-making in political and economic arenas. The information and communication environment as it relates to GM foods is examined in this paper, focusing on five key questions:

(1) What is the current context for understanding the information needs of citizens on biotechnology?

(2) What do we know about how consumers search for and use information? What kinds of strategies do they employ? What information strategies have resulted in what outcomes?

(3) In considering the specific issue of labelling, what do we know about the use of labels and what is the efficacy of this policy approach for GM food products?

(4) What other types of approaches are currently being used to address Canadian consumers on the issue of biotechnology? Are there "best practices" that can be identified? What costs are entailed and what challenges exist?

(5) How do we evaluate the current information environment and what can we recommend to address the needs of the Canadian public?

In examining the nature of public awareness of the issue of GM foods, we find that Canadians' earlier cautious support has changed within the last three years to decreased levels of support and increased uncertainty. As various non-government organizations gave voice to questions about safety and potential environmental risks and as media coverage of the issue increased, public awareness has also grown at the same time as uncertainty has begun to develop.

In this context, how are the information needs of the Canadian public being met? We outlined the research findings relating to information-seeking and information-processing as these might be helpful to the development of public communication approaches. We then examined activities at the federal and provincial levels, those conducted by industry, by non-government organizations, and some approaches used at the international level. Our review demonstrates that there are still a number of challenges to be addressed in providing Canadians with information that meets their needs and interests. At the federal level, there is no central site where information about biotechnology that is geared to consumers can be accessed. Aside from Saskatchewan,

efforts at the provincial level are just being initiated by a few provinces. An organization called the Food Biotechnology Communications Network supported by government, industry, the food production and distribution sectors, and the Consumers Association has become a central source of information as it has become a referral point for the food retail sector. It distributes information via a toll-free line, a website, brochures distributed by mail and as an insert in national women's magazines. A major advertising campaign currently targetted at North Americans has been initiated by the large international biotechnology companies. Non-government organizations, on the other hand, have been adept in getting messages across to the public about issues of risk, of negative environmental impacts, and about questions of control of the technology. They have done this primarily through the mass media.

Our survey of various information approaches directed to Canadians showed that much of the information provided tends to focus on issues of food safety, tends most often to emphasize only the risks or only the benefits, is not as accessible to those who do not have sufficient skills or access to technology, and is dispersed in a wide variety of places. So far, there has been no integrated approach developed to help Canadians understand biotechnology in its broader context: how it is being developed, what the ethical issues are, how it is being managed so that risks are minimized and benefits more equitably distributed and how these are balanced against considerations of environmental sustainability and other ethical considerations.

At the international level, a number of initiatives have been identified as having innovative features. In the U.S., the Department of Agriculture's web-based Biotechnology Information Resource is comprehensive and diverse in its coverage and is consistently up-to-date. Biotechnology Australia combines the federal government's integrated public communication efforts within one umbrella. This is helpful as eight government agencies and institutions participate in the regulation of biotechnology. This program provides one good example of a national effort at communicating with citizens by means of: a Gene Technology Information Service (including a toll-free phone line, websites and brochures distributed through supermarkets), complemented by public forums on biotechnology.

The European Commission has begun a program called "Educating the European Public for Biotechnology" which is a survey of the landscape on various public information initiatives. In the UK, an industry initiative called *CropGen* was created as a response to what the industry saw as a one-sided picture from non-government organizations and the media. The initiative involved creation of a panel of scientists from various biotechnology application areas that was accessible to both the media and the public by phone, e-mail, and a discussion component on its website. The Dutch government has supported a public information effort through the Dutch Consumers Association. Denmark has produced "An Ethical Framework as Foundation for Public Discussion on Biotechnology", perhaps the only country to have done so. Both Denmark

and the Netherlands have also been the most active in the use of citizens' councils or conferences for decision-making on technological issues.

We considered the special issue of labelling of GM foods as this is one of the contentious arenas for GM foods, has been sought by consumers, and is an important element in ensuring that the consumer's right to information is being met . While there are challenges to the implementation of labelling for GM foods, several arguments in favour of labelling are discussed. First, the importance of building consumer trust is imperative, particularly in an environment of increasing uncertainty. Second, there is precedent for process labelling provided by the experience of food irradiation which also grew out of consumer concerns. Such an information effort as labelling can only be meaningful if it is accompanied by a more substantive information program on what genetic modification means, how it is applied, what the potential risks and benefits are.

We concluded that communicating with Canadians on biotechnology should rest on an ethical framework for the development and use of biotechnology. On the basis of such a framework, the communications approaches should then be two-pronged: one is a public communication approach to raise public awareness and understanding of biotechnology in the broad sense discussed earlier. The second prong would be a public involvement and participation approach. The latter is beyond the purview of our paper but is important to note as part of an overall communication effort.

The features of an ideal public communication approach (the first prong) incorporate the following: (1) a diversity of channels; (2) comprehensiveness of the information base; (3) immediacy; (4) balance; (5) transparency; (6) accessibility; (7) attractiveness to consumers so it generates attention, interest and utility; and (8) consideration of a broader range of issues over and above that of safety.

Meeting the Public's Information Needs on Biotechnology

I. Introduction - Study Objectives

With the increasing prominence of biotechnology in our society, and the entry of greater numbers of applications into the marketplace, the question of how publics view this technology, and the conditions for receptivity or rejection has come to the forefront as a policy interest. Nowhere has the issue of public perceptions been more dramatic than in Europe where consumers have refused to have anything to do with genetically modified (GM) foods. In North America, where the debate over GM foods has been relatively sedate, those who have tracked public views note an increase in uncertainty as well as a concern regarding the issues surrounding GM foods.

Central to the public's relationship to technology is the information base on which this relationship rests. From a policy standpoint, the information environment has implications for: how a technology is managed so that benefits are realized and risks are minimized; the legitimacy of decisions made about the technology; the success of an innovation in the marketplace; and the comfort people have as they purchase, use, or even refuse a given application. It is this information environment that we examine in this paper.

We aim to address five key questions:

(1) What is the current context for understanding the information needs of citizens on biotechnology?

(2) What do we know about how consumers search for and use information? What kinds of strategies do they employ? What information strategies have resulted in what outcomes?

(3) In considering the specific issue of labelling, what do we know about the use of labels and what is the efficacy of this policy approach for GM food products?

(4) What other types of approaches are currently being used to address Canadian consumers on the issue of biotechnology? Are there "best practices" that can be identified? What costs are entailed and what challenges exist?

(5) How do we evaluate the current information environment and what can we recommend to address the needs of the Canadian public?

The premise of this report is that consumers have a basic right to be informed about the benefits and uncertainties concerning the products they and their families consume. Furthermore, it is the responsibility of government to provide balanced information to the public that meaningfully conveys both benefits and risks of new food technologies that have been approved for sale in this country. The Consumers' Association of Canada has distilled consumers' rights with regard to the issue of biotechnology. These include: "the right to information, the right to safety, quality, and choice; the right to be heard; and the right to participate in decision-making, as applications of biotechnology are developed in health care and food production." (Agriculture and Agri-Food Canada, 1993).

The UK experience reinforces the need for transparency and full public disclosure. When food disasters broke out in Britain, an uninformed public finally demanded its say. Currently none of the three major supermarket chains in the UK carries products produced using biotechnology.

While consumers will vary in their interest in becoming informed, it is government's responsibility to ensure information is available and to facilitate its accessibility and use. This is acknowledged as an ongoing responsibility of government, but is of particular importance in an environment where various stakeholder groups on both sides of the fence are conveying one-sided information about genetically modified foods.

II. The Current Social Context:

Seeking potential solutions for addressing information needs does not and should not occur in a vacuum. Understanding the current context in Canada is important for the task because what may be effective in some places may not be workable in others; what may also work at one point in time may be less desirable at another point in time. Setting this stage allows us to address the issue of information needs in social context.

Canadian Public Perceptions. In the last decade, there have been a number of studies of Canadians' perceptions of and attitudes toward biotechnology (Decima, 1993; Optima Consultants, 1994; Environics, 1998; Einsiedel, 2000a; Earnscliffe Research, 2000). We will briefly review some of these earlier studies, then describe our most recent study (which compared consumers' perceptions and attitudes in the year 2000 with those held three years earlier) and more current views.

In general, the early surveys showed most Canadians admitting to no or very little knowledge of biotechnology (Decima, 1993). However, higher levels of awareness were found when specific applications of biotechnology were presented. For example, in 1994, seven in ten said they had heard of genetically engineered tomatoes with longer shelf life or

better taste; over eight in ten had heard of hormone supplements given to cows to increase milk yields. (Optima Consultants, 1994). Further analysis of these results showed that over four in ten (44%) could be characterized as supporters, a third were undecided, close to a fifth were opponents, and the remaining 6% were disinterested. Among the supporters, roughly half could be described as enthusiastic proponents and the other half were only cautiously so. In 1998, self-reported knowledge levels remained low with a majority (55%) saying they were either not very (33%) or not at all (22%) familiar with biotechnology (Environics, 1998). **In short, Canadians three years earlier appeared to be cautiously supportive of a technology they were only dimly aware of, and about which they had little or no knowledge.**

In 1997, the initial baseline for our own trend study, Canadians could still be described as cautiously optimistic and supportive. This level of support and optimism was not all that different from that found among US respondents and was particularly striking when compared to Europeans, who were then going through vociferous public debates on biotechnology and particularly on GM food (Biotechnology and the European Public Concerted Action Group, 1997; Hoban, 1997).

However, the debate appears to have crossed the Atlantic in 1999. Stories began to appear in the Canadian media and various non-government organizations began to mobilize around the issue of GM food. The following are some of the key indicators of changes in public perceptions:

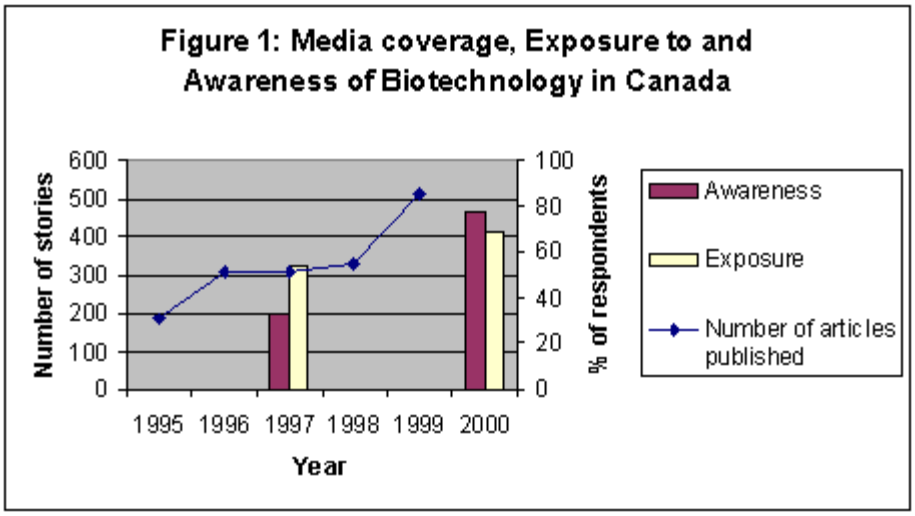
- In 1997, 72% of respondents expected biotechnology to "improve our way of life in the next 20 years"; 63% felt the same way in 2000.
- Seven in ten supported at least four out of six different applications compared to a little over half (56%) three years later.
- There was less enthusiasm for food and crop applications in 2000, in contrast to the preceding period: while 49% definitely agreed that "inserting genes from one plants species into a crop plant to make it more resistant to pests" was useful in 1997, only 30 percent shared the same opinion three years later.

Overall then, levels of support for biotechnology have decreased. In addition, general awareness has definitely increased. Again, using 1997 as the baseline period,

- When asked what came to mind when thinking about biotechnology, over three quarters of respondents in 2000 could come up with some response/notion about biotechnology compared to only a third in 1997.
- Two thirds could recall seeing or reading something on biotechnology in the last three months compared to 54% earlier. However, this did not translate to higher levels of discussion, suggesting that the issue had

become more prominent but remained relatively low in importance, if discussion with others was any indication.[1]

Figure 1 represents the patterns portraying media coverage, the public's self-reported exposure to media coverage, and top-of-mind awareness of "biotechnology". In addition to increasing media coverage of biotechnology, we also found that the highly positive tone which characterized the coverage in the mid-90's had become more negative (Einsiedel and Medlock, 2000).



Note: The number of Globe and Mail stories was found doing a keyword search of such terms as 'biotechnology,' 'genetic modification,' 'cloning,' 'genetic testing,' 'human genome,' and a number of other relevant terms. The resulting sample was sorted to eliminate irrelevant references (i.e. those that were not biotech related- computer clones, RRSP clones, etc.) resulting in the total number of stories per year. Exposure results were derived from a year 2000 survey where Canadian respondents were asked: "Have you seen or read anything about biotechnology in newspapers, radio, or TV in the last three months?" Awareness data from the same survey posed an open-ended question, "What comes to mind when you think about modern biotechnology in a broad sense, that is, including genetic engineering?" Figures include those who provided an answer that related to biotechnology. Fewer than 1 percent was unrelated and these were excluded (Einsiedel, 2000).

[1]Respondents were asked: "Have you seen or read anything about biotechnology in newspapers, radio, or television in the last three months?" The question about discussion was: "Before today, have you ever talked about modern biotechnology with anyone? If yes, have you talked about it frequently, occasionally, or only once or twice?" (Einsiedel, 2000a)

To understand how consumers judge whether a specific application ought to be encouraged, we compared their judgments of attributes including 'utility', 'risk', and 'moral acceptability' as applied to food and crop plants. As Table 1 demonstrates, there has been a shift in the relative importance given to each of these attributes, with a distinct drop in attributions of utility and moral acceptability to both of these applications. Further analysis shows that while utility was the best predictor of willingness to encourage the application in 1997, it currently appears that moral acceptability has assumed greater weight for both applications.

Table 1 - Perceptions of GM food and crops: 1997 and 2000[2]

% Definitely Agree/Agree Applications	Utility		Risk		Morally Acceptable		Would Encourage	
	1997	**2000**	**1997**	**2000**	**1997**	**2000**	**1997**	**2000**
Using biotechnology in the production of food and drinks *Heard: 74%*								
Definitely Agree	29	22	21	24	29	18	27	17
Agree	38	35	34	34	41	37	33	32
Total Agree	**67**	**57**	**55**	**58**	**70**	**55**	**60**	**49**
Inserting genes from one plant species into a crop plant to make it more resistant to pests *Heard: 66%*								
Definitely Agree	49	30	11	18	39	24	41	24
Agree	33	42	27	31	40	31	36	37
Total Agree	**82**	**72**	**38**	**49**	**79**	**55**	**77**	**61**

Our initial focus group testing suggests that "moral acceptability" embraces a broad range of concerns including environmental sustainability, how animals are used in research, ethical research practices, and equitable distribution of risks and benefits. (Einsiedel, 2000b)

[2]Survey respondents were asked: "And now, I'd like to ask some questions about various applications which are coming out of modern biotechnology. For each one, please tell me whether you have heard of the application, then let me know whether you definitely agree, tend to agree, tend to disagree, or definitely disagree with the questions that follow. (a) Using modern biotechnology in the production of foods, for example, to make then higher in protein, keep longer or taste better.(b) Taking genes from one plant species and transferring them into crop plants, to make them more resistant to insect pests."

Another finding may put these results regarding GM food concerns in some perspective: concern about food being genetically engineered remains relatively low in comparison to general concerns about food safety and more specific concerns about chemical pesticides and bacterial contamination. Having said this, one could argue that the general concern about food safety is one that transfers easily to GM foods. It is the question most often asked on information hotlines (see Section V) and it is the theme most often promoted by those opposed to GM foods (see also Earnscliffe, 2000).

What are the underlying dimensions of consumer concern? In looking at the range of factors that might help explain attitudes toward GM food, three dimensions of concern were found: concerns about nature, concerns about the environment, and utilitarian concerns (Einsiedel, 2000a). "Nature" concerns were typified by preferences for more traditional breeding methods and beliefs that genetic modification was 'fundamentally against nature'. Such phrases as 'playing God' or 'tampering with nature' typified top-of-mind responses to the term biotechnology. Environmental concerns were found primarily in connection with applications around inducing pest resistance in crop plants. This may arise from media coverage of concerns raised by environmental groups and specific and highly visible controversies such as the impact of pollen from modified corn on monarch butterflies. The third area of concern – the largest segment – can be classified as utilitarian worries. These revolve around the adequacy of the regulatory system and questions of risks and benefits.

From the various surveys that have been conducted (Decima, 1993; Optima Consultants, 1994; Einsiedel, 2000a), it is apparent that the metric of risks and benefits is not the only criterion used by consumers to evaluate GM food. Ethical and social dimensions play a role in their judgments. These concerns might include food safety but may also incorporate other social values. For example, 'dolphin-free tuna' and other types of eco-labels or such information as 'made without use of child labour' or 'not tested on animals' appeal to their broader social concerns. Another example of a way to demonstrate social concerns is to invest in 'ethical funds'. A CBC Market Place (1998) investigation reported that there are now over 40 ethical funds currently in existence, which account for $625 billion in investments. Also cited was Business Ethics magazine, which tracks the 20 largest ethical funds in the US. In the Fall of 1996, these funds were reported to have produced a return rate of roughly 27%.

These consumer concerns are accompanied by a need for more information and surveys suggest that Canadians believe the government should be the primary source of balanced information. (Earnscliffe Communications, 2000). "A coordinated and centralized locus for information seekers", providing neutral, balanced information is highly preferred (Earnscliffe Communications 2000). Expectations are also high that government will demonstrate a solid plan to manage the risks and benefits of technology. Finally, although many do not expect to participate in public involvement activities, consultations are strongly supported because they "symbolize transparency and inclusiveness." (Earnscliffe Communications, 2000; also, Einsiedel, 2000).

In sum, there has been a shift in consumer awareness of and concern about GM foods. Awareness has increased, with increased media coverage as one likely contributor. Concern has also increased but this remains low to moderate. It is also clear that judgments about biotechnology are not simply a result of risk-benefit projections but encompass a broader range of values.

The Media Influence The mass media play a very important role in identifying issues and their salience (McCombs and Shaw, 1972; McCombs, Einsiedel and Weaver, 1991). As has been suggested in the agenda-setting literature, the media play a significant role in telling us what to think about or what to view as public problems. Their role is also significant in providing some of the information on which beliefs about issues are based. This input has been documented in such areas as food safety (McIntosh, et al., 1994), AIDS (Miller and Williams, 1998; Kitzinger, 1998), and nutrition (Chew, Palmer and Kim, 1995; Payson, 1994). For example, Payson (1994) estimated the effects of media coverage of food safety issues and nutrition on consumption of meat in the US from 1937 to 1991. A net negative effect of risk information was observed.

The media also have an impact in the area of "cultivation". This refers to the notion that persistent coverage over time may suggest a problem to be worried about, may promote a sense of confidence if optimism about a situation is consistently portrayed, or may emphasize an image of risk. Studies have shown that over the long term, media coverage can contribute to cultivating various social expectations. This has been found on the subjects of the economy (Pruitt and Hoffer, 1989), media violence and crime coverage (Signorelli, 1990) and the environment (Hansen, 1991). In all these instances, media coverage has occurred over a long period and has focused on areas of direct personal interest to the public. These are likely some of the factors contributing to these findings.
Having said this, influences on opinions have also been found for technological issues which which are characterized by scientific uncertainty, a lack of direct personal experience, and which are not emotionally charged.

Finally, there is some evidence that this type of persistent coverage can contribute to behavioural changes. Certainly, this has been found in the area of health and nutrition. For example, increased consumer awareness of the health hazards of cholesterol, with the print media as primary information source, was found to contribute to the secular decline in butter consumption in Canada within the period 1966 through 1987 (Chang and Kinnucan, 1991). Another study in the US similarly found that fat and cholesterol risk information was a statistically significant determinant in meat consumption (Capps and Schmitz, 1991; also Ippolito and Mathios, 1996).

NGOs have been extremely effective in promoting their messages via the media. While resource-poor in terms of their ability to produce the slick promotional material typically seen from industry, they have been much better at exploiting the news values pursued by the media. Coverage of biotechnology has increased, both of the issue and of

these organizations. (Einsiedel and Medlock, 2000). In this respect, the media are able to provide a way of balancing the resource disparities that exist between the smaller interest groups and the much larger private sector companies.

In general, it is important to note that these assertions of media influence are not predicated on an assumption of a simple point-shoot-hit-the-target influence. The media and their publics offer up a more complex set of interactions whose nuances are beyond the purview of this paper. Publics respond with their own sets of experiences, beliefs and values, make interpretations that reshape intended messages, and the media also utilize approaches which resonate with their audiences. That said, when publics have little or no experience with a given issue or product, they will draw on what is available and accessible, both internally (from mental schemas stored in memory) and externally, from sources such as the mass media, referred to by Kahneman and Tversky (1982) as the "availability heuristic."

There are important implications from this brief media examination for the environment for biotechnology information. The public discussions and debates about biotechnology which were previously confined to Europe for the most part has moved across the Atlantic. The Canadian media have been instrumental in highlighting some of the issues and NGO use of the media as an information platform provided additional impetus for increased attention. Biotechnology became an important domestic issue as well when Canadian farmers saw the turmoil in their export markets and overseas consumers refused to have anything to do with their products. (MacLeans, 1999)

III. Consumers and Information: What the Research Tells Us.

A. What do we know about consumers, information sources and patterns of information-seeking on food products?

This section focuses on information needs and preferences of consumers to be informed about product choices, and ways in which information needs might be addressed for GM foods specifically. Recognizing and addressing consumer beliefs, perceptions and concerns is an essential component of understanding consumer behaviour around consumer products. Without this understanding, an effective and integrative risk communication strategy cannot be identified and observed (Frewer 1999, Mertz, Slovic and Purchase 1998).

The discussion that follows is based on an information processing model of the way people process and store information that is later used to make decisions, for example, about which foods to buy. Specifically, the model describes how message recipients deal with perceived information and the fate of that information as it is coded, transformed, associated, stored, rehearsed, recalled and potentially, forgotten (see Appendix 1).

At any given moment, an individual is likely to be exposed to multiple incoming audio, visual or other sensory stimuli. Only a small number of these stimuli will actually exceed the necessary threshold to break through the sensory register of an individual, be attended to, and become active thoughts in short-term memory. Short-term memory is the contents of our consciousness, or what we are actually aware of thinking about at any given moment. It is where all processing of information occurs. Individuals are typically only capable of thinking about 7 units of information at any given time (Miller, 1956). A unit of information could be a thought or idea, it could be a number, it could be a visual image or a sound. Short-term memory also has an approximate 20-second duration. If we don't think about new information for a sufficiently long time, it will be lost and never pass to long-term memory where information we remember is stored (Solso, 1998).

The 7-unit guideline can be exceeded, but only if information is presented in a way that facilitates chunking of information according to its semantic meaning, or if some other form of elaboration is induced by the communicator at the time the information is received. To the extent that information is presented in a way that facilitates its processing, therefore, the greater the number of individual units of information an individual can process at any given point in time. Consequently, communications about biotechnology should organize information according to semantic meaning and similar concepts so that more information of both a benefit and risk nature can be processed by consumers more easily and more quickly.

As opposed to short-term memory, long-term memory can contain an infinite amount of information. To remember information we must bring it back into short-term memory so that we can consciously be aware of it again. We might retrieve information from long-term memory to help make a decision in a purchase environment. Alternatively, we might retrieve information from long-term memory to use it in working memory to help us comprehend, interpret or compare to new information we are receiving. Information is always available from long-term memory but may not be accessible, i.e. we may have difficulty remembering it.

It is assumed that information in long-term memory is stored according to an associative network (Anderson and Bower 1973). Nodes in memory store concepts or ideas, and links between nodes denote relationships among concepts. Appendix 2 depicts a hypothetical memory structure for one individual about "tomatoes." "Vegetables" is a concept within the superordinate node. It is linked to "tomatoes", a subcategory denoting the relationship that "tomatoes are vegetables." Types of tomatoes are stored linked to the categorical "tomatoes" node, namely "GMO"/"Flavr Savr" and "non-GMO". Types of tomatoes are further identified as "hot house" and "field" tomatoes under the "non-GMO" node. The associative path to "field" tomatoes is strongest. "Field" tomatoes therefore tend to come to mind more easily than other types, probably because they are most frequently used by this individual. Negative beliefs for GMO tomatoes are well-connected in memory. They have been thought about and compared to each other when information was received,

perhaps because negative-GMO information is felt to be highly informative to choice of a tomato product for this individual. Positive beliefs about GMO tomatoes were not as intricately processed, resulting in fewer links among stored information elements about positive beliefs in memory. Consequently, for this individual, more negative beliefs about GMO tomatoes should come to mind more easily and more quickly than positive beliefs. Activation of negative beliefs in memory can spread directly from one belief to another when information is retrieved from memory because negative beliefs are interconnected. This is not the case for positive beliefs.

Given this overall model of information processing and storage, several key challenges face communication managers who want consumers well-informed about both the positive and negative aspects of GMO tomatoes:

- how to get their messages about GM food products attended to in the clutter that greets consumers at every moment; in the absence of message attention, consumers will not become neutrally informed about GM foods.

- how to motivate processing of both positive and negative beliefs in short-term memory for a sufficiently long time (how to keep the message recipient thinking about the message long enough) that it is retained, or passed on to long-term memory for storage

- how to aid retrieval of relevant risk- and benefit-oriented GM food information when it is needed for use

Each of the above challenges will now be discussed. All four challenges relate to how one might ultimately enhance the retention of GM food information so that consumers are well-informed about benefits and risks. Our discussion will then turn to how information is used to make product judgements or evaluations and product choices. Finally, a summary of key findings and considerations related to delivering consumer information needs for GM foods will be provided.

B. How to motivate message attention

The first challenge is to design communication stimuli so that they will be attended to by their target audience. Message clutter in all media has made this increasingly difficult. Consumers can ignore television messages in a variety of ways (leaving the room, channel surfing, zipping through the ads on videotaped television programs), they can ignore print media (not read magazine or newspaper ads, throw out direct mail without opening it, post a “no flyers please” sign on their front door, not read the flyers that do arrive), they can choose to delete or not access internet advertising, etc.

A key way to increase attention to messages is to make them personally relevant to the target group. This can be done in a number of ways. First and foremost a communication message should be in tune with and appeal to the needs, goals and values of the consumer. Under this scenario, individuals will experience a feeling of affinity or familiarity with the message and be willing to spend time processing more aspects of it. The message could depict sources (individuals) that are similar in appearance or in their initial attitudinal position to the target. It could use drama or rhetorical questions to help engage the viewer in the message. The use of pleasant, surprising, unexpected, prominent, concrete or simple stimuli in communications also help enhance attention (Burnkrant and Howard 1984, Burnkrant and Unnava 1995, Debevec and Romeo 1992). Traditionally in the advertising industry, visual images such as children, animals and pleasant scenery are used to enhance the ambient quality of ads and increase attention. Music is also a popular inclusion to intensify the pleasantness of the viewing experience. If some of these devices were used in a message about GM foods, it should motivate more attention to and processing of benefit and risk information.

One of the key problems facing marketers for the last decade has been the proliferation of media vehicles, all of which compete for the consumer's attention. Taking the television medium alone, it was only 15 years ago that a national television advertiser could efficiently and effectively build a media plan relying on one or more of the three national television networks - CBC, CTV and/or Global. With television media fragmentation, a given viewing household can today access 60 to 100 or more channels, depending on the cable package or satellite service to which it subscribes. To break through this clutter, Cadbury Easter Creme Eggs hired a children's author to write "The Tale of the Great Bunny," an Easter fairy tale (Mills, 1997). The story was illustrated and distributed through magazine inserts, a direct mail campaign, and in schools as part of an activity kit distributed by a "Great Bunny Patrol." The kit included themed crafts, games, puzzles and recipes that teachers could use with their students. The material contained web site information and announced a letter-writing program where kids could write to the Great Bunny at the Land of Cadbury. Traditionally, the company had relied solely on its long-running "clucking" bunny tv ads to promote the brand at Easter. This improved program demonstrates the importance of targeting consumers pro-actively: taking a multi-faceted, integrated message to where they already spend time and making it interactive to increase message involvement and attention. These should be goals of any program designed to inform consumers about GM food in the current communication environment, but as Mills clearly reports, the examples of such a campaign are few and far between.

C. How to motivate processing in short-term memory

Processing in short-term memory can involve comprehension, rehearsal, elaboration of the information in a variety of forms, or abstraction from that information into an evaluative summary concept (e.g. "taste best" linked to "field" tomatoes or "bad for health" linked to "GMO" tomatoes). All of these processing mechanisms can increase the amount

of time that information remains in working memory, and therefore increase the chances that it will be passed on to long-term memory to be remembered later.

Message comprehension involves the interpretation or understanding of new information that is being presented. Frequently, information previously processed and stored in long-term memory can be returned to short-term memory to aid interpretation. If that occurs, processing might include comparing new information to old information for consistency or hypothesis testing about its interpretation. It might also involve comparisons which facilitate the identification of the appropriate place to store new information in long-term memory when it is passed on.

Rehearsal could be at an individual level as one would say a phone number over and over again to themselves to try to remember it. Or rehearsal could be less voluntary, for example, through the repeated exposures to a message communication (e.g. a radio advertisement). Both strategies increase the duration of time that information spends in short-term memory either on single exposure occasions, or through the influence of increased familiarity, and, consequently, additional motivation on subsequent exposure occasions.

When items are elaborated on or thought about together in short-term memory, they tend to become linked to one another associatively when stored in long-term memory, thus increasing the ease with which they can be recalled in the future (Solso, 1998). Clearly, it was easy for the consumer to draw the inference and evaluative conclusion in Appendix 2 that GMO tomatoes were "not for my family." The thoughts relating to "limited research" and consequently, questionable for one's health were sufficiently convincing that the individual thought about them and extrapolated evaluatively, forming a well-connected network of stored information that could be easily remembered. (Petty, Ostrom and Brock, 1981).

One particular strategy of information presentation has been shown to enhance the links that are formed among information elements in memory, and therefore the future recall of that information (MacLeod, Finlay, Kanetkar and Marmurek, 1998). This strategy involves providing individuals with a means of organizing complicated information in memory before that information is actually presented in a communication. The Einsiedel (2000) study demonstrated that many consumers have three types of concerns about GM foods: the effects of production on nature; the effects of production on the environment; and whether proper regulation of GM foods occurs. Consumers, particularly those who are less knowledgeable about biotechnology (Finlay, Morris, Londerville and Watts, 1999), could be provided, these general categories of information before any detailed information about the risks and benefits of GM foods is presented. The categories provide a way for individuals to deal with, interpret and organize complex information. Consequently, information presented after organizing categories are provided tends to be better linked in memory and stored in categorical clusters of similar information. More information of both a positive and negative nature is remembered later since activation flows directly among information

elements and the recall of information from one category, cues the recall of similar information from the same category (Chung and Finlay, 1998).

Consumers may inherently prefer and be predisposed towards simple communications, but the topic of biotechnology is not a simple one. Some consumers may not be motivated to process risk information about biotechnology. The goal of maximizing the effectiveness of a message about GM foods is not to convince consumers to either buy or not buy GM foods. Rather, to fulfill a mandate of full disclosure, strategies are needed which motivate consumers to think about, comprehend and ultimately remember balanced (risk and benefit) information about GM foods.

D. How to aid information retrieval from long-term memory

Information that is stored in long-term memory is not always accessible if paths to that information were relatively weak to begin with and decay occurs. The use of retrieval cues at the point of purchase, however, has been shown to improve retrieval of information that was previously processed and stored (Keller, 1987). A retrieval cue is an element of information that was originally presented as part of a communication. Assuming that element of information was sufficiently attended to and processed that it was passed on to long-term memory for storage, when the retrieval cue is later provided, activation of that element in memory should be immediate. If the element became linked to other message elements during encoding, activation should continue to spread to associated elements in memory. More of the original message will therefore be recalled than if the cue had not been used.

Using Appendix 2, a logical strategy for a supermarket to employ would be to put a "sun-ripened" sign near a display of field tomatoes. This would cue, in the purchase situation, the recall of additional information about field tomatoes that is linked to "sun-ripened," namely that they have a "natural taste," that they "taste great" and that they "may be bad for your health." Consumers would consequently make an more informed choice if they purchased GM tomatoes than they would in the absence of the "sun-ripened" retrieval cue. In a similar manner, prominent visuals or copy lines from communications about GM foods could be used in-store to motivate the recall or remembering of detailed information about benefits and risks that had previously been communicated.

E. Attitude Formation and Decision-Making

The previous sections deal with how to enhance the retention of information, but how is that information used to make decisions by consumers? Do consumers base decisions on an overall attitudinal predisposition or feeling? How are those attitudes formed? Or do consumers base decisions on an examination of specific information or facts that they either retrieve from memory or obtain in a decision situation?

Attitudes towards an object are believed to be formed by considering both beliefs about the object and an individual's evaluation of those beliefs (Ajzen and Fishbein 1980). A belief could be a fact relating to the benefits of GM foods (e.g. "Foods produced from GM seed allow farmers to realize better yields.") The evaluation of the belief is an assessment of how good or bad it is that farmers will realize increased yields.

When evaluating an object like GM food generally or a GM tomato more specifically, consumers would consider all the beliefs that come to mind or which are salient (prominent) about the product. Clearly, in the case of GM foods, a belief could be information about either a benefit or a risk. Beliefs and evaluations for each salient belief are multiplied together and then scores are summed across all salient beliefs. Since the model is statistically derived using regression, researchers can determine which beliefs are used in the formation of attitudes and which beliefs are stronger or weaker in influencing attitudes for a given target group.

$$A_O = \sum_{i=1}^{n} b_i e_i$$

where A_o = attitude towards an object
b_i = belief i
e_i = evaluation of belief i
n = number of salient beliefs

It is presumed that once an attitude is computed according to the above model, it can be stored in long-term memory as an evaluative concept. Accordingly, if consumers hold an attitude towards a GM tomato valenced at 3 (on a 9 point scale), they will be less likely to choose the GM tomato and opt for a non-GM one. If attitude valence is 8, the reverse would be likely to occur. There tends to be a correlation then between attitudes towards an object and the way one behaves towards it.

For a given target group then, this model could be used to determine and rank the importance of all beliefs individuals have about GM foods. What beliefs are statistically reliable in predicting attitudes towards a technology? Are benefit-related beliefs as well as risk-related beliefs used to form overall attitudes towards a technology? (i.e. balanced benefit and risk information). Or are either benefits and risks used in isolation to predict attitudes (unbalanced information)? Which specific beliefs (which benefits or which risks) are important? (Slovic, Lichtenstein and Fischoff 1984).

Finlay, Morris, Londerville and Watts (1999) report that whether balanced information (benefits and risks) is used to determine overall attitudes or whether unbalanced information (benefits alone) is used is a function of the degree of scientific knowledge of the reporting consumer. Individuals with higher levels of scientific knowledge will indicate a stronger intent to purchase specific applications of biotechnology in the food system if both the benefits and risks are credibly presented. On the other hand, individuals lower in scientific knowledge will rely more on benefit-oriented general information to form an

overall predisposition towards foods produced using biotechnology. Working to establish a positive overall predispositions towards seeking information about biotech foods would appear necessary for low scientific knowledge subjects if there is any hope of them being motivated to become more informed about risks and benefits of specific applications. More knowledgeable consumers require more detailed risk and benefit information about specific biotech food products before they feel sufficiently informed to make a choice. A communication strategy for GM foods will have to work hard at motivating the processing of detailed information among low knowledge consumers such that they become adequately informed.

In some situations, product decisions are not based on an overall attitude or on the deliberation of detailed information about the product offering. Instead, simplifying heuristics or rules of thumb may be used. Sandman, Miller, Johnson and Weinstein (1993) have summarized a number of processes underlying individual judgements and decisions concerning risks. Lay individuals tend to simplify large quantities of data into dichotomous (e.g. buy/not buy) relationships. Furthermore, in some situations, the more technical the data presented concerning a risk controversy (not the more data presented), the more extreme individuals will be in their concern.

The traditional rule of thumb used by consumers in the purchase of grocery products is that if a product is on-shelf, it must be safe (Hadfield and Thomson, 1998). Such an heuristic is particularly convenient for grocery products where 56 items are purchased on average during every 20 minute shopping trip (Nedungadi, 1990). The environment of the typical grocery store is cluttered and hectic, with the result that little information search and use tends to occur in-store, despite the fact that consumer decisions are more deliberative when products are perceived to be risky. With increased media coverage of genetically-modified foods, it can no longer be assumed that the traditional heuristic, "if it's on-shelf, it must be safe" operates. The current level of coverage of biotechnology stories, positioning the science as having "hoodwinked" the public mitigates against the long-term health of this heuristic. Mandatory implementation of GM food labeling would likely introduce a new decision heuristic. If a product is labeled GM and there is an alternative, consumers will likely choose the non-GM product. Indeed, research by Hadfield and Thomson demonstrates that the label will also cue additional information search. An opportunity exists, therefore, to establish an heuristic whereby the GM label raises sufficient questions so that consumers are motivated to find out more about both risks and benefits. This will be more likely to occur if information can be accessed relatively effortlessly. This puts extreme pressure on other forms of communication to present a detailed and balanced message to the public in a palatable and accessible manner.

Flynn, Slovic and Mertz (1994) concluded that risk perceptions for environment factors (e.g. street drugs, nuclear waste) are significantly lower for white males than for females or non-white males. Since a biological explanation was ruled out, the authors hypothesized a socio-political explanation based on power, status, alienation and trust

determinants of the perception of the risk White males may perceive less environmental risk because they create it, manage it, control it and benefit from it more directly. Women and non-white males may perceive the world around them to be more dangerous because they are more vulnerable, have less power and control, and tend to benefit less from new technologies. Risk perceptions may be directly influenced by worldview or general attitudes towards the world and it social organization. Since worldviews have been shown to act as orienting mechanisms, helping people navigate in a complex and potentially dangerous world, they may be difficult to easily overcome in their influence on the perception of new technologies with which risk stigma have become associated.

F. Credibility of Message Source

One factor that both the risk perception and consumer behaviour literatures has examined when looking at message effectiveness is the perceived credibility of the communicator of the message. Trust in sources that provide information regarding technologies, health and other issues is integral to the perceived credibility of the message. Within the biotechnology industry's increasingly-reported scientific achievements has come an increasing lack of trust in industry and the governmental bodies responsible for regulating these achievements. After testing a number of potential sources for communicating information about biotechnology, Finlay, Morris, Londerville and Watts (1999) reported that the most trustworthy source was a research unit at a respected Canadian university, while the least trusted source was an association of biotechnology producers. These findings are consistent with Einsiedel (2000) who reported that farmers and scientists were the most respected (with 72% and 70% of respondents saying that the two sources respectively were "doing a good job for society"), while industry developing new products with biotechnology and government making regulations on biotechnology were the least respected (50% and 32% of respondents saying the source was doing a good job respectively.) These examples suggest that judgments of credibility are linked with perceived interests (or conflicts of interest). Trust quickly diminishes in a source perceived to have a direct interest in particular outcomes. It is also linked with previous experiences with a given source and perceived expertise.

The implications of source credibility for communications about GM foods relates to the selection of an endorser who will motivate processing and acceptance of both risk and benefit information. Finlay et. al reported that trust in sources is important, regardless of the degree of knowledgeability of the message recipient about GM foods or science more generally. Slovic (1993) notes that, in the context of the nuclear energy industry, if trust is lacking, no form of communication will be effective. This is clearly a major challenge facing governments in developing a credible message concerning GM foods.

G. Summary - Consumer Information Needs and Use

A positive overall predisposition to GM foods is a desirable cognitive state for consumers, not to convince them to use GM foods, but rather to positively predispose them to search for and process specific information about GM foods so that they become informed about both benefits and risks. This is particularly important for the less scientifically knowledgeable segment of the population.

Consumers require information about GM foods. This information (beliefs about benefits and risks) forms the basis for attitudes towards buying GM foods. Attitudes are known to influence purchase behaviour, particularly if they are highly accessible in memory.

On the basis of what we have laid out in this section, a number of factors should be considered in developing communication programs about GM foods:

- Products should be developed with the needs and values of consumers in mind for optimal success and efficiency. Information that consumers need to evaluate products should be communicated credibly and effectively.

- Consumers need to be candidly presented with and motivated to process all of the benefits, risks, and uncertainties surrounding GM foods.

- Consumers must be targeted pro-actively and creatively, taking messages to them rather than passively relying on traditional media vehicles; messages across media should be integrated and as interactive as possible to increase involvement, interest and synergy; they should also be easily accessible. Only under these conditions will consumers be motivated to learn about both the benefits and risks of GM foods

- Message attention can be enhanced to break through media clutter and motivate further processing of communications; techniques include the use of pleasant, surprising, unexpected, prominent, concrete or simple stimuli.

- A key communication objective should be motivating elaboration of information in short-term memory such that it is passed on to long-term memory for storage; potential strategies here include: message repetition to increase familiarity and message rehearsal, the use of qualitatively persuasive messages to increase elaboration and the establishment of links among both benefit and risk message elements when they are stored

- Attempts should be made to enhance storage characteristics of information in long-term memory; e.g. aiding benefit and risk information storage in clusters

by categorical content, particularly for less knowledgeable consumers

- Consideration should be given to the use of retrieval cues in purchase situations to help consumers retrieve both benefit and risk information from memory that they have learned previously about GM foods.

- Labelling GM foods is a means of ethically informing consumers about what they are buying; the label may further motivate consumers to exert effort to seek more information about GM foods.

- Technical aspects of information should be presented as simply as possible

IV. Labelling as an Information Approach

Information is one basis for a consumer's ability to make informed decisions. It is also the primary principle on which the regulatory system's consumer protection mandate rests.

For the active information seeker, availability of information becomes key. However, for many products in the marketplace, the consumer may have neither the time nor inclination to seek information. This is not necessarily a hindrance because institutional trust may fill this void. When a product is on the shelf, an operating assumption would be that the food is safe. However, other consumer interests and needs or policy priorities have brought about information dissemination practices such as warning labels (cigarettes), health and nutrition information, or environmental or other social considerations.

Labelling is one mechanism for promoting policy goals and/or addressing specific consumer interests and concerns. In this section, we will explore the nature of labels and the regulatory system behind their use, the use of labels by consumers, and policy considerations for the use (or non-use) of labels for GM foods. This is not an attempt to address all labelling issues as other papers have already done so (see, for example, Phillips and Foster, 2000).

A. Food Labels

Codex Alimentarius, the food code established under the Food and Agriculture Organization and the World Health Organization, provides the following definition of *label* and *labelling:*

> ***Label****:* any tag, brand, mark, pictorial or other descriptive matter, written, printed, stencilled, marked, embossed or impressed on, or attached to, a container of food.

> ***Labelling***: includes any written, printed or graphic matter that is present on the label, accompanies the food or is displayed near the food, including that for the purpose of promoting its sale or disposal.

Clearly, labels can include something as simple as a symbol or seal or something as complex as a set of ingredients (with a string of chemical information) and nutritional information. It can include health claims (positive labels) or warnings (negative labels).

Codex Alimentarius and its member nations have agreed that the following information should be mandatory on the label of a pre-packaged food (Codex Alimentarius, *General Standard for the Labelling of Pre-packaged Food*):

- name of the food
- list of ingredients
- net contents and drained weight
- name and address
- country of origin
- lot identification
- date marking and storage instructions
- instructions for use.

In addition to the mandatory information outlined above, agreement has also been reached that the following two areas ought to be mandatory:

- declaration of ingredients on a quantitative basis when special emphasis is given to the presence of one or more valuable ingredients.
- when a food is treated with ionizing radiation/energy, the label of the food must indicate such treatment in close proximity to the common name of the food.

This Commission (whose food committee Canada chairs) has so far failed to reach agreement on the labelling of GM foods, an indication of the contentiousness of this issue.

In Canada, labels on food products serve three main functions:

> (1) To ensure adequate and accurate information relative to health, safety, and economic concerns and to assist consumers in making food choices;
> (2) To protect consumers and industry from fraudulent and deceptive labelling, packaging, and advertising practices; and
> (3) To promote fair competition and product marketability.

Responsibility for the establishment of non-safety food labelling policy lies with the Canadian Food Inspection Agency. Health Canada has responsibility over specific labelling requirements based on health or safety considerations. Food labelling in Canada is regulated

under the authority of the *Food and Drugs Act*. Under this Act, labels are required to contain, among other things, the following basic information:

- common name
- list of ingredients
- name and address of manufacturer or other responsible party
- durable life information on products with a shelf life of up to 90 days
- other product-specific information (e.g., % milk fat in certain dairy products)
- specific information in support of nutrition claims

Comprehensive guidelines are also in place to regulate nutrition and marketing claims.

Other regulations dealing with labelling are in the *Consumer Packaging and Labelling Act* which requires net quantity designations. Other specialized labelling requirements are also included under the *Canada Agricultural Products Act*, the *Meat Inspection Act* and the *Fish Inspection Act*. These deal with grade statements, country of origin, and other specific commodity information.

In general, labels are also required to be truthful, and not misleading or deceptive, and the required information must be:

- easily read and clearly and prominently displayed (with a minimum type height of 1.6 mm.)
- on any panel except the bottom, except for the information required to appear on the principal display panel. (Guide to Food Labelling and Advertising, sec. 2.1 to 2.15)

The current voluntary system of labelling for GM foods clearly stems from the general philosophy articulated that regulatory oversight should focus on the characteristics and risks of the biotechnology product, not the process by which it was created. This science-based risk assessment approach was operationalized in the Regulatory Framework for Biotechnology announced in 1993. Such a framework coupled the need to foster a favourable climate for biotechnology innovation and development and to establish guidelines for risk assessment based on a scientific database. It also laid the groundwork for "build[ing] on existing legislation and institutions, clarifying jurisdictional responsibilities and avoiding duplication."[3]

All of these elements – that regulation would be based on risk assessment of *the product and not the process*, that regulation could be carried out with existing legislation on

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[3]Government of Canada Backgrounder, *A Federal Regulatory Framework for Biotechnology*. January 11, 1993.

a case-by-case basis, and that new institutions were not needed for GMO's – provide the base for the current position on labelling. In essence, mandatory labelling would be triggered only in instances where a product differs substantially from its conventional counterpart or in instances where concerns about safety or allergenicity arise.

There is, of course, an exception to this product-based approach and this is the issue of food irradiation. Food irradiation is a food technology process and Canada's Food and Drug Regulations have required labelling with both a written statement such as "irradiated" or "treated with radiation", and an international symbol.[4] In trial sales that have been conducted in the US, irradiated foods sold well in areas across the country, and in some cases, even better than their non-irradiated counterparts (Wood and Bruhn, 2000). A simulation was conducted in Georgia where consumers were given information about irradiated food before it was purchased. Seventy one percent purchased irradiated beef, including 62% of the consumers who originally stated they would not purchase irradiated food (in Wood and Bruhn, 2000).

B. Consumers' Use of Labels.

What do we know about the use of labels by consumers? A National Institute of Nutrition study (NIN, 1999) on nutrition labelling found 70 percent of the random sample of Canadian adults claiming to refer to the nutrition information panel at least sometimes. The number of Canadians who read labels has increased from 61% in 1989 to 71% in 1997 (NIN, 1998). The main reason given for reading labels was to be informed about what one was eating. This was particularly so for people with special dietary concerns. Those who did not refer to the nutrition information were already familiar with the information, were disinterested, or had little time to read the labels.

In general, Canadians are satisfied with the adequacy of information contained on food product labels. A majority believe that the right amount of information is contained in food product labels (Environics, 1998). As for those who were not entirely satisfied with these labels, complaints centered around their complexity, insufficiency, or what was thought to be misleading information (NIN, 1999).

Other factors play a role in the use of labels including the role played in meal planning and preparation, the perceived importance of nutrition, education, socio-economic and a variety of other demographic factors (Nayga, 1996; Mueller, 1991). Among Canadians, more women than men, those under age 55, those with higher education and incomes, those who perceive themselves to be more knowledgeable about nutrition report using product labels more frequently (NIN, 1998).

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[4] Irradiated major ingredients which constitute more than 10% of the final food must be identified as "irradiated". Signs accompanying the bulk displays of irradiated foods are also required to carry the same identification as shown on package labels. Food advertisements for irradiated foods must clearly reveal that they have been irradiated.

Label reading is also prompted by an interest in making product comparisons, by concern about expiration dates of products or when a product is being purchased for the first time (NIN, 1998; Mueller, 1991). In terms of nutrition information, fat content is a primary motivator for examining labels (Mueller, 1991; Neuhouser, Kristal and Patterson, 1999), as is an interest in the association between diet and cancer.

While most consumers have some functional understanding of such terms as cholesterol, calcium, sodium, and preservatives, far fewer understand such terms as hydrogenation or polyunsaturated fat (Mueller, 1991). More recent studies report a similar pattern of inaccurate interpretation of some label information such as percent daily value (Levy, Patterson, Kristal and Li, 2000). Among Canadians, 23 % have also reported "difficulty understanding the nutritional information on labels (NIN, 1998).

Labels for purposes other than health and nutrition have also had a history of use. Labels have allowed concerned consumers to purchase products that conform to social values such as animal welfare (The Body Shop's "Against Animal Testing" label), fair labour practices (coffee products with the "Fair Trade" label; carpets claimed to be produced "without child labour"), or have been a tool for encouraging environmental stewardship (Gesser, 1998).

It is clear that labels do play an important role in providing information to consumers. When a label simply consists of a symbol, this serves as a signalling mechanism, alerting consumers to some feature about the product. Obviously, it can serve as a warning or as a positive signal. Labels may also incorporate additional information. In the case of the first GM tomato paste that was marketed in the UK until recently, the label "*Made with genetically modified tomatoes*" was used. A separate boxed message on the can had this additional information: *The benefits of using genetically modified tomatoes for this product are less waste and reduced energy in processing.*

Under certain conditions, labels may have significant impacts on whether or not a purchase is made. For example, studies on the impacts of FDA regulatory changes which allowed producers to make health claims on their products such as cereals provide empirical evidence showing changes on the part of both producers and consumers. In the case of producers, there was a decline in production of high-fat, high-cholesterol foods and on the part of consumers, purchase behaviour changes were noted in favour of low fat and low cholesterol products (Mathios, 1998). It should be noted, however, that during this period, additional sources of information on healthy diets were also available such as through the mass media.

Environmental objectives have also been met through labelling. In Germany, low-emission oil and gas heating appliances were labelled, resulting in reduced quantities of sulphur dioxide, carbon monoxide, and nitrogen oxides emitted by 30 percent (Dawkins, 1996). On the other hand, some producers have balked when labels demand standards that

are too strict. When the Dutch did not allow any hydro fluorocarbons (HFCs) and hydro chlorofluorocarbons (HCFCs) in refrigerators, manufacturers opted to follow the less restrictive labelling guideline of the European community (Dawkins, 1996).

C. The Costs of Labelling.

The Australia-New Zealand Food Authority considered the issue of mandatory labelling in 1999 and commissioned an independent consultant to determine compliance and enforcement costs for a mandatory labelling regime. The proposed requirements included provisions to require manufacturers to take all reasonable steps, through audit and/or tests, to determine whether ingredients present within a food they sell are derived from approved GM food commodities. An important assumption of the study was that in complying with the standard, manufacturers would undertake to evaluate all ingredients (including compound ingredients, processing aids, additives and flavourings) for their GM status. This assumption, therefore, represents the highest-cost options for industry. It is based on estimates of processes and costs necessary to substantiate negative claims which are made voluntarily by manufacturers.

The KPMG report (KPMG, 1999) projected that it would cost industry approximately A$3 billion (approximately C$2.58B) to comply with the standard in the first year of operation. This amount is about 6% of turnover and was projected to be reduced to about 3 percent of turnover in subsequent years.

The study concluded that industry was unlikely to absorb such an increase in costs. It projected very large price increases for some enzymes and around 10 to 15% for major ingredients, which could potentially increase prices on processed food from 0.5 to 15%. The report also estimated likely regulatory costs of compliance in both countries to go as high as A$150 million per year (about C$129M) which would involve a full audit of all food producers and retailers. If auditing were to be limited to selected manufacturers and importers and investigation of complaints, this amount could be reduced to about A$14 million per year (C$12M). This, in turn, could be reduced by half if only complaints and reported breaches of compliance were investigated.

Finally, the report examined alternatives to a full mandatory labelling regime. These included not requiring labelling of refined ingredients, minor ingredients or food additives, processing aids and flavourings. Adoption of such alternatives could reduce the cost of compliance for industry and regulators by up to 80%, the report concluded.

It should be pointed out that the Australia-New Zealand Health ministers did not accept the KPMG cost analysis because among other things, it did not appear to consider industry diligence in compliance.

D. The Context for Labelling Programs.

Not much is known about the context for labels. One factor behind the efficacy of labels, of course, is the implementation of codes of practice that help to influence or set benchmarks for behaviour in the marketplace. These may be legislative (e.g., the regulatory demands for tobacco and alcohol products) or they may be voluntarily adopted. One overview of Voluntary Codes conducted by the Office of Consumer Affairs (Office of Consumer Affairs, 1998) has been particularly helpful and we summarize some of its main points here.

The voluntary adoption of codes happens under a variety of conditions: typically, they may be a response to the threat of government regulation, to competitive pressures, or to consumer demands (and possible threats of boycotts, for instance). Some examples of the impacts of these pressures:

- Consumer pressure has forced some industries such as Nike and the GAP to consider more carefully production labour conditions in their factories in developing countries. These companies have developed codes that govern working conditions. (OCA, 1998)

- With the possibility of a European consumer boycott of Canadian wood products because of perceived destructive logging practices, the Sustainable Forest Management Certification system was adopted by the industry. (OCA, 1998)

- The Responsible Care program adopted by the Canadian Chemical Producers' Association was a system of environmentally sustainable practices that covered the product life cycle from production to disposal. This was developed in response to a series of environmental disasters that raised the possibility of government regulation. (Einsiedel, 1998)

The OCA summary suggests that codes generally work best under the following conditions:

- when the industry is mature and stable
- when there are comparatively few players, each of similar market size and power
- when there is leadership from key industry players and a strong industry association
- when there is a positive inducement for firms to participate, as well as sanctions for non-compliance;
- when there is a credible threat of government or legal action
- when there is strong public pressure

Not many of these optimal conditions exist for the biotechnology industry at the present time. The industry is relatively young, consisting of a few very large and many very small players (BioteCanada, 1999) and the industry association reflects this diversity in its membership. At the present time, there appears to be little positive inducement to participate in a labelling program because of the fear that consumers will read a GM label as a warning; the inducement to label resides primarily among those who want to label their products as "GM-free". Here, a voluntary code would then act primarily as a motivator for the auditing of these claims to ensure they are truthful and not misleading.

The development of standards, on the other hand, may provide a different approach to ensuring that labels are truthful and not misleading. When these standards are developed with participation from the community of stakeholders and the guidance of standards boards, the implementation of labelling systems can be more meaningful. The system adopted can have the status of regulation (with some enforcement capacity) when such standards are referenced by a governing body. Should Codex Alimentarius, for example, come to some agreement on labelling standards for GM food, the World Trade Organization will then likely use these standards when appropriate.

While interest in labelling has been high as demonstrated by various surveys[5], (see also Environics, 1999), relative to Europeans, Canadian consumer pressure for labels has not been as pronounced (Earnscliffe, 2000). Those who have expressed an interest in labelling cite freedom of choice as motivating this interest. Hadfield and Thomson (1998) have also argued that a label may trigger an information search on the part of some consumers. Furthermore, they argue that "if producers are faced with the prospect that consumers will, through lack of information, avoid biotechnology products, they will devote resources to providing information." (Hadfield and Thomson, 1998, p. 572). There is then some incentive for producers to provide more information to correct what they might see as information distortions. Finally, "labels would better ensure that purchasing decisions are based on informed consent" (Legault, et.al., 1998, 484; Hadfield and Thomson, 1998).

In 1999, a Voluntary Labelling Committee for Genetically Modified and Non-Genetically Modified Foods was appointed to work with the Canadian General Standards Board and the Canadian Council of Grocery Distributors to develop voluntary labelling standards. This Committee's report was expected in early 2000 although difficulties in arriving at consensus have delayed this process.

The principle behind creating standards as the basis for using labels remains an important one. Standards do not just allow for uniformity of interpretation; they are also

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[5]Phillips and Foster (2000) have summarized an Angus Reid-*The Economist* survey of consumer attitudes to GM food in 1999 where anywhere from 57% of consumers in the US to 82% in Germany said they would be "less likely to buy GM-labelled products". The figure was 68% for Canada.

measures of "value" in an economic as well as a cultural sense. (Busch and Tanaka, 1996). When a producer agrees to a label that rests on a particular set of standards, he or she is promoting transparency as well as providing reassurance of confidence in the product. Such reassurances are particularly helpful in the case of GM foods. A consumer study of public communication and novel foods sponsored by the Food and Consumer Products Manufacturers of Canada found that consumers were seeking reassurance not just about safety but also about the character of the firms they did business with. In these transactions over GM foods, consumers were also interested in these questions: "Are you an ethical person?" "Do you care about these products?" Are you honest?" "Can I trust you?" (Curry, 1997).

While there may be incentives for those wishing to use GMO-free labels, there is little or no incentive for those producing GM products to do the same, given the current environment of opinion. At the same time, an examination of different labelling regimes for GM products around the world led Phillips and Foster (2000) to conclude that the wide variations in labelling approaches and ineffective and costly monitoring systems are creating pressure for a different and more coherent approach to meeting consumer information needs. Doing this through international organizations may be one way to arrive at some consensus but disagreements on GM food among participating countries have made this an extremely slow process.

At the present time, the environment for the use of labels for GM food encourages the use of these labels, at the very least to indicate process. There is precedent for this in the irradiation label; consumers have expressed a preference for GM food labelling; and the imperative for building trust exists. Recognizing producer reluctance to label, it is important that such an effort be accompanied by a major public awareness effort to promote better understanding of the process of genetic modification.

V. Other Approaches to Information Dissemination: The Current Information Landscape

In this section, we examine the question, "what are the current sources of information for Canadian consumers on biotechnology and what is the nature of the information provided?"

A. Government

A.1. Federal level. Seven ministries have responsibility for regulating biotechnology. All, to a greater or lesser extent, try to provide information on biotechnology, although primary responsibility over GM foods rests with the Canadian Food Inspection Agency and Health Canada. These agencies use a range of information tools to address consumer questions including websites and brochures.

A key information initiative was conducted in early 2000 to assure Canadians about the safety of their food system. An information brochure titled ***Food Safety and You*** was sent to every household in the country. The brochure addressed six questions: (1) Why is Canada's food supply one of the world's safest?; (2) What is the government of Canada's role in food safety? (3) Why is accurate labelling important for food safety? (4) How are new food products approved? (5) What can you do as a consumer? (6) What is the government's commitment? A last section called "Hungry for more information?" provided an 800 number as well as a general website address and the website addresses for CFIA, Health Canada, and Agriculture and Agri-Food Canada.

The brochure focuses on the general issue of food safety and embedded issues around novel foods within this more general question. Sidebar boxes provided practical tips on food preparation and food safety. The section on "how are new food products approved" included a sidebar explaining "What are foods derived from biotechnology?". The cost of this entire activity (production of a 7-page four-colour brochure, sent to 12 million households nationwide) was $2.76 million.[6] Clearly, this effort was intended to address general questions about safety, to respond to consumer questions about the safety of GM foods in particular, and to assure consumers about the regulatory system.

The government website <www.canada.gc.ca> is part of the federal government's effort to provide a central information window about Canada. Not surprisingly, it covers everything from business, industry and trade, to jobs, taxes, and consumer issues. If a consumer were to use this site to search for information on biotechnology, the route he or she goes through involves the following: enter through "Programs and Services", go to the Info Centre ("subject matter"), choose "Health, Medicine and Science" from the pop-up menu, proceed to "Nutrition", then to "Food and Nutrition," and there will be information in this section on novel foods.

If a consumer is interested in a list of approved GM foods, he or she would have to be a somewhat savvy user of the internet to find this information.

The federal government recently started a site called *BRAVO* <www.bravo.ic.gc.ca>, which stands for ***Biotechnology Regulatory Assistance Virtual Office***. This site is intended as a regulatory roadmap identifying various regulations and guidelines "to help streamline the information management process and provide a value-added one-stop internet-based window to access regulatory information required for biotechnology products." This site has been set up to assist industrial ventures primarily and is NOT intended to target the consumer as primary user.

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[6]Information about this campaign was obtained from the brochure and from the Canadian Food Inspection Agency.

The Consumers Association of Canada has recently noted the difficulty consumers have in tracking down information about regulatory responsibilities. The CAC has advocated "a 'single-window' approach to the regulatory side of biotechnology. In other words, there must be one well-publicized point of contact for consumers where consumers can be either immediately provided with the information they need or be directed to the correct expert." (Consumers Association of Canada, 1999)

A.2 Provincial government initiatives.

Many of the initiatives at the provincial level are just starting. The exception is the province of Saskatchewan which funded a non-profit organization, ***Ag-West Biotech*.** This organization's main objective is to facilitate and promote the development of the biotechnology industry by providing development support to companies. At the same time, the organization also "raises awareness and understanding of the role of biotechnology". Its support comes from the Canada-Saskatchewan Agri-Food Innovation Agreement.[7]

Ag-West Biotech has the most extensive experience in information dissemination at the provincial level. It runs an information centre called the Saskatchewan Agricultural Biotechnology Information Centre (SABIC) whose mission is "to familiarize individuals with the benefits of biotechnology, to discuss issues, and to demystify terms and concepts." It provides information through demonstration labs and disseminates information through its publications which include the Food Biotechnology Resource News, the Library Series, Biotechnology Fact Sheets, and the Producer Information brochure. Ag-West also runs a website at <www.agwest.sk.ca>.

Through its demonstration lab, visitors can get hands-on experience with simple experiments including separation and viewing of DNA material, introducing visitors to the process of finding genes and genetic engineering. Since SABIC opened in October, 1997, over 5,000 people have visited the demonstration laboratory. Responses from visitors to the demonstration lab have been very positive, with comments indicating enjoyment of the hands-on approach and open discussion. SABIC also reaches a broader audience by travelling to farm fairs, science festivals, and other similar venues.

It costs $145,000 to run SABIC annually, including its publications. Other costs such as rent for lab space and office costs are subsidized by AgWest Biotech.

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[7]Information on AgWest Biotech and its educational activities were obtained from its website and from K. Broten, SABIC coordinator.

B. Industry

B.1. Council for Biotechnology Information[8]

Mandate and Description

The Council for Biotechnology Information (CBI) was formed by seven multinational firms in biotechnology/life sciences: Aventis CropScience, BASF, Dow Chemical, DuPont, Monsanto, Novartis, and Zeneca Ag Products, Inc.. The program was developed to give North American consumers a more positive outlook on the possibilities of biotechnology, as a response to the perceived sensational attention the topic had been receiving in the media, especially in Europe. Findings from the industry's consumer research also showed that consumers were mostly exposed to the risk factors involved in biotechnology. The program was launched April 3, 2000 in the US and May 3, 2000 in Canada. Print ads were launched on June 1, 2000. This activity will run for a minimum of three years and may extend to five years if necessary.

The information provided is intended to complement existing sources of information (such as that provided by the Food Biotechnology Communications Network), and also to provide a more positive perspective on the applications of food biotechnology.

The information provided by the CBI is directed entirely at consumers. Research determined what consumers wanted to hear about biotechnology applications, and that is what is showcased in the CBI's information program. The three main areas for the promotion of biotechnology are: the enhanced nutrition of foods, improvement of the environment, and the ability of biotechnology to solve world problems (e.g., world hunger).

Information Sources

The CBI program consists of television and print media advertising, a toll-free telephone number, an internet website, and a printed information kit called *Good Ideas Are Growing*. All sources are available in both French and English, with differences in the English materials for the US and Canada.

Target Demographics

There are two primary target demographics of CBI's program for North America: 1) the primary household grocery shopper, i.e. women 18-50 yrs., and 2) opinion leaders, i.e. people with a higher education who may have previously been exposed to information on biotechnology (e.g., people from governement, media, and education). In Canada, an emphasis has been placed on the first demographic group, using targeted advertising.

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[8]Information on the Council for Biotechnology Information was obtained from the CBI website, from its press kit, and from interviews with Art Stirling of Pioneer Hi-Bred Canada, the designated contact for Canada's CBI campaign.

Advertising - Print and Visual Media

Based on demographic targeting, print ads are run in a variety of news sources including the *National Post*, the *Globe and Mail*, and magazines such as *Canadian Living*, *TV Guide, Reader's Digest* and *MacLean's*. The print ads are full colour, showing a picture of someone who has (through medicine or agricultural applications) benefitted from biotechnology, accompanied by a short testimonial, a few words on biotechnology, and an 800 number and website address .

Television advertising, has been running since May 3, 2000 in Canada, May 10, 2000 in Quebec (see Appendix 3). There are two ads each for Canada and the US, one thirty second spot and one sixty second spot. According to a press release, "the ads feature real people who have benefitted from biotechnology in medical and agricultural applications." That said, there do exist small differences between the Canadian and American ads. The crops mentioned in the American ads are soybean and cotton, while in the Canadian ads they are Canola and corn; however, the visual portions of the ads remain essentially the same.

The ads introduce the CBI and talk superficially about the benefits of biotechnology. The goals of the television ads are threefold. First, they intend to bring attention to the applications of biotechnology, with focusing on agriculture and the other half on medicine. Subsequent ads planned for production and release will emphasize specific applications, for instance, in the area of medical developments, and will include testimonials from people who have benefitted from the technology. The second goal of the ads is the same as might be found with any product launch, that of "brand identification". The CBI is interested in creating a "brand" for biotechnology with which people can become familiar. The final goal of the ads is to promote the CBI's other sources of information, the website and the toll-free line, information which appears at the end of the ads.

Toll-free Line

In Canada, the toll-free line (1-800-980-8660) is automated, and intended for callers to leave their names and addresses so as to receive an information package. The CBI took the exclusively automated approach in Canada because it did not want to duplicate the efforts of the FBCN. The information package, callers are told, will provide references to other sources. For its first two weeks of operation, the toll-free line received 81 calls in English and 15 calls in French.

Information Kit - Good Ideas Are Growing

The information kit entitled *Good Ideas Are Growing* contains various information points. Included are a fourteen page brochure which focuses on the three main issues, plus two others: biotechnology's benefits for agriculture, and an assurance about the safety of food biotechnology. The last page of the booklets provides a list of "other groups, scientists and government agencies" that can be contacted via the internet for more information on biotechnology. Among the sources listed are the FBCN, the Consumer's Association of Canada and the National Institute of Nutrition. Along with the booklet, six fact-sheets of two

to four pages each, are included. In addition to the fact-sheets on the three main topics the CBI focuses on in biotechnology are a letter on questions and answers (about the CBI and biotechnology in general) and an overview of Canada's food regulatory system. A storyboard for the sixty second Canadian commercial is also included. The information kit is available for full download from the website.

Website

The address for the website is advertised in the television ads and will be included in the print materials. It is advertised as <www.whybiotech.com>, but is also accessible at <www.whybiotech.org>. The site is available in both French and English, though currently the French site is under construction, and not as much information is available. (It is intended to be a mirror of the English site.) The site is managed from the US and updated regularly (three times a week). The operation of the site out of the US is one reason why there are difficulties updating the French site. Another reason cited is the belief that there is not as much information available in French as in English on the subject of biotechnology (e.g. in news items).

The information on the CBI website is kept to a level most consumers can understand and does not addressing the science of biotechnology in any depth. The content emphasizes the positive aspects of biotechnology, including quotes from "third-party experts" who all speak for biotechnology. Much of the information on the site reflects the CBI's three main promotional objectives. Not surprisingly, the links that are provided are to sites that have a similar positive bent on biotechnology.

Statistics are available for the website for the US only for the month of April. In that time, the website had 4,500 unique visitors every week.

Funding

The funding for the CBI comes from its founding industry members. Its first-year costs (including start-up) are US$50 million, US$7 million of which constitutes the Canadian portion of funding. The latter figure does not include creative development costs, which were covered by the U.S. portion of the budget.

B.2. Provincial Industry Alliances.

There is an industry alliance present in most regions around the country. They include: the BC Biotechnology Alliance, BioAlberta, the Toronto Biotechnology Initiative, Ottawa Life Sciences Council, Quebec Bioindustries Association, BioNova, and BioAtlantech. These groups are provincial industry associations with a similar goal of promoting the development and interests of biotechnology businesses in the region.

Mandate

Canada's biotechnology industry alliances are intended to advance the biotechnology

industry in their areas by connecting people in industry, public research institutions, and the provincial and federal governments. Information that is available from these alliances promotes the advantages of biotechnology. The intended audience is not necessarily the average consumer but opinion leaders, journalists, teachers, and high-school science students.

Information Activities

Currently, none of the major industry alliances across the country have programs set up to deliver information specifically to consumers, or the public at large. The main target of information (outside of members) is post-secondary students and teachers. The goal in this area is to promote biotechnology within the educational system and to encourage students to pursue biotechnology- related careers. This is achieved though expositions such as the Aventis (Connaught) Biotech Challenge which allows students to participate in a biotechnology-based science competition sponsored by government and industry. Other educational resources, such as teaching manuals, are available to teachers.

Most of the alliances have their own websites, which have some information on biotechnology, but are more focused on the alliances themselves.

C. The Food Biotechnology Communications Network (FBCN)[9]

The Food Biotechnology Communications Network (FBCN) was set up as a source of information and referral centre for further information on biotechnology issues. In addition to its own dissemination activities, it has also become a referral point for a number of the major food retailers in Canada. In order to understand this role, its structure and activities will be described in some detail here.

FBCN was incorporated as a not-for-profit organization in 1995 from a pilot project that had been run for the three years prior, with support from the Canadian Institute of Biotechnology (now incorporated with BioteCanada, the national industry alliance). It is directed by a nine-member Board of Directors whose representatives are chosen from government, non-government, and private sectors (three for each). In addition to the Board of Directors, FBCN has the advice and counsel of a fifteen member Advisory Committee appointed by the Board of Directors to provide input into the policies and initiatives of the organization.

Information Dissemination Activities

FBCN provides information in three ways – via a toll-free information line (1-877-366-3246), a website <***www.foodbiotech.org***> and through a brochure, *A Growing Appetite*

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[9]Information about FBCN was obtained from its website, its print information materials, and interviews with Diane Wetherall, Executive Director.

for Information. Besides the brochure (which directs people to the website and the toll-free line), information about FBCN is mostly disseminated through press releases and referrals.

Brochure - A Growing Appetite for Information

The brochure was co-produced with the Consumers' Association of Canada. It covers basic biotechnology application information, regulation information, labelling information, a brief scientific overview, and contact lists for further information. An initiative taken in November, 1999 saw 700,000 copies of the brochure distributed in *Canadian Living Magazine*, a women's magazine available across Canada. This cost approximately C$100,000. A similar initiative will be taken in the July 2000 issue of *Coup de pouce*, a Canadian French-language women's journal. So far, 1.25 million copies of the brochure have been printed. Its initial cost was C$20,000 (writing, design, production), with another C$200,000 spent on printing so far. With the exception of bulk orders, these brochures are available free of charge.

Call Centre

The call centre, accessible by a toll-free line, was established in May 1999, staffed by a single, part-time representative, a dietitian-nutritionist. It expanded in November of 1999 to include three permanent and four part-time staff members fielding calls from across the country. The phones are staffed from Monday to Friday, between 10 AM and 5 PM Eastern Time. The service centre is located in Guelph, Ontario, with one of the staff members located in Medicine Hat (running on the same hours as the Guelph office).

Staff members are required to have a Bachelor of Science degree in agriculture, nutrition or the biological sciences and some customer service experience. Weekly meetings are held for the staff in which guest speakers, with expertise related to biotechnology, are brought in. It is currently not required that representatives have bilingual capabilities since fewer than 10% of calls have been in French.

Some statistics provide a picture of usage patterns (FBCN, 2000):

- 1,437 calls were received from November, 1999 through May, 2000.
- 69% of callers were female; 39% identified themselves as consumers
- From February through May, 2000, 58% of the calls were from Ontario and Quebec; 21% were from the Prairie provinces, and 7 % each were from BC and the Atlantic provinces.

The top five questions asked for the month of March are categorized, with the number of calls in brackets and examples of the types of questions asked, as follows:

1. General information about food biotechnology: (30)
    - *What information do you have on biotechnology?*
    - *What are genetically engineered foods in Canada?*

2. Samples of questions relating to specific foods: (29)
    - *Is there a fish farm that has genetically modified salmon?*
    - *Which Quaker cereals contain GE corn?*
    - *What is Loblaw's position on GM foods?*
3. Labelling: (14)
    - *Why is it taking so long to have a food labeled in Canada?*
    - *Why would a manufacturer voluntarily label?*
4. Against GE: (5)
    - *I think there should be a complete moratorium on GM foods like there is in Europe.*
5. Regulatory/government: (5)
    - *Where would I find legislation for food biotechnology?*

In 1999/2000, the call centre cost was $300,000, with 60-70% of the budget covering staffing costs (including a contract project manager and full- and part-time call representatives). The rest covers the costs of the long-distance calls and overhead.

Website

FBCN's website supplements its other information sources. Information is provided about which food products, by category, have been approved and registered through Health Canada and the Canadian Food Inspection Agency.

A set of Frequently Asked Questions (FAQs) is available on-line. Some of the questions are about food biotechnology in general (e.g. *Why hasn't the government told us about genetic engineering?*[10]), while others address very specific issues (*Was L-Tryptophan the cause of the EMS outbreak?*). The questions have appeared on the website in response to both questions that arise often from consumers on the toll-free line, and media stories that draw a great deal of public attention.

A "news items" link connects the user to the AgNet news service at the University of Guelph, a daily compilation of news items, summaries of scientific reports, and other biotechnology-related announcements. Another link, "what the heck is Biotech?", provides information on biotechnology in general, and closely resembles the brochure. One additional feature of the website is an interactive quiz which can be taken and "graded" on-line.

The website is updated daily by the same representatives who staff the call centre. So far, **the average number of visitors to the website has been around 20,000 per month,** but a better tracking system is expected to be installed when the site is updated. Enquiries can be addressed through e-mail, but so far there has been a relatively small number (5/day),

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[10]The response to this question is typically that discussions have been ongoing since 1988, but that the multi- stakeholder consultations have been conducted since 1993 but were rarely publicized. However, callers are told that any other concerns are welcomed by federal ministries.

and most of them are questions about the organization itself.

Funding

FBCN "is "a not-for-profit organization funded through memberships, grants and revenue generated through educational programs and special events." The 1999/2000 budget totalled C$500,000 which included the start-up costs for the call centre. Funding for the centre comes from three main sources: memberships, projects with food manufacturers and distributors, and government grants.[11]

D. Information from Food Retailers[12]

Food retailers such as the supermarkets are at the front-lines with consumers. We interviewed public affairs representatives at two of the large outlets, Safeway and Loblaw's, about information on genetically modified food. Both referred our calls to the FBCN line. No further information was available. The Canadian Council of Grocery Distributors, a non-profit association of the grocery distribution industry (wholesale and retail) has made available the information produced by FBCN to members who ask. Specifically, the brochures on *What the heck is biotech*, *A Growing Appetite for Information*, and *What's in Store* can be ordered by members. Officially, CCGD promotes three points on GM foods: (1) GM foods should meet the same safety requirements as any other food; (2) CCGD is in favour of voluntary labelling guidelines (and is actively involved in their development); and (3) the organization believes GM foods can have some benefit.

E. Non-Government Organizations[13]

E.1. Greenpeace

Greenpeace has positioned itself in complete opposition to biotechnology/genetic engineering, and the subject is currently one of its major campaigns. The organization's goal is prevention of the release of GM organisms. Greenpeace's campaign is directed to the general public, providing information on its causes through press releases and media events. Pamphlets on biotechnology are available at Greenpeace offices, on the website

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[11]There are around 100 members (subject to fluctuation because of annual renewal) with different fees for different members. Individual members account for 60% to 70% of membership, and are charged $40 (all membership fees are for one year in Canadian dollars). Association membership costs vary depending on size, from $500 to $1000. Corporations pay $2500 for their membership, or $5000 to be considered a founding member. However, membership fees account for only 15% of total revenue. Projects with the Food and Consumers Producers and Manufacturers of Canada and the Canadian Council of Grocery Distributors account for 35% of revenue. The remaining 50% of revenue comes from a grant from the Government of Ontario, through its Provincial Rural Job Strategy.

[12]Information was provided by access either to the retailer's websites, or by representatives over the phone. Brian Weston of the CCGD western region provided much of the information for the Canadian Council of Grocery Distributors.

[13]Information was gathered from NGO websites and from their representatives over the phone.

<***www.greenpeacecanada.org***>. They are also handed out at public demonstrations. Titles include *Genetically Engineered Foods: an eXperiment with nature*, *Harvesting Destruction,* and *The True Cost of Food*, but publications by non-Greenpeace affiliates are also available, and these cover the range of scientific opposition to biotechnology.

Greenpeace also publishes a newsletter available to its members and the general public. Currently, the website's main feature is genetic engineering, and covers issues under the headings 'secret ingredient,' 'the environment,' 'human health,' 'myths & facts' and 'actions & events.' Individuals can join Greenpeace's Cyberactivist Network online. The information gives updates on action being taken by Greenpeace, and information against biotechnology. There are no other sources of information offered by Greenpeace, but the organization works in collaboration with the Council of Canadians on the issue of biotechnology, and the website provides links to other NGOs.

E.2. Friends of the Earth

The mandate of FoE regarding biotechnology, which falls under its ongoing 'Real Food' campaign, extends to issues such as human health and the ethical questions surrounding genome mapping, but its primary focus is on the consumer/citizen right to know about food composition. FoE is also advocating funding for organic farmers that matches the funding given by the government to the biotechnology industry. The organization was a representative at the Biosafety Protocol discussions in January 2000.

FoE distributes its information to the general public mainly over its website ***<www.foecanada.org>*** which is linked to other sites, but not actively promoted. Questions are answered if submitted over e-mail. Other distribution approaches are by post and by phone, though internet access is the preferred information dissemination method (to reduce costs). Only the organization's brochure is available by post, and this does little more than give a brief overview of the organization itself. Not much information is available in hard copy, though two newsletters are available. *Link* is the FoE International newsletter that is published bi-monthly and available for a subscription fee. *Earth Words* is the publication sent out irregularly by FoE Canada to donors. Questions on biotechnology may be answered over the phone by a qualified representative, but this person is on contract, and is not always available. FoE's approach is mainly to explain biotechnology in scientific but generally comprehensible terms, and to promote its position on the issue.

E.3. Council of Canadians

The Council of Canadians is "an independent, non-partisan citizens' interest group providing a critical and progressive voice on key national issues." One of its current campaigns is focused around genetically engineered foods, and aimed at the general public. The Council's stand on the biotechnology includes calling for a moratorium on all GM foods until there is long-term testing for human and environmental safety, for mandatory labelling of all GM products, and for the elimination of corporate influence over the GM product approval process. Links on its site are to other active organizations that share its views (e.g.

Greenpeace, the Sierra Club and Friends of the Earth; these links are reciprocal), as well as groups of scientists who are sceptical of the safety of GE foods. The information presented on the website <www.canadians.org>, in the brochures and factsheets, and in its publication, "Canadian Perspectives" (a magazine published quarterly, available on the website and through the venues listed), promotes its positions on the issue.

Information can be obtained from local groups, chapters and coalition partners, also at events, local meetings, and by direct requests to the Council's offices (accessible across the country through a toll-free line 1-800-387-7177). Information is released on the website, via press releases, and through mail-outs and e-mail updates.

E.4. The David Suzuki Foundation

The David Suzuki Foundation is a "federally registered Canadian charity which explores human impacts on the environment, with an emphasis on finding solutions." This is achieved through education on related issues and participation in initiatives relating to the same. Currently, biotechnology and genetically engineered foods are not a main focus of the Foundation. There is, however, information available that is related to the topic. David Suzuki (for whom the Foundation is named, and with whom it is run) writes a weekly column called *Science Matters* that is featured in newspapers in Canada. A search of the Foundation website <www.davidsuzuki.org> currently features four of these articles dealing with GE foods. The approach taken in these articles is at once interested in (and never dismissive of) food biotechnology, and, at the same time, is critical of the current testing practices of these foods. Suzuki enjoys wide recognition and credibility with the public.

E.5. The Canadian Institute for Environmental Law and Policy (CIELAP)

The Canadian Institute for Environmental Law and Policy based in Toronto has focused generally on environmental issues but it has also produced position papers on biotechnology. In 1995, CIELAP produced a good reference called ***Citizen's Guide to Biotechnology*** (CIELAP, 1995). This provides an overview of biotechnology in an easy-to-read format and is more balanced in its consideration of questions of risk. Unfortunately, this booklet needs to be updated. Its website is located at ***<www.cielap.org>.***

E.6. Rural Advancement Foundation International (RAFI)

RAFI is an international non-governmental organization headquartered in Winnipeg. Its goals include conservation and sustainable improvement of agricultural biodiversity. RAFI has been active in mobilizing to sustain genetic diversity, especially in agricultural environments. It is also active in investigating the impacts of intellectual property questions on agriculture and food security. Its website is at ***<www.rafi.org>***

Its target audiences are primarily journalists and opinion leaders. RAFI has had a major impact in promoting debates around "terminator technologies" and patenting.

F. Evaluation of Existing Programs

The programs we have just described which are aimed at Canadians cover a variety of channels and employ varying communication styles. We have summarized this information in Table 2. After examining the various information programs and approaches, we briefly summarize what we see as the strengths and weaknesses of these various programs as these relate to raising awareness and information processing consideration. Criteria used to evaluate programs are those provided in Section III (G) discussed previously.

Strengths of Existing Programs

- Many programs create positive predisposition to seeking more information about GM foods to encourage searching for more details (e.g. web site, toll free number)
- Some programs have provided information from trusted information sources (e.g., scientists); some from less trusted sources (e.g. government)
- Some programs provide food safety tips, which attempts to address consumer needs.
- Some programs address the issue of food regulation which is of key concern to consumers
- Many programs use visuals or illustrations which are colourful, eye-catching and convey a feeling of familiarity which should encourage attention.
- Some programs employ a mix of highly interactive and involving media (e.g. quizzes on web sites, information packages, Kids pages on web sites)
- Some programs are delivered to consumers in their homes, such that access to information is effortless.
- Some programs use illustrations which could be used as retrieval cues in-store, if such programs were augmented.
- Target audiences can easily associate with individuals portrayed in tv ads.
- Camera work in tv ads is close-up, slow motion, and intimate, thereby inviting attention.
- Attractive visuals have been used to garner attention(e.g. father/son looking at a field of green and a weathervane, farmer in leather jacket with a picket fence and field of green, a boy and a dog).
- Musical overlay is appealing on tv ads
- Material in information kits/booklets tends to be well-organized to aid processing of information (e.g. specific types of benefits of gm foods are grouped together, increasing the likelihood they will be processed and stored in their own cluster in memory; consequently, this information should be well remembered)

Weaknesses of Existing Programs

- Some programs convey no information on risks of gm food production; some discount the risks.
- Not all programs employ interactivity when employing media with this capability.
- Not all programs are designed to be thought-provoking and to motivate elaboration.
- Food and nutrition information on web sites is not always easily found or is not accessible; a consumer would likely give up before getting to the information.
- Web site information is frequently very pro or anti-GM foods; balanced information is rare.
- Web site graphics could frequently strive to be more appealing; do not motivate attention and processing.
- Web sites are less accessible to low- income and low- education individuals.
- Some information booklets rely on alarmist techniques and/or shock value to gain attention; these approaches may discourage processing of information since consumers frequently turn away from this type of information and don't want to deal with it.
- Some programs have limited reach.

Table 2 - Overview of Information Sources, Channels and Assessment of Content

Source	Target Audience	Channels	Content
Government - Provincial	secondary education	education resources (video, print), teacher programs with lab displays, websites, publications/brochures	typically focused on benefits
- Federal	general public	brochure, website	addresses food safety in general; regulatory information difficult to access
Industry - CBI	general public (consumers), opinion leaders	television ads, website, information kit, (print ads)	designed as a 'product launch' to familiarize consumers with CBI and raise awareness about biotech applications; promotes biotechnology
- Provincial Industry Alliances	members, secondary education institutions	websites, information kits, conferences/presentations	industry-network focused; scientific information supplied to secondary students and teachers with a higher technical level of understanding
Food Biotechnology Communications Network	general public	toll-free number, website, brochure (distributed through women's magazines)	information on science, applications, regulation; emphasis on benefits

Food Retailers	general public (consumers)	refer inquiries to FBCN	uses FBCN information
NGOs - Consumers' Assoc. of Canada	general public (consumers)	works in cooperation with the FBCN	see FBCN
NGOs - Rural Agricultural Foundation International	international opinion leaders, other NGOs	website, new releases, publications, media coverage	information based on mandate of conservation and sustainable improvement of agricultural biodiversity; focus on intellectual property rights
NGOs - Greenpeace, Friends of the Earth, Council of Canadians, David Suzuki	general public	website, information pamphlets, media coverage	emphasis on risks of biotechnology, promotes mandatory labelling
Media	general public	print, broadcast, websites	highlights the conflict surrounding biotechnology and generally sensational; editorials and business reporting are supportive, while news coverage is increasingly negative

Table 3 - Sample Costs

Method of Information Distribution	Cost (Cdn.)
1. TV advertising	$45,000
2. Magazine Ad - English - French	$33,000 $11,000
3. Demonstration lab	$145,000
4. Call-in information line	$300,000
5. Website - design - hosting (per year) - maintenance (per year)	$10,000 $1,200 1,200
6. Brochure (colour - writing, design and initial production of 7,500 copies)	$20,000

Notes:
1. CTV primetime single 30 second spot.
2. For Chatelaine magazine, single run (one issue)
3. Ag-West Biotech's SABIC demonstration lab
4. FBCN 1-800 Information Line
5. Design and hosting based on FBCN. This figure is, of course, variable and sites designed by commercial firms can cost as much as $50,000 to $100,000 depending on the site's features. Maintenance figure is a minimum and will vary depending on frequency and type of updates.
6. Based on FBCN pamphlet *A Growing Appetite for Information*, colour brochure - writing, design and initial production of 7,500 copies.

G. Other International Approaches

The issue of GM foods is one that confronts the global community. While time constraints did not permit us to do an exhaustive scan of practices designed to meet various publics' needs for information, we conducted a more limited investigation of what other countries and institutions are doing to meet this challenge. Here we present a brief overview of innovative practices.

G.1. The USDA's Biotechnology Information Initiative. There are a large number of websites available to address biotechnology issues. One of the more useful ones is the ***Biotechnology Information Resource*** run by the National Agricultural Library of the US Department of Agriculture. This site provides access to selected sources, services and publications covering many aspects of agricultural biotechnology.

In our most recent visit, the site featured new entries which included most recent reports from a variety of sources including the Rockefeller Foundation, a congressional committee report on plant biotechnology, NGO policy papers, and a newslink summary. Also provided are links to other agricultural biotechnology websites, a RealAudio link to various sources such as National Public Radio (which was then running a series on GM foods), bibliographies, education resources, job information, patents, and other federal biotechnology documents.

As a central site for agricultural biotechnology information, this site has a number of strengths:

1. Its diversity of sources – The categories of information sources are fairly diverse, including government, industry, non-profit, NGO's and university sources. The site features alternative views from such groups as the Union of Concerned Scientists and the Rural Advancement Foundation International (RAFI).

2. Its updated information – The site is updated almost daily for certain sections, frequently for others.

3. Its utility to a broad range of users – The site can be used by stakeholder communities as well as educators, students, researchers and the general public.

A related site, the Agricultural Network Information Centre <www.agnic.org>, provides a model of information distribution that may be worth examining further. Although AgNIC is more broadly concerned with agriculture issues beyond biotechnology, its mode of operation is innovative. The Agricultural Network Information Centre is based on an alliance of US land-grant university libraries and other agricultural libraries, extension services and other similar organizations. It focuses on the provision of quality electronic agricultural information over the web. Member participants are responsible for specific segments of agricultural information and develop home pages in that area of responsibility.

This is a distributed processing model, providing advantages to members that cannot be obtained individually. The alliance is based on consensus decision-making where possible, cooperation and collaboration, minimal overhead or central bureaucracy, and a dynamic operational structure . Each participating university has a member on the AgNIC editorial board. Each member responsible for a designated area of expertise oversees monitoring of the internet and other sources to identify candidate information systems. Each member also nominates data bases that allow tracking of particular subjects.

It might be possible to create a similar information dissemination model based on inter-university collaboration on the issue of food biotechnology, working closely with Health Canada, CFIA, and AAFC.

Another useful site is the National Centre for Biotechnology Education run by the University of Reading in the UK The site has been in operation since 1985 and is funded neither by government nor industry but from course fees. Its focus is on "the promotion of biotechnology education, not biotechnology", an important distinction that is reflected in the site content. As the site's mission states: "Understanding the technology, how it is applied and regulated, and informed debate about the issues it raises are essential if society as a whole is to benefit from the technology while minimizing the adverse effects that many fear may arise." Its content includes news items, parliamentary reports, information on field trials and their evaluations, and regulatory information.

G.2. Biotechnology Australia

Like Canada, Australia's regulatory system for biotechnology involves several ministries or agencies (eight in the case of Australia). Just in the past year, these government agencies were integrated under a single name, *Biotechnology Australia*, making it much easier for the consumer to recognize and to access the regulatory information system.

Biotechnology Australia <www.isr.gov.au> has now put together a number of initiatives to meet Australian consumers' needs for information. A brochure has been produced which addresses six questions: (1) What is genetic modification?; (2) Why have gene modification? (3) How do consumers identify genetically modified food? (4) What foods are genetically modified? (5) Who regulates gene technology and its safety? (6) Who makes sure your food, including genetically modified food, is safe? (7) Where can I find more information? These easy-to-read brochures are distributed widely in supermarkets and other food retail outlets.

A Gene Technology Information Service has also been introduced which is a toll-free phone line. Three website addresses are also promoted (those of the Australia-New Zealand Food Authority, the Commonwealth Science and Industry Research Organization, and Biotechnology Australia), all of which provide information on gene technology. The Commonwealth Scientific and Industrial Research Organization of Australia (CSIRO) has updated sections on the subject of Gene Technology which are "consumer-friendly"; that is, the information is easy to find, presented in an easy-to-comprehend style, and addresses most questions ordinary consumers might have. Interestingly, information about both risks and benefits is provided and areas of uncertainty are acknowledged.

Finally, Biotechnology Australia is starting a series of public forums on gene technology. These are initially aimed at rural communities and will feature speakers who will address the science, industry and grower perspectives, benefits and risks, and regulatory information. According to its media release, "the forums are not about promoting biotechnology or particular products as such; rather they will aim to provide factual information about both the pros and cons of the technology and the full scope of its implications for agriculture, health and the environment." (Media Release, <www.isr.gov.au> April 19, 2000).

G.3. The UK *CropGen* Initiative[14]

On the industry side, a European initiative is CropGen, a consumer and media information initiative "to make the case for GM crops by helping to achieve a greater measure of realism and better balance in the UK public debate about crop biotechnology." This is an innovative approach from the point of view that part of the project includes a panel of eight eminent scientists, representing such areas as plant sciences, food microbiology and consumer affairs, to respond to questions posed by the public or the media (questions are submitted to the panel via e-mail at their website <www.cropgen.org>, or local rate charge by telephone, and are answered individually, with a set of frequently asked questions and their answers available on-line). Nowhere else has this panel-model been employed. The panel provides an immediate way of responding to issues as they arise, by making its members available for media and public debates. They are also available on-line for public questions. When issues arise in the area of biotechnology, when government action is taken, or when GM-opposing groups do or say something relevant, the panel is invited to respond. It is currently seeking ways to become more pro-active, rather than re-active.

The project is funded by the crop biotechnology industry, and a communications agency has been hired to conduct the day-to-day administrative work. The panellists are neither paid by the industry for this project, nor are they employed in any other capacity by any of the sponsor companies. The sponsors and the panellists hold separate meetings, and are never in contact except through the communications agency. This arrangement allows the panel to operate at arms-length from the sponsors (Moses, 2000). The total budget for this one-year project approaches GBP£500,000 (C$1.125 mil.).

The downside of this project still remains that it is funded by the crop biotechnology industry. It was clearly an outcome of the intense public furor over GM foods in the UK and the success of groups such as Greenpeace and Friends of the Earth in gaining media attention.

G.4. European Commission Program: Educating the European Public for Biotechnology

This initiative is designed to survey the current information landscape and to suggest best educational practices for biotechnology. The project's goal is to assess public information and education initiatives carried out by member states and to understand how public perceptions and attitudes might be related to information availability, accessibility, and educational practices. The initiative involves 12 of the 15 member states of the European Union, Switzerland and the United States (in particular, California, serving as a US comparison). It will examine media and internet sources, educational materials and approaches, and other material generated by such sources as industry and public advocacy

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[14]Information about CropGen was obtained from its website and additional personal communications with the program's director, Professor Vivian Moses of King's College, London.

groups. The intent is for member states to learn from each other's experiences. The program will incorporate a survey at the project midpoint to allow some correlation between public perceptions and the information resources available. Its internet site is currently located at <www.boku.ac.at/iam/ebe/>.

Funding for this project is provided by the European Union's European Commission under the Research Training Networks and Raising Public Awareness programs. The program began in February, 2000 and is expected to be completed in two years. Its budget is 268,000 euros (C$377,880.00).[15]

G.5. The Netherlands' *Consumentenbond*

In the Netherlands, the government has provided funding to the Dutch consumers association (*Consumentenbond*) to run a hotline specifically geared to addressing consumer questions on biotechnology. In addition, citizen consultation efforts such as consensus conferences have been conducted with considerable effort to gain media attention as a means of extending the reach of these public participation initiatives.

G.6. Denmark's Ethics Framework as Foundation for Public Discussion

For a long time, there has been a recognition in Denmark that the use of biotechnology and genetic engineering is very much a political question. With this as a starting point, the Danish government has pursued an approach to biotechnology regulation that has involved a broader spectrum of the public in decisions about the technology. It has, for example, pioneered in the use of citizen conferences to incorporate lay citizens in technological questions (Einsiedel, 1998; 2000a). More recently, with increasing public discussions about the products of biotechnology, it has pushed through a public discussion paper that presents an ethical framework for developing, managing, discussing, and using biotechnology. Developed by an expert group with interests representing the natural sciences, health sciences, social sciences and philosophy, the paper entitled *An Ethical Foundation for Genetic Engineering Choices,* promotes the idea of public discussions and public choices within an ethical frame.

This ethical framework outlines the principles under which the development and use of biotechnology, and specifically, genetic engineering, ought to proceed. Among other things, it articulates some key social goals such as the promotion of quality of life, respect for the human being's autonomy and dignity, and respect for the integrity and vulnerability of life. It also outlines some of the boundary conditions for genetic engineering such as rejecting germ cell research and specifying the conditions under which genetic engineering may be carried out on animals. It also places emphasis on maintaining environmental

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[15]Information about this program was obtained from the program website at <www.boku.ac.at/iam/ebe> and from Prof. Vivian Moses of Kings College (London), program coordinator.

sustainability. Finally, the principles of democratic debate and decision-making are spelled out. (Danish Ministry of Industry and Trade, 2000)

Denmark remains unique in carrying out this particular initiative.

G.7. Best Practices

We are now at the point where we can identify the attributes which would characterize an ideal programmatic effort to meet the information needs of consumers. These attributes are based in part on our examination of the current context for Canadian publics in terms of their attitudes toward and expectations about biotechnology and information content and approaches they would find more useful, as well as on our investigation of the different information dissemination programs currently available.

These information approaches would be characterized by the following features:

1. *Diversity of channels*. Consumers have different skill levels, backgrounds, and interests. No single channel (e.g., magazines or a TV advertising campaign) will meet the needs of these different consumers. The broader the range of channels utilized within a given set of resources, the better.

2. *Comprehensiveness of the information base*. While it is possible to come up with sets of issues or questions that might be frequently asked by consumers, there will also have to be some attention paid to different information needs of different groups. Those who are more informed might be interested in more in-depth information in some areas. The general public can be characterized as including groups who know nothing about biotechnology to groups who are very knowledgeable in a particular area such as farmers or those with more specialized knowledge on a range of biotechnology issues. They also include groups with different interests, priorities and values.

3. *Immediacy*. One of the advantages of an information line (by phone or electronic mail) is the fact that a caller can have an inquiry addressed right away. This attribute may also be a feature of with websites.

4. *Consideration of a broader range of issues over and above that of safety*. It is clear from the various studies of public perceptions that while safety remains a key concern of various publics, other aspects about the technology are also of public interest: what are the potential impacts of a given application on the environment? How do we ensure that the welfare of animals is given adequate consideration? Are benefits or risks equitably distributed or are certain groups bearing a disproportionate share of either one?

5. *Balance*. Clearly, no technology promises a hundred percent benefits and no risks; hardly any technology can also lay claim to having closed the book on its knowledge base. Balance requires consideration of <u>both</u> benefits as well as risks, and addressing both what is

currently known and where the areas of uncertainty are. This particular attribute is clearly missing from most approaches.

6. *Transparency.* Is all information relevant to making judgments about a message, a decision, or a process available, acknowledging certain constraints such as privacy considerations?

7. *Accessibility.* Is there an account made of skills of consumers or access to technology? Are appropriate individuals available to respond to public inquiries and are they equipped to address questions posed?

These attributes relate to a process of raising consumer awareness and better understanding of biotechnology. It does not start from the premise that consumers need to be educated to accept biotechnology; rather, it respects consumers' rights to more and better information about a technology and its various applications that has great ramifications on their lives.

In assessing the governance requirements for the two strategic technologies, information technologies and biotechnology, Fukuyama and Wagner (2000) have argued that public information approaches can no longer afford to be unidirectional. They maintain that broader decision-making models are required such as citizen councils and greater involvement of NGO's. Our experience with citizen councils have convinced us of this view (Einsiedel and Eastlick, 2000; also Sclove, 1998).

VI. Conclusions and Recommendations

Our survey of the landscape of the information environment for the Canadian public points to a number of key findings:

1. Although GM foods is still a low-key issue among Canadians, the increasing media attention, increased activity among NGO's focusing on risks and other stakeholders' responses attempting to counter these messages, and continuing European debates on GM foods ensure a continuing focus in the public arena. There is also evidence that awareness has increased among Canadians and with this awareness has developed some concern and uncertainty.

2. In examining what we know about consumer information processing approaches and decision-making, such factors as perceived risk, accessibility of information, costs of searching for information, and institutional trust come into play. There is a lot that these approaches can bring to the development of an effective and efficient communication program.

3. There is a considerable amount of information that promotes either only the risks or only the benefits of GM foods. Little information is available from more neutral sources that encourage consumers to weigh information on their own. There is also no central source where a consumer can go to, with information dispersed across a variety of sources. Often, information searches require some familiarity with the subject so what is available is often geared to a more highly informed group.

4.Our survey of the labelling issue suggests challenges with a voluntary labelling framework. The conditions for successful adoption by producers and their implementation are not optimal. Neverthless, in order to meet consumer demands for more information and in order to build consumer trust, labelling of GM food must be seriously considered . At the same time, this needs to be accompanied by education programs so that consumers understand what is involved in genetic modification processes.

5. There are not very many "Best Practices" that we have been able to identify in terms of an integrated program of communications with the public. Australia comes closest to providing this type of effort. The other programs we have described locally and at the international level efforts have specific positive features in some areas but inadequacies in others.

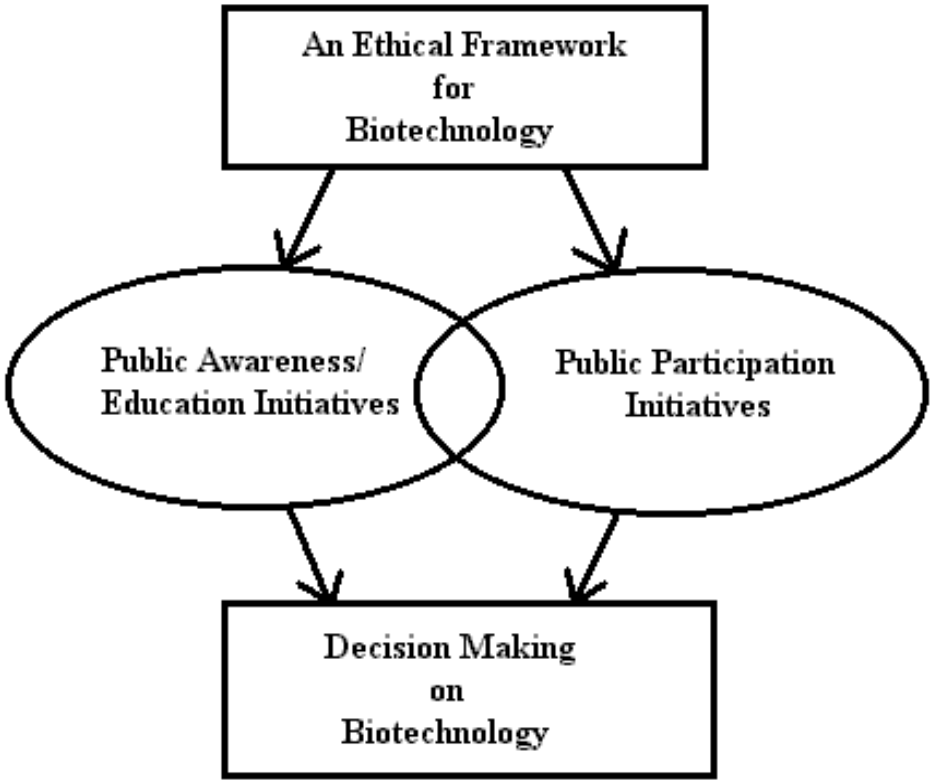
Given this overview, what can we recommend that might help address this challenge?

The communications effort, we recommend, should rest initially on an ethical frame for dealing with the technology. Here we borrow from the Danish initiative of spelling out key principles that guide our continuing development and use of biotechnology. As was pointed out in the previous Canadian biotechnology advisory committee report, "Central to the goals of such a (national) conversation would be the development of a socio-ethical framework for public policy decision-making, with the objective to clarify values and help decision-makers address specific issues as they arise." (NBAC, 1998).

The communications effort can then proceed on two pillars: the first is a communication approach to strengthen public awareness and understanding about biotechnology. We have outlined some of the elements of this approach to public awareness and understanding in Table 4. We emphasize here that we are not advocating selling the public on buying into biotechnology. As the Nuffield Council suggested,

> *There needs to be a much greater effort to spread knowledge and understanding about the processes of genetic modification, what it can and cannot achieve, what risks there are and how they are being guarded against. (*Emphasis added)
> *If it is to be handled successfully, it is important that there should be full public knowledge of the developments that are taking place.* (Nuffield Council, 2000)

Figure 2 - A Decision-Making Framework for Biotechnology



This underlines the need to present a more realistic portrait of biotechnology that stems from respect for the public. It is the only way to gain public trust. As had been observed in an earlier overview of the Canadian consumer and biotechnology, **"**Canadians have changed, both as citizens and as consumers. We have become a 'harder sell', and trust must now be earned, and not taken for granted.**"** (Legault et al., 1998, 493)**.**

The second pillar is one of providing more opportunities for public engagement and involvement. This second element recognizes Canadian publics as legitimate participants in decisions about a technology whose benefits and risks they are expected to experience and whose directions are intended to reflect the broader social values and goals of this society. (See Figure 2 for an outline of these elements). This approach to engage Canadians across the country is part of CBAC's mandate and is now underway.

The federal government has a primary role in informing Canadians about how this technology is being regulated so there are answers to questions about safety and the management of risk. Its dissemination of information on food safety was an important

first step in the direction of addressing regulatory questions. However, there is also the challenge of a perceived conflict of interest in terms of the government's role in promoting this technology. In this area, the federal government has not done as much to explain what role this technology plays in the Canadian economy and what it is doing to maintain and balance both of these interests. **We recommend that a fuller picture be provided to Canadians about the research initiatives being undertaken and supported with public funds, the efforts to address goals of environmental sustainability as these are balanced against economic goals**, **and the regulatory processes that ensure safety and manage risks.**

It is also critical that some means of working in partnership with other levels of government should be strengthened. Provincial governments are proceeding to develop local efforts and, where possible, **federal-provincial efforts ought to be coordinated more effectively to avoid duplication, make more effective use of limited resources, and provide ways of localizing the context of biotechnology information**.

We also recommend that partnerships with other stakeholders might also be established to create more effective information dissemination approaches. The distributed network model of the U.S. Agricultural Information Network might be worth examining. Different universities with different areas of expertise around the country can participate in this effort. This concept of 'a national information library' on biotechnology has been mentioned before and should be re-examined. (Purchase, 1998)

Along with the Consumers Association of Canada, **we further recommend the single-window approach to information on biotechnology <u>for the consumer</u>.** The BRAVO site that has already been established for industries is not going to be as helpful to consumers; a separate one might be considered under the aegis of Health Canada and the Office of Consumer Affairs.

As part of an ethical stance toward information dissemination, labelling of food products of biotechnology should proceed. Delaying this process only serves to promote further concern and mistrust.

The role of other stakeholders is more clearly defined and will proceed according to their specific interests (i.e., industry, NGO's). As expected, industry will promote the benefits of the technology and some NGOs will actively promote risks and questions. Both perspectives are part of the mix of messages in the public sphere.

It is our view that the governance challenges over biotechnology are such that information has to be viewed as a right, as a resource for decision-making, and as a means for more active participation, making the technology's governance more effective and more democratic.

VII A Sample Public Information Strategy

Some Issues to Consider When Developing a Public Information Program About GM Foods

1) Need to identify segments of consumers with different information needs, concerns and values vis-à-vis GM foods who might be making or influencing household food purchase decisions; might be based on demographic differences (income, education, region, profession, city/community size, age, number of children); might be based on psychographic/lifestyle considerations (health consciousness, nutrition consciousness,
degree of concern for humanity at large, political interests, interests of large consumer groups like baby boomers)

2) Need to consider target group gender; females will be more distrusting and place greater weight on risks of GM foods than males

3) Need to consider regions of the country that may have different predispositions towards GM foods, different values, and different approaches to information seeking about GM foods; by way of example, Québec consumers traditionally have a stronger health and food (traditional recipes, etc.)orientation; Southern Ontario has a stronger agricultural focus

4) Need to consider age of target consumers; traditionally the elderly and young adults (Generation X'ers, 18-25 years) have been most skeptical and critical of government practices and of business in general; they are expected to be the most distrusting age groups of GM foods

5) Need to consider the presence of children in households within target segments; it is anticipated that consumers will have more interest in learning about GM foods if children are present (and therefore couldn't be harmed by GM food consumption)

6) Need to consider degree of target group knowledgeability; less knowledgeable consumers will be less predisposed towards attending to and processing risk and benefit information about GM foods; it will be important to first positively predispose them to the need to seek balanced information on the topic to overcome potentially inherent apathy; higher
knowledge is anticipated to be correlated with higher education, higher income, and a rural population; those with higher knowledge may have a greater inherent interest in and capacity to understand information about the risks and benefits of GM foods

7) Need to consider credibility of the source planned to deliver a message about the risks and

benefits of GM foods; government is clearly not the best source; in an information campaign, may need to demonstrate that source for content of information is a group such as university scientists or farmers

8) Need to consider credible intermediaries (schoolteachers, nurses, doctors, religious leaders, pharmacists) and the role they might play in conveying balanced information to the public at large

9) Need to consider existing predispositions towards GM foods which may be hard to change; for those who are extremely negatively predisposed, how can their minds be opened to receiving a balanced message?

10) Need to facilitate exposure to information, particularly for those consumers with less inherent interest in learning about GM foods; unique, creative and interactive distribution systems will be required for information dissemination

11) Need to consider cost efficiency of reaching given target segments; the fewer demographic and/or psychographic constraints placed on the segmentation exercise, the more mass-oriented (and therefore efficiently reached) will be that segment. Conversely, however, the more tightly targeted a message is to a segment's specific information needs and values, and if that message is delivered in a place where the target segment already spends time, the more effective that message will be at rendering that segment of consumers informed about both the risks and benefits of GM foods. This strategy could be easily pilot tested against one or more target segments and assessed via tracking research to determine its degree of effectiveness

Table 4 provides a summary of potential target groups for an information campaign designed to convey comprehensive information about GM foods. For each segment, the following are provided: background information, goals of the communication program, creative tools that might be used, media vehicles that might be used, an assessment of the cost efficiency of reaching each target group and the identification of questions or unknowns about each target group that need to be answered. Table 5 includes media vehicles that might be used to meet the information needs of such a public awareness initiative.

Table 4 Target Segments and Considerations for a Communication Campaign

Potential Target Segments*	Background	Goals of Communication	Creative Tools	Media Vehicles	Cost Efficiency to Reach	Questions for Research
Less knowledgeable consumers about biotech	- low ability to process info, given weak existing knowledge base - low interest and involvement in new messages	- to positively predispose to become informed about/search for info about GM foods - to motivate to retain balanced info about GM foods	- may need to stimulate attention to and processing of info via use of appealing visuals - message should be low in technical nature - interactive, creative tools to increase involve-ment and interest	- mix of vehicles designed to maximize potential for exposure	- low-moderate since attention will not be optimal and multiple vehicles will be required to achieve	- precise demographic correlates with low knowledge ?

More knowledgeable consumers about biotech	- should be motivated/able to easily integrate new information with stored information to become neutrally informed - may be more educated, with higher income, and live in rural areas	- to render consumers informed about both the risks and benefits of GM foods	- provide detailed information	- vehicles can be chosen to deliver detailed information as targeting permits (e.g. newspapers, pamphlets, magazines)	- low-moderate since may not be efficiently reached based on high knowledge targeting criterion	- precise demographic correlates with high knowledge ?
Females	- more risk averse than males - may make/ or at least influence more food purchase decisions, esp. if children are present in house-hold	- to positively predispose to becoming neutrally informed about risks and benefits of GM foods	- depends on current knowledge levels - ensure approach is highly relevant to risk concerns, esp. vis-à-vis children	- female-targeted magazines or newspapers - consumer forums	- relatively efficient if mass female-targeted magazines or newspapers could be used	- current knowledge levels and predispositions
Males	- less risk averse/ more accepting of technological advances than females	- to inform male consumers of both the risks and benefits	- factual message	- male-targeted magazines or newspapers	- relatively efficient	- current predispositions

Québec consumers	- traditionally more health oriented - greater emphasis on traditional foods and recipes - respond to home-grown spokespeople	- to motivate consumers to become informed about risks and benefits of GM foods	- use home-grown spokespeople/ sources to maximize credibility and attention - ensure approach is relevant to cultural values	- newspaper, magazine, television (high viewing incidence)	- relatively efficient if region is the only criterion	- existing attitudes, values, knowledge, specific cultural influences
Other regional segments ??						- basis for segmentation: cultural? values? attitudes?
Mature/senior target group	- traditionally skeptical re government	- to motivate to search for and retain risk and benefit information	- simple, clear message - ensure approach is relevant to needs of seniors - “seniors” spokesperson	- seniors magazines, pamphlets in care facilities/ retirement homes	- low since attention may be low and group may be expensive to reach	- current knowledge and predispositions

Generation X'ers	- influential target group in society - future mainstream target group - traditionally skeptical re business, industry and government (authority)	- to motivate to seek information re both benefits and risks to make own informed decision re GM foods	- credible source may be very specific for this group (e.g. a peer) and be very important to communication effectiveness - ensure approach is relevant to values of target group	- targeted magazines, radio, television - provide opportunities for target group to participate in discussion (e.g. consumer forums)	- low since may be hard to reach	- current predispositions - most effective creative approach and source (requires testing)
Baby Boomers	- segment with relatively homogenous interests (quality, appeal of 60's and 70's images, relatively well educated) and with relatively high buying power	- to motivate to become neutrally informed about gm foods	- motivate message attention through use of relevant language and images	- upscale magazines, editorially targeted magazines, newspapers	- relatively efficient give broad scale mix of potential vehicles	- what are attitudes now?

Consumer Interest Groups	- highly skeptical of biotech industry and government - highly skeptical of counter information	- to motivate reception to benefit as well as risk information re GM foods	- credible source is important	- presentations by credible source to meetings of these groups -communica-tion vehicles should provide participation opportunities (e.g. consumer forums)	- cost intensive activity so low in efficiency	- potential to render this group open to unbiased information? - perceptions re which sources are credible?
Health system intermediaries (doctors, nurses, nutritionists pharmacists)	- may currently trust the approval system for GM foods but have questions - should be a group that is trusted by the public	- to provide full risk and benefit information in an unbiased nature - to motivate accurate re-dissemination of information to the public at large	- may need more detailed technical information to feel they understand issues - ensure unbiased nature of communication and source credibility	- detailed pamphlets distributed in hospitals, health units, doctors offices, pharmacies	- moderately efficient to reach but high distribution costs	Baby Boomers

Education intermediaries (teachers, religious leaders)	- may be trusted by public	- to provide full risk and benefit information in an unbiased nature - to motivate accurate re-dissemination of information to the public at large	- may need to motivate to become educated	- pamphlets distributed via schools, church organizations	- moderately efficient to reach but high distribution costs	- current degree of knowledge and predispositions
Media	- mixed set of biases have been displayed	- to motivate to convey balanced information to the public to achieve full disclosure on GM foods	- forthright, honest information con-tent - credible source required to overcome media skepticism	- media forums, press releases, press conferences	- relatively efficient	- precise biases that need to be addressed ? - sources perceived to be credible ?

* Note: Overlap between segments exists

Table 5 - Overview of Elements of a Possible Information Approach

Target Audience	Media Channels	Goal	Why Effective?
General Public	TV Advertising	Awareness of benefits and risks Motivate additional information search	* high general reach of most population segments * potential for high attention and high processing if strategically designed * strong vehicle to motivate subsequent information search
(general or specific targets possible via choice of print vehicles)	Print advertising (magazine or newspaper)	Awareness of benefits and risks	* targeted reach possible through choice of specific vehicles (working women vs. homemakers, business people, teens, allergy sufferers etc.) * generally, better reach of higher educated individuals * potential to disseminate large quantities of information * excellent opportunity to generate attention, message processing and retention if creatively designed

	1-800 number	Awareness of benefits and risks/ question enquiry	* good reach of interested parties/ individuals with concerns/questions * interactive, flexible and dynamic; opportunity to tailor content to individuals' information needs * attention and processing potential are high, given high involvement of caller
	Web site	Awareness of benefits and risks	* good reach of interested parties * good reach of individuals with higher levels of education * interactive and involving, therefore high attention and retention * if properly designed, flexible and dynamic, since individuals can move around site in a well-identified manner to obtain the information they need * potential for involvement can be enhanced via the use of quizzes, games * can be designed to reach a variety of age groups with different information needs

(content can be targeted specifically to teens, younger children, geriatrics, high education levels, low educational levels, ethnic groups etc.) (can also be specifically distributed to these groups)	Information kits	Awareness of benefits and risks Interest in GM foods	* can be targeted to specific demographic groups * interactive and attention-getting if creatively designed * potential to create high awareness levels for GM food and to convey large quantities of information * reaches the target group pro-actively (where they already spend time) and actively (in an involving manner) * potential for distribution of retrieval cues for information conveyed (fridge magnets, shopping list pads, posters, etc.)
	Information Forums/ Public Discussion Round-tables	Awareness of benefits and risks Interest in GM foods Provide the opportunity to empower the public/to let them have a say	* interactive; empowering * pro-active reach of the target group * high information retention
	Product labels	Convey product derivation Motivate additional information search	* facilitate informed decision making around product choices * cue individuals that more information search may be desirable

Educators / Students	Information kits; other curriculum materials	Means of generating awareness of benefits and risks and interest in GM foods by a trustworthy source	* facilitate education on GM foods * potential to involve students interactively * reaches the target audience where they already "spend time"
(also the general public)	Mobile exhibit that travels around to schools /museums/doctor's offices/ hospitals/public health units/nutrition units/YMCA/YWCA/churches/community organizations /retirement homes in communities around the country (à la the Québec Policy on Nutrition in the 1980's)	Means of generating awareness of benefits and risks and interest in GM foods by a trustworthy source	* educate consumers of all ages in an involving manner * potential for high attention to message and high levels of processing * pro-active information delivery (reaches out to consumers of all ages) * could include a demonstration lab to further enhance involvement
Media/the Press	Press kits, back-grounders, broadcast- or print-ready information materials	Means of generating awareness of benefits and risks and interest in GM foods	* high potential for attention and processing of editorial that will likely be perceived to be unbiased in origin * strong reach of interested parties among the public
Retailers/ Retail Distributors	Merchandising campaign	Means of generating awareness of benefits and risks and interest in GM foods	* point-of-purchase opportunity for consumer awareness generation of benefits and risks of GM foods

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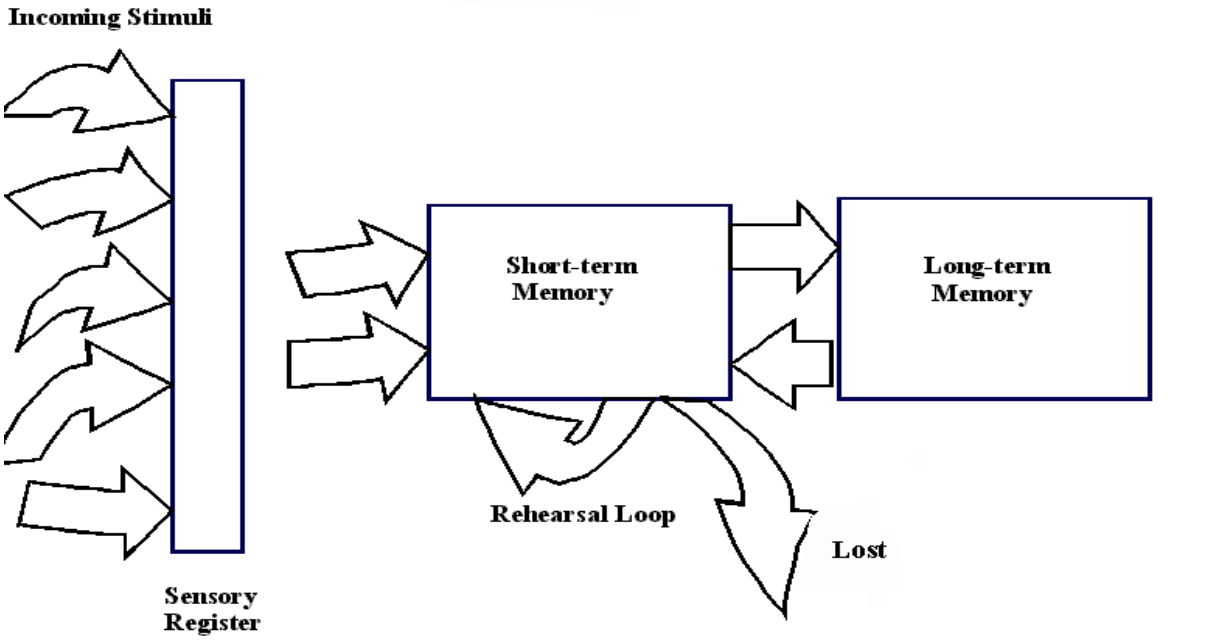
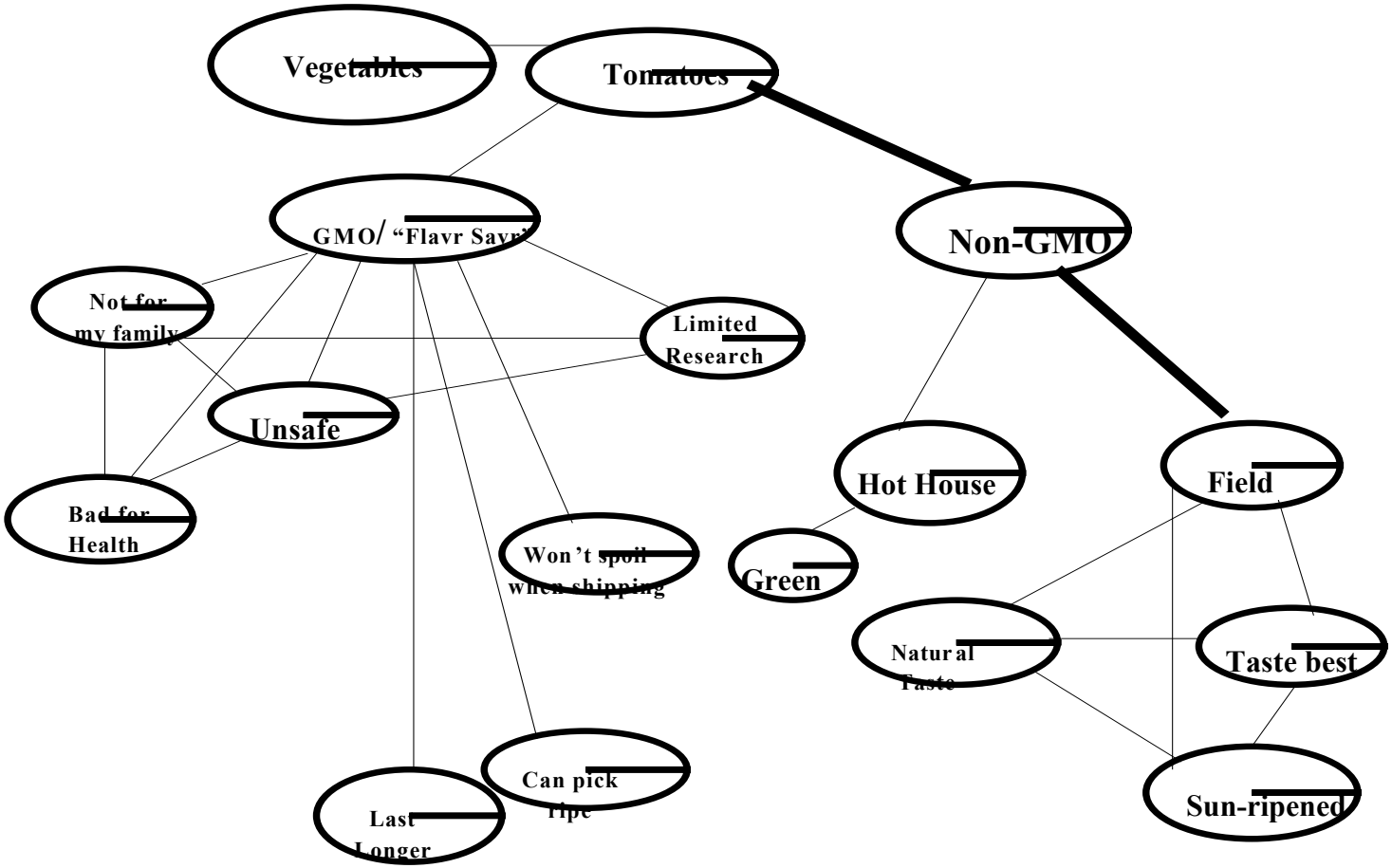
Appendix 1
Information Processing Model *



*** Adapted from Shiffrin and Atkinson 1969**

Appendix 2

Hypothetical Associative Network of Stored Information for "Tomatoes"



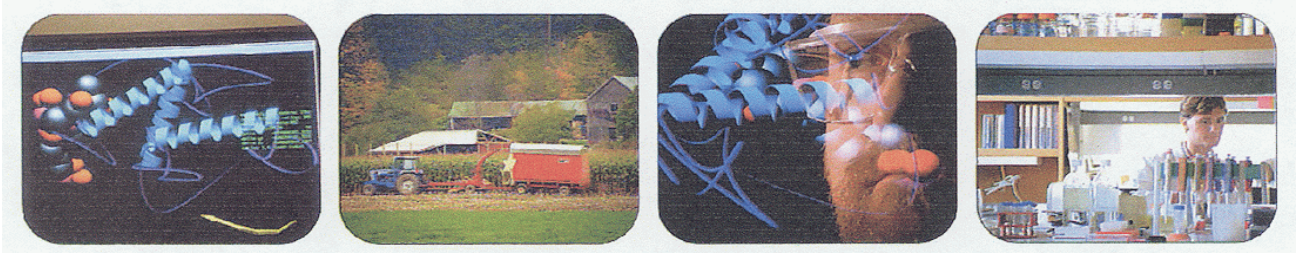
Appendix 3

COUNCIL FOR BIOTECHNOLOGY INFORMATION

"PROMISE" :60 Canadian Version

ANNCR (VO): a canola crop in Canada yields a more bountiful harvest...

A patient has a medicine she needs... A boy can survive a childhood disease... A corn crop can protect itself from certain pests... Because discoveries



In biotechnology, from medicine to agriculture... Are helping doctors and farmers... To treat our sick...

and protect our crops,

A farmer can produce a healthier grain...

A farmer in Africa can provide better for his family...

Because biotechnology Researchers test and test, to find new solutions

Solutions that are improving lives today...

Solutions that could improve our world tomorrow.

To learn more about biotechnology and agriculture visit our Web site or call our eight-hundred number