BRIDGING THE KNOWLEDGE DIVIDE:
Experiences in Communicating Crop Biotechnology

Mariechel J. Navarro
with Contributions from
the Biotechnology Information Centers

International Service for the Acquisition of Agri-biotech Applications (ISAAA)

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Preface

The germ of the idea that led to this handbook was conceived a few years ago. There was a felt need for a publication that existing and potential Biotechnology Information Centers (BICs) could use as a guide in doing their science communication work. In addition, an external reviewer of the Global Knowledge Center on Crop Biotechnology (KC) of the International Service for the Acquisition of Agri-biotech Applications (ISAAA) highlighted the fact that the KC had a rich pool of information on and experiences in communicating biotechnology. It was but logical, the expert said, that the KC contribute towards a 'robust knowledge' on science communication using its accumulated experiences. Hence, this publication is meant as a resource for all science communicators.

The excitement over the project, however, was dampened by other concerns and deadlines. It was only in early 2008, after sporadic starts, that this publication eventually got into 'fast forward mode'. By that time, the timing was apt as there were enough materials to use, experiences to document, and lessons learned and ripe for sharing. Contributions solicited from the BICs and perspectives distilled from other science communication experts provided both theoretical and practical inputs.

This handbook starts with a discussion of the importance of communication in biotechnology and how it is a crucial factor in promoting an open and transparent debate on the topic. The development of biotechnology in the global arena and the role of communication in furthering the gains of the technology are emphasized. Communication, however, is looked at not merely from the act of disseminating information but as a process that extends to the acts of engagement and partnering.

An overview of the KC and the BIC network is presented noting its primary stakeholders, organizational set-up, institutional arrangement, funding sources and activities. The handbook then segues to communication specifics: understanding stakeholders, designing a communication plan, identifying key messages, developing strategies and approaches, evaluating efforts, and assessing impact. It ends with a synthesis of lessons learned, capitalizing on issues and concerns for any science communicator.

Aside from the KC and the BIC network, many other institutions are involved in sharing information resources on biotechnology. This handbook, thus, provides an annex of some of these institutions with contact links.

We hope that this handbook can contribute to the exciting field of science communication in general, and biotechnology communication in particular. As a working and evolving document, updates of this publication will be posted at http://www.isaaa.org.

M.J. Navarro

I Introduction

Crop biotechnology, one of the many possible scientific options to improve agricultural productivity, has delivered significant socio-economic and welfare benefits to farmers. It is the use of advanced scientific approaches to produce crops that may have any or a combination of the following traits: increased yield, pest and disease resistance, abiotic stress tolerance, enriched nutrient content, and other quality traits.

James (2007) reports that about 12 million farmers in 23 countries have planted biotech crops spread across 114.3 million hectares. Of these farmers, 90 percent or 11 million are small and resource-poor farmers from developing countries such as China, India, the Philippines, and South Africa. At the same time, a few stakeholders have sparked debate on perceived risks and safety of biotech crops. As a result, biotech crops have been caught in a maelstrom of controversy. Diverse issues like scientific, political, economic, ethical, cultural, and even religious viewpoints are raised by different stakeholders. A focus on societal and ethical implications has made it a recurring and contentious public policy issue.

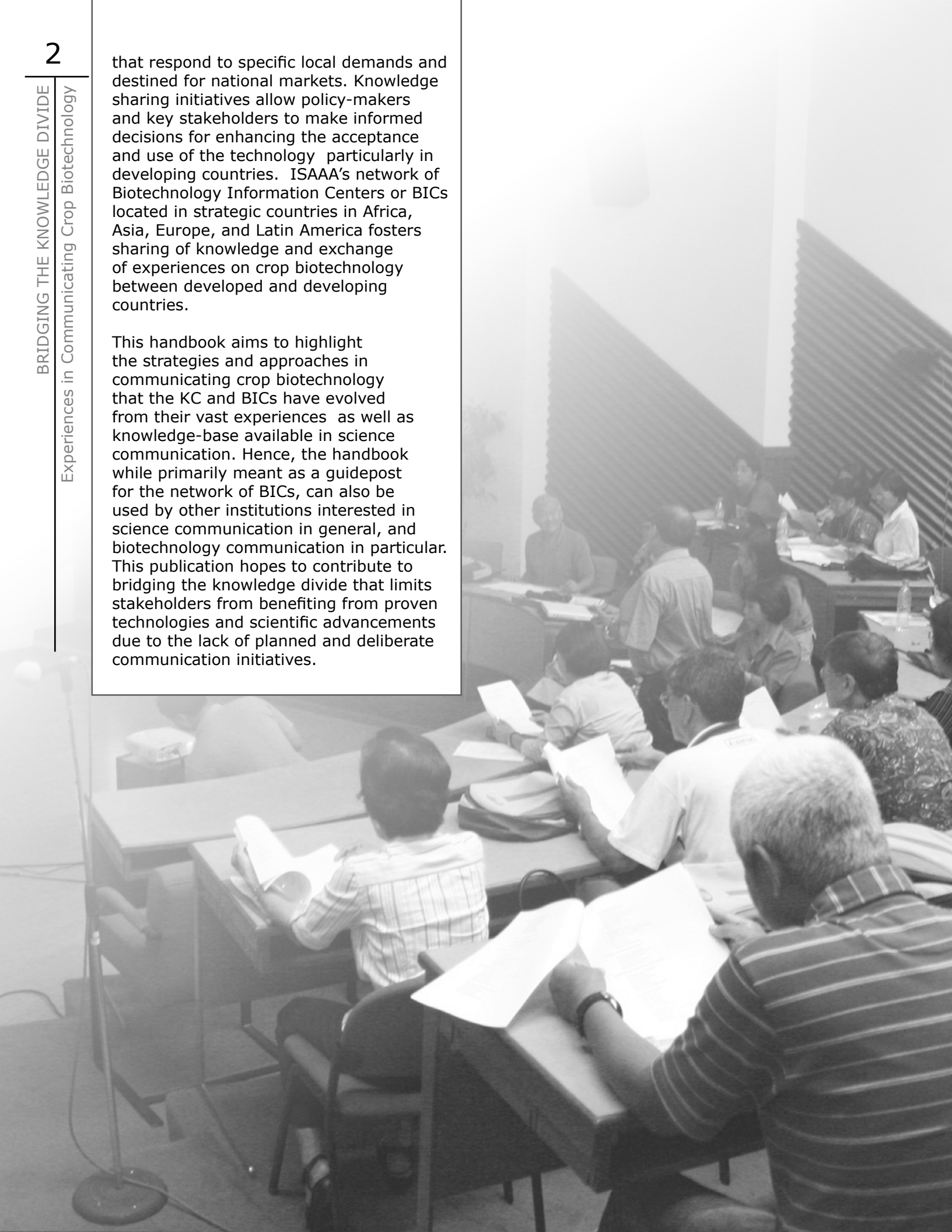
Concerns related to crop biotechnology must be balanced with adequate science-based, authoritative information to enable various stakeholders to engage in an objective and transparent debate. Mutual understanding and dialogue will enable the global community to understand the attributes of crop biotechnology and help farmers and consumers to realize its potential benefits.

The International Service for the Acquisition of Agri-biotech Applications (ISAAA) supports a two-pronged objective – technology transfer and knowledge sharing. It facilitates the transfer of technologies to developing countries through public-private partnerships. ISAAA's flagship program, the Global Knowledge Center on Crop Biotechnology, more familiarly known as the KC, addresses the second objective of making available science-based, authoritative information on crop biotechnology to the global community.

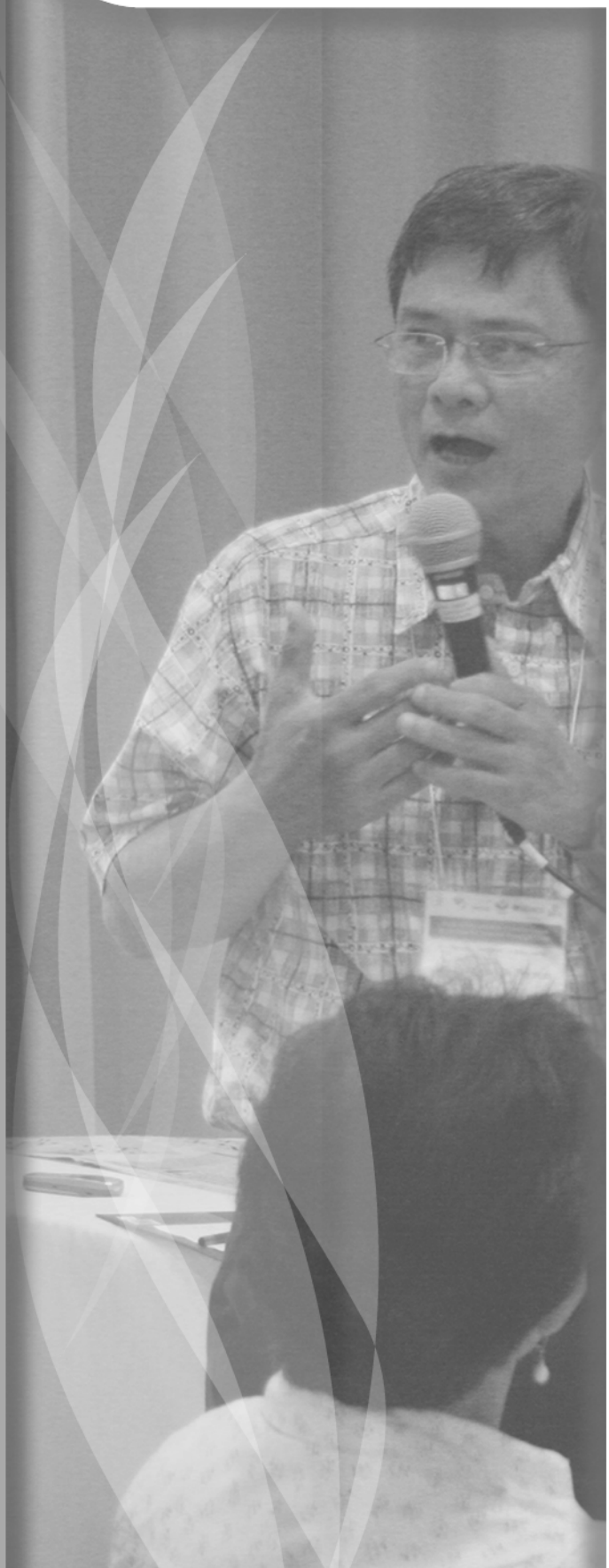
The lack of effective communication may jeopardize projects in the public sector

that respond to specific local demands and destined for national markets. Knowledge sharing initiatives allow policy-makers and key stakeholders to make informed decisions for enhancing the acceptance and use of the technology particularly in developing countries. ISAAA's network of Biotechnology Information Centers or BICs located in strategic countries in Africa, Asia, Europe, and Latin America fosters sharing of knowledge and exchange of experiences on crop biotechnology between developed and developing countries.

This handbook aims to highlight the strategies and approaches in communicating crop biotechnology that the KC and BICs have evolved from their vast experiences as well as knowledge-base available in science communication. Hence, the handbook while primarily meant as a guidepost for the network of BICs, can also be used by other institutions interested in science communication in general, and biotechnology communication in particular. This publication hopes to contribute to bridging the knowledge divide that limits stakeholders from benefiting from proven technologies and scientific advancements due to the lack of planned and deliberate communication initiatives.



II Communication and Biotechnology



Public support is crucial if a technology is to be accepted and adopted by those who stand to benefit from it. Hence, science communication is an important component of the technology generation and utilization continuum. Science communication as defined by Gregory and Miller (1998) is a process of generating new, mutually acceptable knowledge, attitudes, and practices. It is a dynamic exchange as disparate groups find a way of sharing common messages. It is a process of negotiation based on trust that leads to mutual understanding, rather than through statements of authorities or of facts. Hence, communication is necessary to enable stakeholders to participate in the social processes of debate and decision-making. "Science's new social contract with society" demands the participation of various stakeholders in knowledge generation and validation which is essential for the development of 'socially robust knowledge'. Hence, science and society transform each other (Gibbons, 1999).

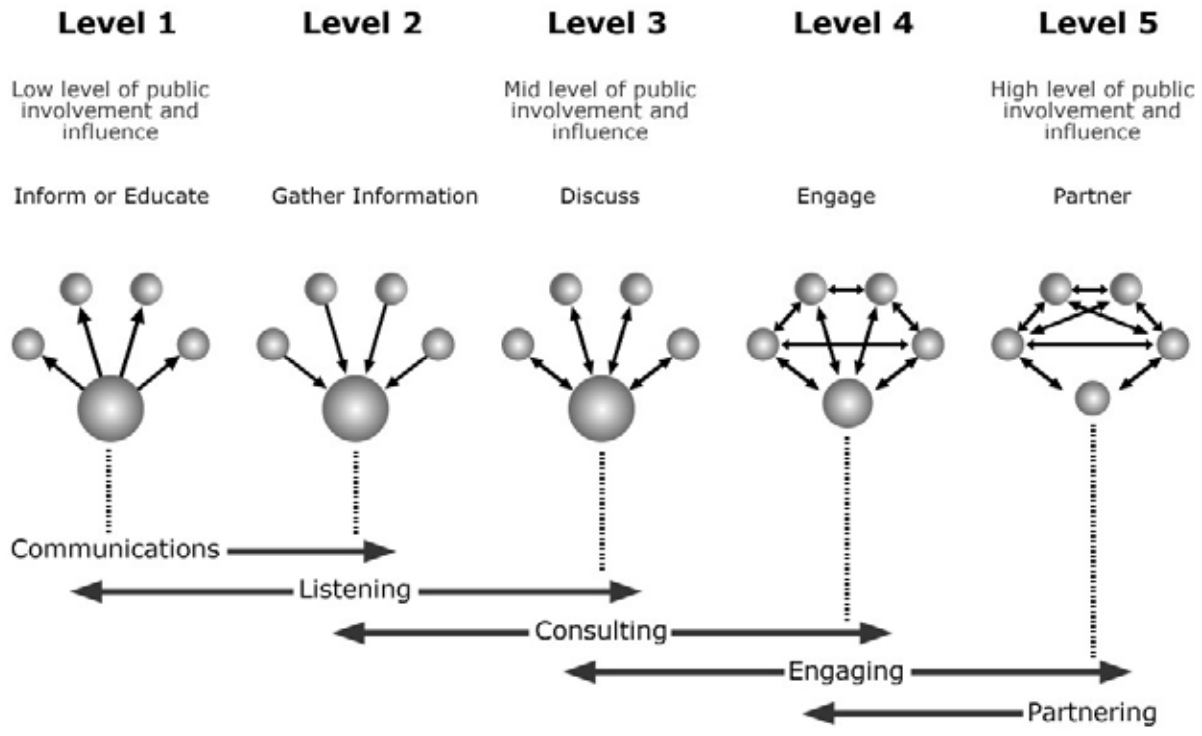
Science communication is therefore crucial in promoting an open and transparent debate about the potential risks and benefits of a new technology like biotechnology. This debate guarantees responsible use of the technology and assures stakeholders of having a choice or say in its adoption.

Canales (2007) cites the case of the European Union that has debated the issues of genetic modification (GM) for a long period and even enforced six years de facto moratorium on GM foods (1998-2004). This has vast implications for agriculture, research and development, and innovation not only in the European Union but also in individual member countries. It eroded scientific temper, and affected funding level and support for public biotech research. In addition, it contributed to the establishment of an overly cautious biosafety regulatory system that is unable to overcome impasses; and created a negative climate for investment by the private sector. As a consequence, the public developed negative opinion on GM crops as well as affected trade relationships, market acceptance, and delayed deployment of crop biotechnology in developing countries.

The case of many countries venturing into crop biotechnology show a general pattern of low public knowledge of biotechnology, distrust on the part of environmental groups, and government's slow action on regulatory support which is crucial for the technology to thrive. This scenario is compounded by lack of or inaccurate information, misinterpretation or over-simplification of facts. Cormick (2007) enumerates five factors that affect acceptance of biotechnology: information, regulation, consultation, consumer choice, and consumer benefit. In this scenario, it is important that adequate, science-based information is made available to various stakeholders to help them analyze issues, correct misinformation, and make early and informed decisions.

Brossard and Shanahan (2007) argue that "no cookie-cutter approach will suffice for developing an approach to understand how to communicate about biotechnology." Nevertheless, best practices are available. In order to improve the understanding of crop biotechnology and how its products may contribute to personal well-being, a strategic plan for public communications is required. Traynor et al. (2007) identify some specific objectives for public communication: make evident to decision-makers that modern biotechnology can be an effective tool for increasing agricultural productivity, and thereby economic growth, without imposing unacceptable risk to the environment or human and animal health; and enable members of the public to make informed decisions about appropriate uses of biotechnology by providing accurate information about benefits, risks, and impacts. Experiences can be shared to enable stakeholders to decide as to how, when and where biotechnology should be used.

Hence, there is a need for a multi-stakeholder process or dialogue to ensure public acceptance for crop biotechnology and in evolving enabling policies. A process of deliberation is expected between and among stakeholders to converge diverse ideas. Saner (2007) enumerates reasons why there is a need to involve the public, among which include: potentially improve public policy, a more informed and engaged public, more solid support for regulatory decisions, and greater public confidence in government.



Source: Health Canada's Public Involvement Continuum http://www.hc-sc.gc.ca/ahc-asc/pubs/public-consult/2000decision/pol-continuum_e.html. Health Canada. September 9, 2006. Reproduced with the permission of the Minister of Public Works and Government Services Canada, April 8, 2008.

Figure 1. *Levels of the public involvement continuum.*

Table 1. *Diffferent Levels and Methods of the Public Involvement Continuum*

LEVEL	TYPE	WHEN USED	PURPOSE	METHODS
1	Inform or educate	• Decision already made and public should know results • Need for acceptance of proposal before decision is made	• Concerns can be addressed with information; factual information helps understand policy or program	• Social marketing • Community mapping • Fact sheets • Information kits • Public awareness campaigns • Press release
2	Gather information	• Policy decisions still being shaped • Factual information is missing • Information on opinions is missing	• Anticipate communication challenges	• Meetings with stakeholders • Community or public meetings • Community or public meetings • Focus groups • Public hearings and seminars • Surveys
3	Discuss	• Need two-way info exchange • Input may shape policy directions, program delivery • Opportunity exists to influence final decision	• Want to facilitate discussion among stakeholders	• Bilateral meetings • Info technology-based methods (interactive website, electronic conferencing, online discussion groups, e-mail lists) • Issue conferences • Technical consultations • Workshops
4	Engage	• Citizens can shape policy directions • Citizens should talk to each other on complex, value-laden issues	• Opportunity for shared agenda setting and open timeframes • Options generated together will be respected	• Constituent assembly • Roundtables • Citizen's panel
5	Partner	• Develop programs in partnership • Want to empower citizens or groups to manage process • Citizens or groups want to develop solutions themselves	• Agreement to implement citizen and groups solutions • Government ready for "enabler" role	• Consensus conference

Table summary developed from information in Saner, 2007

A policy for public involvement in decision-making can best be explained using a public involvement continuum illustrated in Figure 1 and elaborated in Table 1 (Health Canada, 2006; Saner 2007). Each level of public involvement and influence requires specific methods depending on the purpose of the initiative. For example, when a decision has already been made and the public needs to know about this, the objective of involvement is merely to inform or educate the public. Public awareness campaigns are thus appropriate at this level. On the other hand, a higher level of involvement is needed when it is necessary to empower groups to manage a process. In this level, consensus conference is a suggested method to meet the objective.

Medlock et al. (2007) identifies the following levels of communication to distinguish communication initiatives for specific audiences:

- Communication at the citizen-citizen level;
- Communication between citizens and experts;
- Communication as a catalyst for societal dialogue; and
- Communication for the policy-making sector.

Case in point is the social acceptance process of Bt maize in the Philippines.

The Case of Bt Maize in the Philippines

The approval of Bt maize in the Philippines in December 2002 was not without controversy. It was the first genetically modified food/feed product ever to be allowed for commercial planting in Asia, and therefore attracted enormous amounts of media and public attention both locally and internationally.

During the 7 years of the local evaluation of the technology, there was a continuous communication tug-of-war among the technology developers, the scientists, scientific organizations, advocacy groups/ non-government organizations, the farmers involved in the trials and the government sector. The debate in the Philippines continued from 1996 to 2002, and well after Bt maize was approved for planting and commercialization. The debate also saw a plethora of stakeholders, who included even the religious community, all trying to win the hearts and minds of the public and the government agencies assigned to assess the technology.

Some cause-oriented groups uprooted a field trial, sued the technology developers and lobbied for a moratorium on GM crops. A group of Catholic priests and nuns pleaded with local government units to refrain from giving support to GM activities in the community. Even politicians, including two senators, joined the fray by alleging that GM products could cause cancer and that it was a crime to do GM research. Filipino scientists battled it out with various groups in order to clarify the various concerns regarding the Bt maize technology.

Addressing the different concerns of such a diverse group of stakeholders became a real challenge, but was critical to the eventual commercial approval of Bt maize in the country.

-Excerpts from "The Bt Maize Experience in the Philippines: A Multi-stakeholder Convergence" in Brossard, D. et al.'s The Public, the Media, and Agricultural Biotechnology, 2007.

The Global Knowledge Center on Crop Biotechnology

The International Service for the Acquisition of Agri-biotech Applications' (ISAAA) Global Knowledge Center on Crop Biotechnology, familiarly known as the KC, was established in September 2000. It was established in response to an urgent demand from senior policy-makers in developing countries[1] for an entity that would make authoritative information available to facilitate and support transparent decision-making process regarding crop biotechnology. They noted that "the scarcity of current authoritative information and knowledge regarding food biotechnology crops represents a major deficiency that denies policy-makers and scientists access to the vital knowledge needed to make well-informed decisions." In particular, they concluded that:

- Consumers are generally ill-informed regarding agri-biotech crops and food. Anti-biotech groups mounting aggressive campaigns, initially in Europe and now globally, erode public confidence;
- Claiming their rightfully authoritative positions, the global science community, government regulators, and the agri-biotech industry must instill public knowledge and confidence through credible educational initiatives. Full awareness of the benefits, constraints, and attributes associated with food biotech crops belongs in the hands of developing nations – who stand to gain, or lose, the most;

[1] Six senior policy makers responsible for food biotechnology crops in ISAAA's client countries in Southeast Asia participated in a two-week Travelling Workshop in Europe and North America (Canada and USA) in September 1999. The Study Group was composed of Dr. Joko Budianto, Director General of the Agency for Agricultural Research and Development (AARD) in Indonesia; Dr. Hassan Bin Mat Daud, Director of the Malaysian Agricultural Research and Development Institute's (MARDI) Biotechnology Center; Dr. Rogelio A. Panlasigui, Undersecretary of Science and Technology in the Philippines; Dr. Sakarindr Bhumiratana, Director of the National Center of Genetic Engineering and Biotechnology (BIOTEC) in Thailand; Dr. Ruben L. Villareal, Chancellor of the University of the Philippines Los Baños; and Prof Vo-Tong Xuan, Vice Rector of the University of the Cantho, Vietnam and Rector of An Giang University, Long Xuyen City, Vietnam (Van Zanten, et al., 2000).

- Developing countries have been eclipsed in the dialogue on food biotechnology crops. Totaling more than 80 percent of the global population, the people of the Southern Hemisphere should be adequately represented in this critical global debate. Instead, vocal and affluent activists from the North - on both sides of the dispute - have dominated, sometimes taking a patronizing attitude towards their southern neighbors and generally not addressing the urgent needs of resource-poor, subsistence farmers in developing nations; and

- Developing countries lack current and authoritative information on crop biotechnology.

The Study Group recommended that ISAAA should "move quickly to implement its Global Knowledge Center on Crop Biotechnology. Great benefit will come from the consistent and focused distribution of knowledge in plain language through ISAAA's global network."

The ISAAA Southeast Asia Center which had already been in existence since 1997, was designated to be the hub of the KC. Along with the core KC officially set-up in September 2000, three initial Biotechnology Information Centers were established in the Philippines, Thailand, and Malaysia.

Building on the strength of ISAAA's commitment to start the information network, the KC buckled down to operationalize its mandate.

Expert planning workshop. In January 2001, some 24 experts from Asia (China, India, Indonesia, Malaysia, Philippines, Thailand, and Vietnam); Africa (Egypt, Kenya, and South Africa); Europe (United Kingdom), Latin America (Brazil) and the United States of America were invited to a communication and network planning workshop in Bangkok, Thailand. The workshop sought to get a scenario of biotechnology in various parts of the world and assess the communication efforts being made; experts' perspectives on various communication activities; and communication design and implementation plan for specific BICs for the years ahead.

The country reports acknowledged that tremendous biotech activities were happening in the developing world but were not being reported. It was recognized that developing countries saw the potential of biotechnology to contribute to improved agricultural production. In addition, a common desire to collaborate and a shared vision from the country representatives formed a strong foundation for a network where countries from the developing world could share experiences regarding the technology. It was agreed that the BICs

flesh out their respective roles and activities based on specific information needs and identified stakeholders. The KC would then perform a facilitative role and provide tools and services to complement local activities, i.e. prototype communication materials, training, and coordination of information flow across the nodes.

Objectives. Based on the discussion in the workshop and a brainstorming exercise with experts, the identified objectives of the KC were to:

- Serve as a global knowledge center and network on crop biotechnology;
- Assist national biotech programs in creating an enabling environment for the safe application of crop biotech, through the creation of Biotechnology Information Centers (BICs);
- Generate, process, and package knowledge on crop biotech;
- Facilitate sharing of knowledge among various stakeholders; and
- Develop and validate appropriate science communication modalities.

Primary stakeholders. The 2001 network meeting identified the KC's four sectors to be reached: non-government organizations, media, health/nutrition specialists, and national scientists. Eventually, the KC's primary audience evolved to include policy-makers, the academic community, and the private sector.

Several countries are in very different stages in the process of adopting GM crops. Some are still evolving biosafety guidelines to be enacted into law and thus policy-makers, the academe, and scientists continue to be the main focus of communication efforts. Policies have to be put in place by governments that are science-based and free from emotional or ideological biases in order to deliver desired benefits. Through the KC's network of BICs, specific audiences in each of the member countries are identified including farmers and industry, with the 'general public' eventually reached via the multiplier effect of communication.

Organizational set-up. The KC is under the direct guidance of the ISAAA Global Coordinator/ Southeast Asia Center Director, who in turn is accountable to the ISAAA Board of Directors. A manager oversees program implementation and is supported by a multi-disciplinary team. Activities are implemented based on a team approach with each individual contributing his/her share in the attainment of specific objectives.

Activities. In carrying out its objectives, the KC is involved in various activities that span global knowledge networking; information needs analysis and strategy design; information repository building; and information packaging. Specifically, these include:

- Environmental scanning – involves consolidating information about issues and concerns that affect stakeholders regarding biotechnology;
- Coordination and monitoring of a global network of BICs and linking with key institutions;
- Global outreach through Internet-based applications – development and updating of a website and its two e-newsletters, Crop Biotech Update and Biofuels Supplement;
- Publication design and development –production of various print materials from brochures, semi-technical publications, monographs, and Briefs, as well as submission of articles to peer-reviewed publications;
- Video documentation - development of video series on experiences of developing countries with regard to biotechnology applications;
- Development of other communication tools such as board games, mentor kits, radio plugs, exhibits, and CD ROMs on information resources;
- Capacity building of stakeholders – design and implementation of workshops, seminars, and other outreach activities;
- Communication research – conduct of studies to better understand knowledge levels, attitudes,

and viewpoints of stakeholders, either as an audience or a user of communication materials; and

- Special projects – involvement in external communication activities requested by development partners and specific groups.

The KC has a global mandate and hence, focuses on the macro perspective of the biotechnology arena. It critically scans global developments and analyzes issues and concerns to come up with implications for developing countries. This information is transformed into prototype communication strategies that stakeholders will find useful for decision-making. It is the network of Biotechnology Information Centers, however, that cater to specific information needs of local stakeholders.