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APPLYING AUDIENCE RESEARCH TO PUBLIC DIALOGUE ABOUT SCIENCE: AN EVALUATION OF COMMISSIONED RESEARCH FOR THE PUBLIC UNDERSTANDING OF BIOTECHNOLOGY PROGRAMME

by

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Abstract

Inclusive public dialogue about issues of concern to science and society can democratise and widen the knowledge base for decision-making so scientific research and developments are made accountable to citizens' priorities. This participatory model of science communication is not yet widely practiced. More research is needed into how to make such communication effective. Formative audience research can inform a communication strategy's design to meet its objectives effectively and enhance its relevance to participants' needs and communication preferences. However, audience research designs based on transmission models are inadequate for the participatory objectives of public dialogue. They must therefore be adapted.

This dissertation proposes how audience research should be designed and conducted when the objective of communication is public dialogue about science, such as biotechnology. The methodology involves building an evaluation framework from the literature and applying this to a case of applied research. Four sub-questions are addressed. First, audience research and participatory development communication literature is reviewed to propose how audience research should be designed and conducted for public dialogue broadly. Second, literature on public engagement about science is analysed for the challenges in public dialogue about science and the implications for audience research. Third, a set of guidelines is presented for evaluating the appropriateness of audience research for public dialogue about science. Finally, these guidelines are used to evaluate a case of qualitative audience research commissioned by the Public Understanding of Biotechnology (PUB) programme, judging the appropriateness of its design to the communication objectives and extracting further lessons for audience research.

The findings present a "double-dialogical" approach to audience research, where the research methods and the information elicited reflect dialogical objectives. This approach emphasises listening over telling, building relationships over interrogating targets, and optimising inclusivity and diversity in identifying participants, framing issues, and selecting channels and spaces for deliberative dialogue, wherein participation and information dissemination play complementary roles. Following these principles, audience research can build democratic foundations for public dialogue about science while recognizing the following challenges: the specialized and technical nature of science, the complexity of issues, the power of commercial interests, the need for social accountability, low motivation and interest amongst publics, and the resistance of technical experts and decision-makers towards dialogue. A framework of guidelines is offered for designing and evaluating audience research for public dialogue about science, structured around 5 interrelated elements: WHY – clarifying the objectives of communication and audience research; GENERAL – overall

research design considerations; WHO – conceptualizing and investigating dialogue participants; WHAT – framing issues from multiple perspectives; and HOW – identifying spaces and channels for public dialogue. Applying the framework to the case study demonstrates the guidelines' usefulness for evaluation purposes, grounds the study in an actual case of audience research and extracts lessons for future applications. The framework succeeds in judging the appropriateness of the study's design for its purpose.

The study contributes to the search for effective means of public engagement by proposing practical guidelines for the first steps of such a process, a methodological praxis for audience research that can be useful in scholarly and practitioner communities and can be refined and adapted for various contexts.

Keywords: formative audience research, public dialogue, public engagement, democratization of science, science communication, participatory development communication, research design, guidelines, evaluation of applied research.

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List of Abbreviations

DST	Department of Science & Technology
FAO	Food and Agriculture Organisation of the United Nations
GM	Genetically modified *or* genetic modification
GMO	Genetically modified organism
HIV	Human Immunodeficiency Virus
HSRC	Human Sciences Research Council
NGO	Non-governmental organisation
PRCA	Participatory Rural Communication Appraisal
PUB	Public Understanding of Biotechnology
SAASTA	South African Agency for Science and Technology Advancement

Chapter 1: Introduction

1.1 INTRODUCTION

> *It seems that as societies grow more complex – culturally and politically pluralistic, based on increasingly complex science & technology, aware of complex global interdependencies – communication and communication research become correspondingly more important (Priest 2005: 266).*

Innovations in modern science and technology undoubtedly offer potential solutions for many contemporary problems, but also carry questions of uncertainty, risk and inequity. Issues of concern to science and society are characteristically complex and are perceived through divergent interests, values and knowledge systems. This plays out, for example, in health, agriculture, food security, climate change, and energy resources – all of which are priority issues in development.

Numerous arguments favour increased public dialogue about complex scientific issues (Priest 1999). Such dialogue, it is argued, is necessary to broaden the knowledge base for policy decision-making, hold science accountable to citizens and to development priorities, and support democracy (United Kingdom (UK) 2001). The notion of public dialogue about science represents a shift in the field of science communication toward participatory democratic principles. The objective is not to educate the public and gain their support for science, as is the case in cognitive-deficit models of science communication based on transmission of information (Borchelt & Hudson 2008). Instead, the aim of public dialogue about science is the co-creation of sustainable, accountable science through inclusive, deliberative discussion and collaboration, which values the diverse knowledge of so-called experts, publics, and lay citizens, and which recognises broader ethical, political, metaphysical and environmental concerns surrounding the processes and products of science (Davison, Brans & Schibeci 1997; People Science & Policy [PSP] 2012; Singhal 2005).

Public dialogue about science, as with other communication programmes, requires careful planning and design (PSP 2012; UK 2001). It has been noted that the nature of science-related issues – with their technical complexity, uncertainty and frequent controversy – presents unique challenges for communication (Irwin & Michael 2003; Priest 1999; Scoones, Leach & Cockburn 2006). To understand these challenges we can look to the fields of science communication and of science and citizenship, which examine the intersection of science, society and development. To approach the challenges, the development communication field can offer guidance in participatory communication and communication strategy design, particularly audience research processes (Bessette 2004; Melkote & Steeves 2001).

The emphasis on participation as a goal in notions of public dialogue about science lends itself to comparison with participatory development communication, described as "…moving from a focus of informing and persuading people to change their behaviour or attitudes, to a focus on facilitating exchanges between different stakeholders to address a common problem" (Bessette 2004: el.[1]).

Audience research, originating in the broader communication, media and marketing fields, has helped to guide the design of development communication programmes so that they are appropriate to the needs, existing knowledge and communication preferences of their intended audiences (Dellinger 2006; Melkote & Steeves 2001; Mody 1991). Appropriate methods of audience research could be applied in the context of public dialogue about scientific issues. Audience research could inform the design of communication and action surrounding, for example, adaptation to climate change, implementation of male circumcision as an HIV-prevention intervention, the relevance of modern agricultural technologies for small-scale farmers, and policy debates about DNA archiving for police forensics.

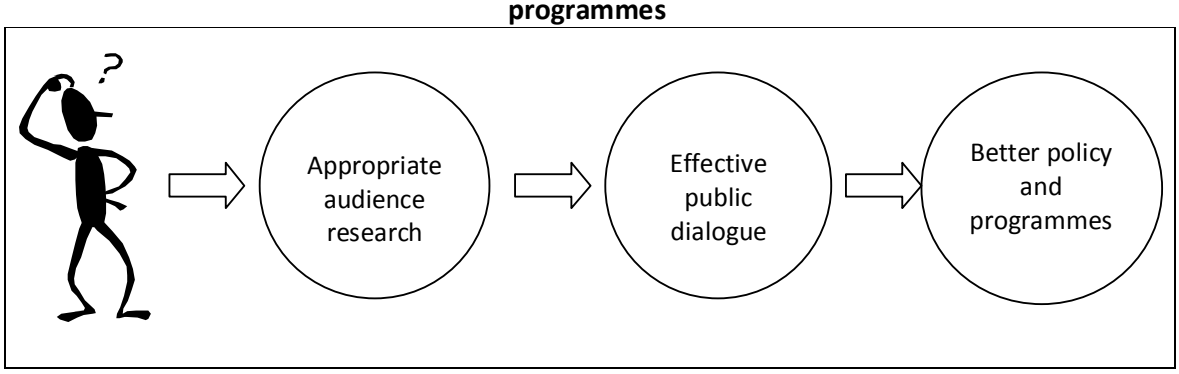
In recent times there has been considerable public reaction to developments in modern biotechnology (defined in 1.5.3), making this a scientific sub-discipline of particular interest in the context of public dialogue (Irwin & Michael 2003; Leach, Scoones & Wynne 2005;

[1] The notation "el." is used throughout this dissertation in citations that refer to electronic sources which have no page numbers, such as websites and electronic journals that do not have paper versions.

Priest 1999). As South Africa (along with several other countries) promotes and invests in biotechnology as a driver of scientific, economic and human progress (South Africa 2001), a critical praxis of citizen participation in policy processes – informed by inclusive audience research – could help to ensure that biotechnology initiatives are guided by objectives of democracy, social justice and sustainable well-being (UK 2001). Programmes that aim to promote dialogue about biotechnology, such as the Public Understanding of Biotechnology programme in South Africa (South African Agency for Science & Technology Advancement [SAASTA] 2012), have sought to understand how best to identify and reach their audiences and fulfil the programmes' aims (UK 2001).

Figure 1-1 below represents the background and rationale for this study that has been described up to this point.

Figure 1-1: The importance of appropriate audience research for better policy and programmes



In short, as Figure 1-1 illustrates, effective public dialogue can make for better science-policy decision-making, and appropriate audience research can enhance the effectiveness of public dialogue. What makes for good-quality, appropriate audience research – given the principles of public dialogue and the challenges of communicating about science – is therefore a key question in this chain, and one this study tries to answer. Research is needed on the application of audience research to the field of public dialogue about science and sub-disciplines such as biotechnology. It is hoped that such an enquiry can contribute to a methodological praxis that is critical, rigorous and useful in the scholarly and practitioner communities and ultimately to society. The meaning of "appropriate", "effective" and

"better," as stated in the above figure, must be made explicit. This will be done in the course of this dissertation.

This study enters into an opportunity for interdisciplinary sharing, as connections are made between science communication, audience research and development communication, in order to arrive at appropriate methods of audience research to inform public dialogue about science. While experience in the development communication field can offer its methods and theories to the interaction of science and society, so in turn can experiences from this field of application serve to enrich existing development communication research and praxis. The inquiry embarked upon in this study will combine insights from these fields of literature with the empirical experience of an applied case of commissioned qualitative audience research undertaken for the Public Understanding of Biotechnology (PUB), a programme implemented by the South African Agency for Science and Technology Advancement (SAASTA). The availability of this case provides the opportunity to evaluate and learn from its strengths and shortcomings to inform future similar instances of audience research for public dialogue about science, which is the goal of this study. This is captured in the research question in the section to follow.

1.2 RESEARCH QUESTION

The central aim of the research has been formulated as the following question:

How should audience research be designed and conducted for programmes that aim to promote public dialogue about science, with specific reference to the Public Understanding of Biotechnology programme?

1.3 SUB-QUESTIONS

In order to address the main research question, the following sub-questions will be explored:

1) How should audience research be designed and conducted when the objective of a communication programme is to promote public dialogue?

2) What are the particular communication challenges inherent in public dialogue about science to which attention should be paid when designing audience research?

3) Based on the findings of sub-questions (1) and (2), what guidelines can be used to evaluate the appropriateness of the design and conduct of audience research for public dialogue about science?

4) Applying these guidelines to a case of commissioned audience research for the Public Understanding of Biotechnology programme, (i) to what extent was its design and conduct appropriate to the goal of the programme, and (ii) what lessons does it offer?

1.4 DEMARCATION OF THE FIELD OF STUDY

As described in the introduction, the research question involves a multidisciplinary and complex topic which will require an understanding and synthesis of a number of fields, i.e. development communication, science communication, and Audience Studies. It is not within the scope of this Masters dissertation to explore in-depth all aspects of the relevant fields. The enquiry will be limited to examining the point at which the relevant fields intersect, venturing only as deeply into each discipline as serves the research question. While acknowledging various models of development communication and science communication, the main interest and focus of this study is on audience research to guide public dialogue about science, terms to be clarified in the next section.

Furthermore, the study does not set out to describe basic 'how-to' knowledge for doing research nor to prescribe step-by-step instructions for designing audience research for public dialogue about science. Rather, the guidelines developed are offered as a contribution to critical debate and adaptable application by researchers within the needs of a particular context.

As will be shown in the course of this dissertation, matters of uncertain and complex science – like modern biotechnology – are often controversial and value-laden. It must be noted that it is not the aim of the researcher to argue for or against or take any particular stand on these issues, but to investigate aspects related to their communication.

1.5 CLARIFICATION OF KEY TERMS

The following key terms, as they are used in this study, are clarified below:

- Audience research
- Participatory development communication
- Public dialogue
- Biotechnology
- Commissioned research

1.5.1 Audience research

The term audience research can be used in the context of scholarly and applied research, in development communication and commercial media, as well as in referring to various stages in the communication process, including the formative or early design phase. These distinctions are described in more detail in Chapter 3. This study focuses on formative audience research in the applied 'real-world' context of Development and science communication planning. An appropriate definition of the term is sought for these purposes.

Mody (1991: 62) writes that formative audience research "refers to the systematic collection and analysis of evidence to aid decision making during the planning, design, and production stages of a programme, product or system". The United States Department of Health and Human Services defines audience research as "any communication research that is conducted on specific audience segments to gather information about their attitudes, knowledge, interests, preferences, or behaviours with respect to prevention issues. Segments may be based on various grouping strategies, such as race and ethnicity, age, education, or family income. Some investigators refer to audience research as 'formative' or 'elicitation' research" (USA 2012). This definition is useful, except for its context-specific

restriction to prevention issues. Not all communication programmes that call for audience research have prevention issues as their intended objective.

Where the term audience research is used in the proposed dissertation, it will be used with the following working definition which combines elements of the above:

> *Audience research is the systematic collection of information about the intended participants in a communication programme, product or system – their knowledge, attitudes, behaviour, information needs and preferences with respect to the topic and channels of communication – so as to inform the design of the communication programme to meet its intended objectives and enhance its relevance and appropriateness to the audience's needs.*

1.5.2 Participatory development communication

Anyaegbunam, Mefalopulos and Moetsabi (2004: 10) provide a definition which adequately captures the meaning of participatory development communication as intended in this study:

> *The systematic design and use of participatory activities, communication approaches, methods and media to share information and knowledge among all stakeholders in a… development process in order to ensure mutual understanding and consensus leading to action. The aim is to facilitate people's participation at all levels of the development effort to identify and implement appropriate policies, programmes and technologies to prevent and reduce poverty in order to improve people's livelihood in a sustainable way.*

Attention must be drawn to the term "stakeholders" in the definition above. In Bessette's (2004: el.) writing about participatory development communication, stakeholders are defined as "community members, active community groups, local and regional authorities, NGOs, government technical services or other institutions working at the community level, policy makers who are or should be involved with a given development initiative". This

definition positions people as participants in communication. Bessette (2004) argues that the words 'audience' and 'target audience', which still remain in use, are inappropriate within the participatory development communication paradigm as they imply the passive reception of messages. This study will note Bessette's argument and, although using the term 'audience', will critically re-examine the relationships implied through its use as the study progresses.

1.5.3 Public dialogue

The terms public dialogue, public consultation, public engagement, public participation are often used interchangeably, but it is important to distinguish them more acutely as they reveal different perspectives on the relative role of citizens in decision-making and of the intended outcomes of communication. The literature review in Chapters 3 and 4 will engage with these distinctions in more depth. Public dialogue is chosen in this study as the most appropriate term to highlight a particular interest in dialogical communication about science, which is acknowledged as one aspect of the broader concept of public engagement. The next paragraph defines public engagement in order to reach a suitable definition of public dialogue.

Public Agenda (2008: 2) looks at public engagement in terms of a citizen-centred approach to democracy and defines it as "a highly inclusive problem-solving approach through which regular citizens deliberate and collaborate on complex public problems [and which] allows people to join the public dialogue surrounding a problem and provides them the tools to do so productively". Similar definitions are given for public engagement with science (Borchelt & Hudson 2008; Research Councils UK [RCUK] 2002), which is used as an umbrella term to include various models and formats of communication, from information dissemination to consultation to dialogue. However, in practice, public engagement can often lean more towards "telling" than "listening" and is often not inclusive enough of divergent actors and perspectives (Friedman 2010; PSP 2012; Wadsworth 1997). For this reason, the term public dialogue is used to emphasise deliberative, participatory objectives, the incorporation of public input into decision-making and two-way, symmetrical communication (Borchelt & Hudson 2008; RCUK 2002). However, the term will be used in a broad sense, similar to the

definition of engagement above, to include various models of communication, including one-to-one, one-to-many, many-to-many and many-to-one (RCUK 2002).

The term public dialogue is therefore used in this study with the following meaning in mind:

> *Public dialogue is a participatory engagement process, inclusive of divergent actors and perspectives and using various forms and tools of multi-directional communication, in which citizens and stakeholders collaborate, deliberate and provide input into decision-making and problem-solving surrounding issues of broad public importance.*

1.5.4 Biotechnology

Acquaah (2004: 2) writes that "there is no clear consensus among the scientific community on the definition of biotechnology… Some definitions are criticized as 'too broad to be useful', while others are said to be 'too narrow to be informative'". The United Nations Convention on Biological Diversity defines biotechnology as: "Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use" (United Nations 1992: Article 2). Very similar definitions are offered by Acquaah (2004:2), Priest (1999: 96) and SAASTA (2012). In SAASTA's Public Understanding of Biotechnology programme the term is used to encompass a wide scope of applications such as agricultural, medical, industrial, environmental and food-processing applications.

One can further distinguish between traditional and modern biotechnology. Traditional biotechnology "has been around for centuries in baking bread, brewing beer and wine, making cheese and compost" (SAASTA 2012). Modern biotechnology, on the other hand, is synonymous with "genetic engineering – the active manipulation of DNA, sometimes across species – which is probably the most controversial form of biotechnology" (Priest 1999: 96).

Given the diverse perspectives on biotechnology and its potential for controversy (Omamo & Von Grebmer 2005) a definition of it should avoid being "politically charged" (Acquaah 2004:

2). It should therefore (a) neither condone nor disapprove of the technology, (b) acknowledge the difference between traditional and modern biotechnology and (c) consider biotechnology in the political, social and economic contexts in which it is developed, commercialised and applied (Omamo & Von Grebmer 2005).

Thus, the working definition of biotechnology to be used in this research will be as follows:

> *Biotechnology is a broad term referring to the development, application and (where applicable) commercialisation of technologies that use biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use. The term includes traditional and modern biotechnology (the latter involving genetic manipulation) and encompasses agricultural, medical, industrial, environmental and food-processing applications.*

1.5.5 Commissioned research

The case study presented in this study, namely qualitative audience research for the Public Understanding of Biotechnology programme, consists of a commissioned research project. The term "commissioned" refers to the formal appointment, authorisation and payment of somebody to perform a prescribed service (Penguin Student Dictionary 2006: 168).

According to the Social Research Agency (2002: 9), "specific [social research] projects are often commissioned by public authorities and other bodies who operate in the public sector or serve the public good, as a basis for informing the planning, development and implementation of policy and/or of improving service delivery".

Priest (2005: 266) speaks of applied research in a similar vein as "research that has been generated by the discovery or observation of a problem or situation that needs to be understood and resolved ... Sometimes this term means research done to meet an objective set by someone other than the researcher (a government agency, corporation, service organization, or advocacy group seeking to produce a particular result or solve a problem it sees), rather than springing from a theoretical problem identified by the researcher… There

is no inherent reason why good research cannot be done in response to needs identified outside the 'ivory tower' research community".

For the purposes of this study, commissioned research will be defined as:

> *Specific research carried out as a paid service on formal appointment by a public or other authority in response to a particular real-world situation, and which informs the planning, development and implementation of a particular programme or policy.*

1.6 CONCEPTUAL AND THEORETICAL BACKGROUND

This section presents a review of existing literature that underpins this study. This is intended to establish a conceptual and theoretical framework in which to situate the enquiry, demonstrate the need for this research and clarify the research problem.

The overview is organised thematically based on the following:

- The participatory trend in development communication
- The participatory trend in science communication
- Participation of the audience in development communication
- Audience research for public dialogue about science

1.6.1 The participatory trend in development communication

The call for public dialogue can be located within the broader context of development communication theory and practice, a dynamic and multidisciplinary field with wide-ranging interpretations of its goals and means (for overviews see Melkote & Steeves 2001; Servaes 2002; Waisbord 2001). The evolution of the field has been characterised in part by an ongoing tension between two conceptual models: diffusion and participation, each associated with particular theoretical roots and objectives (Melkote & Steeves 2001). While diffusion and participation are often presented as competing approaches, they can be considered complementary, particularly within the requirements of public dialogue. This concept of complementarity of models is primary to the remainder of this study.

1.6.2 Diffusion

The concept of diffusion – of information, messages, ideas and innovations – lies at the centre of early approaches to development communication and is still the dominant paradigm espoused by many government, donor and development agencies today. The diffusion approach is founded on the ideology of modernisation, which has been criticised for its ethnocentric biases and its "hypodermic needle theory" of communication, whereby it is assumed that messages (often mass-mediated) and the ideas they promote (often Western and modern) can be effectively "injected" into passive receptors in so-called 'underdeveloped' countries, and that this would contribute to their development, following in the footsteps of 'developed' countries (Melkote & Steeves 2001; Rogers 1986).

Development communication programmes based on the diffusion approach are most often top-down and expert-led, and conceive communication as a one-way transfer of information to a passive recipient. An example is Laswell's 1948 model (in Steinberg 2007), in which the structure of communication directly follows the question, "Who says what to whom through what channel and with what effect?" Diffusion-oriented approaches often emphasise behaviour change as the desired effect of messages, which are designed, targeted at a particular audience and disseminated (Bessette 2004; Tufte & Mefalopulos 2009). As this approach makes use of the mass media, its advantages are its broad reach and its conformity to linear, efficient planning and production processes.

1.6.3 Participation

The participatory paradigm arose in the 1970s in response to the criticisms of the diffusion approach. It constituted a shift in focus toward the facilitation of a horizontal process of ongoing dialogue between active stakeholders who participate in knowledge-sharing, consensual decision-making and collaborative action around a common goal (Bessette 2004). This corresponds to a transactional model of communication, which is meaning- and people-centred and recognises that communication is embedded in the context of an interactive relationship between active participants, each with their own frame of reference.

However, Yoon (1996: el.) reminds us to consider "participation and communication as an instrument to empower people rather than as a vehicle for moving information".

Notable theorists and practitioners who influenced this movement in the 1970s are Brazilian pedagogue Pablo Freire (1994), participatory research pioneer Robert Chambers (1997; 2002), Columbian Orlando Fals-Borda and Antonio Gramsci in Italy (in Joyappa & Martin 1996). A common principle in their work is the promotion of more equitable processes of knowledge creation which value the capacities and experiences of ordinary people and their capacity for self-development (Melkote & Steeves 2001). It is put forward that such an approach could bring about empowerment and the transformation of oppressive conditions. The expected outcome in the participatory model is greater engagement in social and political processes, sustainable change and collective action (Tufte & Mefalopulos 2009: 29).

Various studies have found evidence of the effectiveness of participatory communication approaches to strengthen existing social networks (Malhotra *et al.* 2005); improve communication linkages between local actors and decision-makers (Bessette 2006); and improve people's skills, confidence and competencies to improve their own lives rather than waiting for outside assistance (Bessette 2006; Malhotra *et al.* 2005; McCall 2010; Ruland 2003: 3). Furthermore, interventions created in a participatory fashion can be more relevant and effective than those designed solely by outsiders, as they take cognisance of how issues are embedded in broader socio-cultural contexts and influenced by systemic and structural barriers (Malhotra *et al.* 2005). Participation is thus a worthwhile end in itself and not only a means for achieving other development outcomes.

Despite these potential benefits, participatory communication has been criticised for having a limited reach and sometimes being so context-specific that its successes cannot easily be up-scaled (Ruland 2003; Yoon 1996). Participatory approaches are more complex and difficult to manage as they do not lend themselves to linear, top-down management systems that govern much of the development sector (Hornik 1989 in Colle 2002: el.). Some of the assumptions on which participation is based are criticised as naïve and unfeasible (Wasserman 2001: 172-174). In addition, the shifts in power encouraged by participatory approaches can lead to resistance and conflict (Yoon 1996).

In summary, whereas the diffusion paradigm emphasises telling, information, education and persuasion, the participatory paradigm emphasises listening, exchanges and action amongst diverse actors around a common issue. While the former is able to reach large audiences with a particular message, often through mass media, the latter is the more empowering and transformative approach as it enables and equips citizens to participate in decisions that affect their lives and values the contribution of their experience and knowledge. It will be put forward in this study that these two approaches to communication can be combined for effective social change, drawing on the strengths and addressing the limitations of each and using the methods of each as appropriate for the purpose and context of communication.

1.6.4 Participation as citizenship

Recent years have seen the rise of new discussions on participation as citizenship and as a social and political right, as noted by Cornwall and Gaventa (2001: 2). This trend has been influenced by the field of participatory democratic governance and human-rights approaches, which encourage governments to respond and be accountable to their citizens' concerns (Hicks 2008; McCall 2010: 13-15). Cornwall and Gaventa (2001: 9) argue for an approach in which "the concept of participation shifts from beneficiary participation in state-delivered programmes to a means of holding the state accountable through new forms of governance that involve more direct state-civil society interactions".

The increasing interest in the interface between the state and citizens has been accompanied by a search for effective participatory mechanisms and processes for citizen engagement. This search has given rise to a collection of methods and principles varyingly described as public dialogue, deliberation and public engagement "as both a means and an opportunity for bridging the democratic governance gap" (Eguren 2008: 314).

The trend towards greater participation of citizens in decision-making that affects their lives, with recognition of the value of their existing knowledge, can also be noted in other disciplines. Science communication is an example, which is discussed in the next section.

1.6.5 The participatory trend in science communication

A shift in focus towards the need for more participatory structures is also noted in the literature on the science-society relationship, which has been studied, described and theorised by different fields. The interface between science, society and development has been of interest to development studies and development communication since the beginning of the modernisation era of development, with significant focus on technology uptake, health promotion and agricultural extension (Melkote & Steeves 2001: 67). Other fields interested in the science-society interface include science and technology studies (STS), sociology of scientific knowledge (SSK), science and citizenship, philosophy of science, science communication and risk management. While the distinctions between these approaches will not be described in this dissertation, it suffices to note that the field has widely differing perspectives on the science-society relationship, which more or less conform to two broad models, introduced below.

The early (and still widely dominant) form of science communication is based on a scientific literacy or cognitive-deficit model, built on a one-way flow of information from the science experts to the so-assumed ignorant lay public. This model of science communication largely considers science and technology as isolated, sovereign centres of objective knowledge free of cultural interference and autonomous from the rest of society (Downey & Dumit 1998: 5-6). The model aims to improve the public's understanding of science and assumes that this will lead to positive acceptance of science (Borchelt & Hudson 2008). This perspective is criticised, inter alia, for its failure to appreciate how "laypeople negotiate their relationship with science in a broader, social context" (Wynne 1993, cited in Rogers 1999: 182).

The democratic or interactive science model, on the other hand, portrays science as inseparable from social and institutional connections, and scientific knowledge as inherently uncertain and open to divergent interpretations by so-called experts and the lay public (Einsiedel & Thorne 1999: 49). This model recognises that the development and application of scientific knowledge take place within broader political, economic, environmental, social and ethical contexts and result in products, interventions and systems which affect our lives in multiple and divergent ways (Leach, Scoones & Wynne 2005). For example, choices about

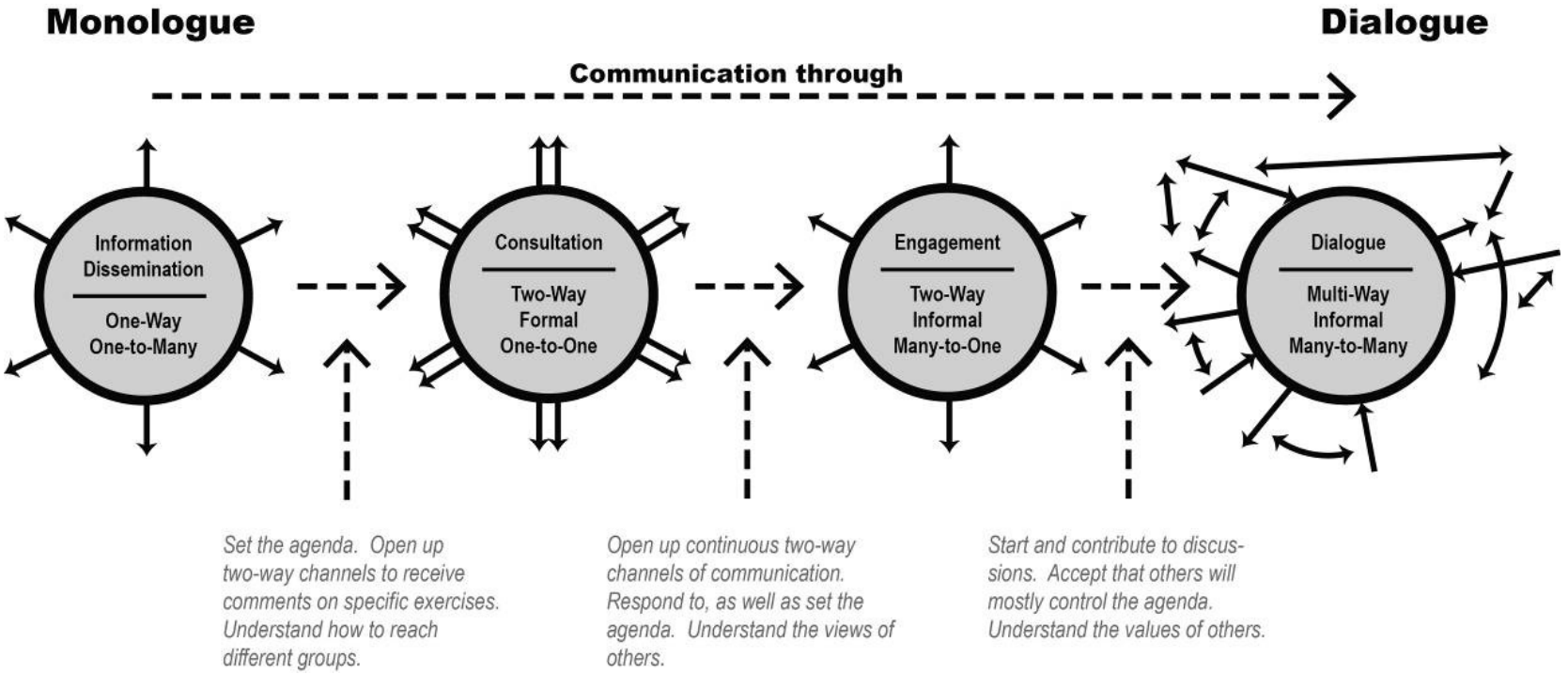
science and technology affect the energy we consume, the healthcare and medicines we use, the ways our cities, roads and public transport operate, how our food is grown and processed, how we deal with our waste, and how we communicate with each other.

In opposition to the cognitive-deficit assumption, Scoones, Leach and Cockburn (2006: 1) suggest the notion of "cognitive justice", whereby the knowledges (deliberately in the plural) of "lay experts" and of other disciplines of "traditional experts" are given a platform to contribute to decisions on the direction and application of science. This entails a more dialogical, horizontal structure for communication. Scott and Hudson (2005: 1) explain that "the public has a legitimate opinion to offer based on other areas of knowledge and expertise which frame the context in which any technology would be considered and used… Consulting the public can lend much to the quality of the policy debate".

Literature can be found about cases in which the public's involvement has been engaged on, amongst other topics, energy policy (Barker 2002), allocation of healthcare budgets (May 2008), setting priorities in healthcare (Bruni, Laupacis & Martin 2008), determining the values that should guide biobanking (Burgess, O'Doherty & Secko 2008), environmental assessment (Wiklund 2005), the conduct of community-based clinical trials (Fairhead, Leach & Small 2006; Marsh *et al.* 2008), and the selection of nuclear power or waste-disposal sites (Irwin & Michael 2003).

The changes in approaches to science communication has been accompanied by the use of different terms, including 'scientific literacy', 'public understanding of science', 'public engagement with science' and 'public dialogue about science'. As listed here, these can be placed on a continuum of models of science communication from monologue to dialogue. These are depicted in Figure 1-2.

Figure 1-2: Continuum of science communication approaches



Source: Dyball & King (2002: el.).

The dialogical/interactive model of science communication posits a new perspective on the relationship between science and society: "The form and direction of science and technology are no longer seen as inevitable and monolithic, awaiting 'discovery' in nature. Instead they are increasingly recognised as being open to shaping by individual creativity, collective ingenuity, cultural priorities, institutional interests, stakeholder negotiation and the exercise of power" (Stirling 2005 in Scoones, Leach & Cockburn 2006: 1). However, the idea of including citizens in decision-making about science is not yet widely accepted (Chopyak & Levenesque 2002) and is sometimes only paid lip-service without genuine commitment (Wilsdon, Wynne & Stilgoe 2005).

In relation to biotechnology, Priest (1999: 98) asserts that "society at large has a legitimate stake in evaluating both the feasibility and desirability of the direction that [genetic engineering] does – and does not – take". She argues that social or public control over the general thrust and direction of genetic research is consistent with the ideals of democracy, which "rests on the notion that public policy is undertaken with the consent of the governed" and is especially justified when science is publicly funded. Critics oppose, for example, how genetically modified crops have been developed and introduced with little consideration of the priorities of farmers whose livelihoods they are meant to improve (Wakeford & Pimbert 2003: 1).

How this dialogical ideal of science communication is achieved in practice is a question that has been raised in the literature. Scholars in the field of science and citizenship have called for greater development and critical reflection on the theoretical and practical bases of public engagement with science (Chopyak & Levenesque 2002: 165; Scoones, Leach & Cockburn 2006; Wakeford & Pimbert 2003). Scoones, Leach & Cockburn (2006: 4) highlight the question of "what conditions and what avenues of participation offer routes to more vital forms of… solutions based on mutual recognition and respect". Such scholars advocate that more consideration and research is needed about "participatory research approaches that involve user perspectives in setting research agendas" (Scoones, Leach & Cockburn 2006: 4).

Science and technology issues, as Scoones, Leach & Cockburn (2006: 2) argue, present a number of challenges for communication and for participation in particular. These derive partly from their claims to specialised knowledge that tend to exclude lay citizens, especially in less literate societies. Secondly, often the issues are complex and uncertain (Priest 1999: 97) and therefore do not lend themselves to a bounded process of designing a particular message for dissemination, but require the provision of a platform for various views to be heard and discussed.

Rogers (1999: 183) argues for the importance of understanding audiences when communicating about science. She asks, "What can listening to audiences tell us about how mass media might better provide understandable information about uncertain and complex issues?" As Prewitt (1982, in Rogers 1999: 182) argues, "the public knows more about science than scientists know about the public".

As demonstrated here, the practical application of dialogical communication about science therefore requires insight into avenues for participation, message design, understanding of the audience and identifying appropriate channels for communication. These aspects have been considerably studied within development communication, making it a useful field to turn to for theoretical and practical guidance on public dialogue about science.

Having drawn connections between the parallel moves towards participatory principles in development communication and science communication, and having identified the need for audience research in dialogue about science, development communication is considered for guidance on conducting and using audience research, with specific reference to the participation of the audience.

1.6.6 Participation of the audience in development communication

Development campaigns, projects and other bounded communication programmes are tools that have been used in development communication since the early days of the field following the Second World War (Melkote & Steeves 2001). Scholarship about the design and implementation of such programmes has led to the continuous development of

approaches based on theoretical and empirical experience. Early campaigns based on the diffusion of innovations theory are criticised for the many assumptions made about what the audiences needed to know and in what form and through what media they should receive messages designed for them. As the field developed, social marketing models (drawing from commercial marketing techniques) tried to address these criticisms by systematically considering the needs and interests of various audience segments and then basing communication interventions on such information (Melkote & Steeves 2001). The trend towards a participatory approach in development communication raised the value of involving the audience in this process of audience analysis rather than simply making them the subjects of analysis (Snyder 2003). This represented a turn towards audience-participatory research, which is promoted and well documented by Mody (1991) who describes its role in audience-based message design.

Mody (1991) proposes an approach to audience research which involves the audience at message-design and pre-testing phases in a dialogue between audience and message producer. Ideally in this model the audience tells the producer what they want to hear and how, and the producer designs an audience-responsive message on a relevant topic, treated in an appropriate idiom, which enables effective communication: shared understanding of meaning.

The effectiveness of audience-participatory research has been demonstrated through empirical research (Noar 2006). Dellinger (2006), for example, describes how an HIV campaign, developed and implemented with the participation of a marginalised and traditionally underserved audience, led to a significant increase in HIV testing and test retrieval compared with previous campaigns, which their intended audience had found to be inauthentic and irrelevant.

Audience research is not without its limitations, however. Mody (1991: 121-124) warns of bias in research design, manipulative use of “audience intelligence” by message producers acting in their own interest, and the possibility that the audience’s views are not valued by the message-design team. As Snyder (2003: 173) points out, the audience’s power is limited to making suggestions, which are not necessarily taken up. These problems are partly tied to

the persistence of a one-way communication model where the audience's participation is limited to the message-design phase, whereafter they become "receivers treated as targets for persuasion and change" (Melkote & Steeves 2001: 242).

Thus, while substantial developments and contributions have been made within development communication as to how audience research processes can guide the effective design of communication programmes, limitations and questions remain. Appropriate audience research methods are needed for a participatory development communication approach, which go beyond designing messages for dissemination. Instead they use communication as an empowerment tool (Bessette 2004) and consider audiences as active participants in dialogical communication and collaborative action (Melkote & Steeves 2001: 248). In this context, a term like "target audience" with its military language may itself be inappropriate as it denotes the passive reception by specific population groups of a message designed and transmitted by some authority (Bessette 2004).

Solutions to these potential shortcomings can be found in other methods, both within the development communication field and others. For example, Havelock (1971 in Melkote & Steeves 2001: 249) suggests "a problem-solving model" where the needs of users, their diagnosis of problems and proposed solutions drive the need for information. Considerable methodological insights are offered by Participatory Rural Communication Appraisal (PRCA) and Participatory Communication Strategy Design, which seek to involve and empower the marginalised as partners in a multidirectional process of research, planning and action to improve their livelihood (Anyaegbunam, Mefalopulos & Moetsabi 2004; Mefalopulos & Kamlongera 2004: 1). In participatory media or action-media methodologies, users create their own content and the line between researcher, producer and audience becomes blurred (e.g. Lunch 2004; Melkote & Steeves 2001: 249-269; Parker 1997). Examples from applied anthropology (Wulff & Fiske 1987) demonstrate how in-depth ethnographic research with an emic perspective (seeking to understand sociocultural systems from the inside out) has led to highly relevant and culturally appropriate programmes of communication and social intervention which are rooted in local realities and build on existing social networks and forms of communication.

This broad range of fields is reviewed in seeking an appropriate approach for applying audience research to public dialogue about science, which is the focus of this study. Priest (2005: 265) states: "the possibilities for triangulation and fusion among methods, and opportunities for the development of appropriate new methods, are part of what make [the communication research] field intellectually exciting". The possibilities open up further when looking at how the science communication literature has sought to understand audiences.

1.6.7 Audience research for participatory science communication

Rogers (1999: 182) argues that little is understood about "how audiences make sense of information about complex scientific issues, issues in which uncertainty is a major component". This points to the need for communicators and scientists to be able to listen to the public's perspectives on science. Common practice in science communication, however, is to conduct public-opinion surveys, which aim to identify gaps in people's knowledge which need to be filled – not to hear what the public thinks (Davison, Brans & Schibeci 1997; Priest 1999; PSP 2012; UK 2001). This research approach clearly accords with the cognitive-deficit model, which is critiqued by proponents of dialogical approaches to science communication.

According to Rogers (1999: 180), numerous surveys of public understanding of science conclude that lay people know little about science. A quantitative study of South Africans' knowledge and perceptions of biotechnology, for example, indicated that eight out of ten people did not know what biotechnology is (Rule & Langa 2005). Wynn (1993, in Rogers 1999: 182) however, points out that one-dimensional quantitative measures of public understanding of science don't appreciate how "laypeople negotiate their relationship with science in a broader, social context". Priest (1993, in Rogers 1999) points out that while experts tend to use a narrow cost-benefit framework to assess the risks of new technologies, laypeople take into account a wider variety of issues including ethical, social and environmental considerations.

Davison, Brans & Schibeci (1997) critically review a number of major surveys on public attitudes toward biotechnology and identify problematic features in them. These include a consumerist rather than citizen-oriented conception of public discourse, the assumption of a

unitary 'general public', the use of a cognitive-deficit approach to public understanding of science, and presuming a politically neutral, instrumentalist model of science and technology. They propose alternative approaches which would recognise a diversity of publics and lay people's knowledge, employ interactive research instruments, address ethical, political, metaphysical concerns and overcome a technocentric[2] approach.

In a similar critique, Priest (1999: 98-99) asserts that opinion polls often glean opinions – on complex issues – that are based on a "quick glance… by a public that is either ignorant or propagandized". She argues that "public opinion about science is formed most meaningfully in what is sometimes described as a public space, that is, as a result of open and informed interpersonal discussion among citizens". She notes the relation of this "public space" to Habermas' (1989) notion of the public sphere and emphasises its important role in democratic societies.

Several processes exist that enable the citizen participation called for by Davison, Brans & Schibeci (1997) and Priest (1999). Some examples referred to in the science communication literature are the citizens' jury, consensus conference, the 21st-century town meeting or town halls, deliberative polling, stakeholder forums and reconvened focus groups (Davison, Brans & Schibeci 1997; National Coalition for Dialogue & Deliberation 2012; Scoones, Leach & Cockburn 2006; Scott & Hudson 2005; UK 2001). These methods essentially create a simultaneous platform for research into the public's views as well as implementation of a dialogue. Though some uses of these methods in public engagement with science and biotechnology in particular have been documented, from both 'developing' and 'developed' countries, scholars have called for greater development and critical reflection on their application to public engagement with science (Wakeford & Pimbert 2003; Scoones, Leach & Cockburn 2006).

[2] **Technocentrism**: As an egocentric child refers all questions to him or herself, "technocentrism is the fallacy of referring all questions to technology" (Papert, 1990).

"An over-identification with [computer] technology at the expense of human relationships" (Ince 2001, brackets inserted to indicate broader application).

The arguments presented here demonstrate the need to better understand the audience in science communication, acknowledge the value of lay knowledge and its contribution to science debates, and develop appropriate means to engage the public's participation in informed and balanced discussion. This reiterates the value of looking to the development communication field for its scholarship on these critical issues.

1.7 RESEARCH DESIGN AND METHODOLOGY

An appropriate strategy has been sought to address the main research question, namely:

> *How should audience research be applied to programmes that aim to promote public dialogue about science, with specific reference to the Public Understanding of Biotechnology programme (PUB)?*

This section briefly describes the components of research design employed in this study and introduces the selected case. This will demonstrate the appropriateness of this strategy for answering the proposed research question. An in-depth discussion of the research design and methodology is provided in Chapter 2, where reference to the literature on research design and methods provides guidance on their use.

1.7.1 Research design

The research design combines elements of literature review and evaluation research within the structured framework of a case study strategy (Hofstee 2006; Mouton 2001). Through a thorough review of the literature, a set of methodological guidelines will be established for applying audience research to public dialogue about science. These guidelines will be applied as an evaluation framework to an empirical case of commissioned audience research. This will enable a critical reflection and evaluation of that case against the guidelines developed from the literature.

1.7.2 The case study strategy

A case study research strategy engages in the close, detailed examination of a single (or sometimes multiple) example or phenomenon in a tightly structured way (Yin 1984; Hofstee 2006). Using various methods and types of evidence (Yin 1984), it is a suitable approach for holistically examining "a contemporary phenomenon in its real-life context" (Yin 1981: 59). This study makes use of a case of commissioned qualitative audience research carried out by the researcher for the South African Agency for Science and Technology Advancement (SAASTA) between July and November 2007 to guide the future communication strategy design of the Public Understanding of Biotechnology (PUB) programme. The commissioned PUB study fulfils a number of reasons for selecting a case for in-depth study: it offers significant opportunity for learning (Tellis 1997), is typical of the phenomenon under investigation (Ragin 1999) and the principles learned can be extrapolated to other cases (Hofstee 2006: 123).

1.7.3 Literature review as part of research methodology

A literature review involves the systematic selection, reading, analysis and integration of texts from the secondary literature (University of Toronto 2009). The literature review in this study will play an important role in establishing a set of guidelines that will be applied as an evaluative framework to the selected case. The main fields of literature that will be examined are, broadly: audience research, development communication and science communication, with an emphasis on participatory, democratic perspectives. Besides the conceptual and theoretical background provided in this chapter, the engagement with the literature takes place in the body of the dissertation in Chapters 3 and 4, and not in the conventional second chapter of the dissertation.

1.7.4 Evaluation research

Evaluation, according to Scriven (1991: 139), "refers to the process of determining the merit, worth, or value of something, or the product of that process". Trochim (2006) provides another definition: "Evaluation is the systematic acquisition and assessment of information to provide useful feedback about some object". Combining these definitions for the

purposes of the present study, evidence from the PUB study will systematically be acquired and assessed in order to determine the appropriateness of the study's research design for purposes of enabling public dialogue about science, and thereby provide useful feedback that can aid future research design in similar studies. This process will make use of an evaluation framework comprised of guidelines developed through the literature review. While evaluation is most often applied to intervention programmes, this study seeks and employs appropriate methods for evaluating the quality of applied research.

1.8 DIVISION OF CHAPTERS

Following this introductory chapter, the dissertation is structured as follows:

In **Chapter 2** the research design and methodology will be discussed in detail. The discussion provides support for the use of a case study strategy combined with evaluation research and a literature review. The development of an evaluative framework for analysing the case study requires further exploration of the literature as part of the research methodology in the subsequent chapters.

Chapter 3 begins the process of developing a framework of guidelines for evaluating the case study. This chapter presents a systematic review of literature related to audience research and participatory development communication. It will address sub-question 1: *How should audience research be designed and conducted when the objective of a communication programme is to promote public dialogue?*

Chapter 4 expands on the initial set of guidelines by examining literature and previous studies concerned with science communication, particularly public dialogue about science, in order to answer sub-question 2: *What are the particular communication challenges inherent in public dialogue about science to which attention should be paid when designing audience research?*

The revised set of guidelines should address sub-question 3: *Based on the findings of sub-questions (1) and (2), what criteria can be used to evaluate the potential of particular audience research projects to inform public dialogue about science?*

Chapter 5 describes the case study of PUB audience research, including the programme context and goals, as well as the research objectives, design and methods, and a description of the research outcomes.

In **Chapter 6** the final set of guidelines are applied to the case study as an evaluation framework, drawing on the available evidence in order to answer sub-question 4: *Applying these guidelines to a case of commissioned audience research for the Public Understanding of Biotechnology programme, (i) to what extent was its design and conduct appropriate to the goal of public dialogue about biotechnology, and (ii) how does it contribute to the guidelines?*

Chapter 7 is the final chapter. Here, the salient findings and conclusions will be presented, addressing the research question and each sub-question. The study's main contributions as well as limitations are noted, and recommendations will be made for further research.

1.9 CHAPTER SUMMARY

This chapter has outlined the rationale for the study, defined the research question, clarified key concepts and demarcated the scope of research. It has provided a conceptual and theoretical background from the literature on the topic, and briefly introduced the methods of investigation. The structure of the remaining dissertation has also been explained.

Chapter 2: Methodology

2.1 INTRODUCTION

The previous chapter provided a comprehensive introduction to the topic of study and outlined the research question. An overview of the literature was given as background and rationale, and the methods of investigation were described in broad terms. This chapter will now deal with the research methodology in more depth. In contrast to the conventional placement of a literature review in the second chapter of a dissertation, here the methodology is addressed first in order to establish a framework for a systematic engagement with the literature in the chapters to follow.

Put simply, this is a study of a study. It is an academic study which critically evaluates the case of a commissioned research project against insights gained from the literature, in order to answer the question:

> *How should audience research be designed and conducted for programmes that aim to promote public dialogue about science, with specific reference to the Public Understanding of Biotechnology programme?*

This chapter begins with a statement of the epistemological assumptions that inform the approach to this research. This is followed by a description of the research design and methods selected and the rationale for doing so. The limitations, challenges and ethical considerations of the methodology are also presented.

2.2 EPISTEMOLOGICAL APPROACH

Epistemology is the philosophical study of knowledge – of how we know what we know and what counts as knowledge. Epistemology is central to academic inquiry because it provides the basis on which knowledge claims are made and underlies the choice of methodological approach (Scott & Marshall 2009). A suitable epistemological position for this study was

sought that would be appropriate to the nature of this particular enquiry and the challenges it presents.

The commissioned research project which forms the case study for this dissertation was conducted by the same researcher writing this dissertation. It is only by virtue of the researcher's personal involvement in the case that access thereto and knowledge of its surrounding context is possible. To deny this personal involvement would not only be a dangerous untruth but would also deny a valuable research opportunity. That said, an acceptable intellectual framework is needed in which to validate and deal with the presence of the self at two levels – as the consultant with the experience of conducting the PUB study and as the researcher writing this dissertation, reflecting on and critiquing that experience in retrospect.

A positivist approach, which values detachment, distance and impartiality, would consider any involvement of the personal in research a threat to objectivity. While positivism has long been the dominant paradigm in science and still holds this hegemony in many disciplines, its validity in the social sciences especially has been widely refuted. The attempt at completely objective and value-free research has come to be accepted as impossible (England 1994) and "context-stripping" (Klein 1983: 91).

Alternative approaches to positivism have arisen from various schools of thought, including feminism, critical theory, interpretivism, constructivism and post-structuralism (Scott & Marshall 2009). What these loosely have in common, and the position which is held in this dissertation, is that knowledge is socially constructed and understood in terms of an inevitable relationship between the knower and the known. Resonating with the objectives of this study, this position requires acknowledgement that: "Research is a *process* and not just a product. Part of this process involves reflecting on and learning from past research experiences [and] being able to re-evaluate our research critically" (England 1994: 82).

To critics who would warn of "rampant subjectivity" (Lather 1991: 52), Du Bois (1983: 113) responds in her call for "passionate scholarship", derived from Michael Polanyi's (1959) phrase, "the passionate participation of the knower in the act of knowing". Du Bois (1983:

113) states, “Passionate scholarship in no way means mushiness or a focus on our own navels; it demands rigor, precision and responsibility in the highest degree”.

Procedures will be used in this study that help to “protect our work from own passions and limitations” (Lather 1991: 69), such as the systematic use of triangulation, a dialectical relationship between data and theory, and reflexivity. These will briefly be explained in the paragraphs to follow.

Triangulation, a well-established analytical logic used in this study, helps to establish data credibility by drawing on multiple data sources, methods and theoretical schemes (Lather 1991: 66). In addition, experiential accounts of the case study will be subjected to an evaluation framework developed from theoretical insights from the literature and evidence from other studies for comparison.

The development of the evaluation framework and its application to the case study will strive for “empirical accountability – the need to offer grounds for accepting a researcher’s description and analysis – and the search for workable ways of establishing the trustworthiness of data in critical inquiry” (Lather 1991: 52). Nevertheless, the potential exists that this process may be influenced by the researcher’s prior experience. While this may be seen as a limitation involving bias, a researcher’s prior constructs “…are only ‘biases’ if they are not acknowledged or explored, as is almost always the case in positivist research” (Reinharz 1983: 175). Such acknowledgement requires the procedure of reflexivity.

England (1994: 82) defines reflexivity as “self-critical sympathetic introspection and the self-conscious analytical scrutiny of the self as researcher”. In defence of the critique of reflexivity as mere “navel-gazing”, Okely (1992) distinguishes this from self-awareness and critical scrutiny of the self. “Indeed those who protect the self from scrutiny could as well be labelled self-satisfied and arrogant in presuming their presence and relations with others to be unproblematic” (Okely 1992: 2). Accepting that “…the researcher is a visible and integral part of the research setting” (England 1994: 84), a critical awareness of the influence of personal experience is retained throughout the investigation, and a reflective account thereof is provided in Chapter 6. As Smith (1988 in England 1994: 84) says, “Indeed, research

is never complete until it includes an understanding of the active role of the analyst's self which is exercised throughout the research process".

In summary, this research will claim as valuable the knowledge developed through personal experience, while striving for rigour by submitting this experience to critical self-scrutiny, triangulation with other sources of evidence and challenges from the literature. This approach is intrinsic to the research design and methods utilised in this study, which shall be described next.

2.3 RESEARCH DESIGN

2.3.1 Overview

As introduced in Chapter 1, the overall approach to answering the research question combines elements of the following typical research designs, each of which will be discussed in turn below:

- Case study
- Evaluation
- Literature review

These elements come together as follows. A case study strategy provides the overall framework for systematically and holistically examining evidence from a single case of applied audience research. The case is explored with the purpose of evaluating and learning from it as a case of audience research for public dialogue about science. A literature review will provide the insights with which to build the necessary evaluation framework as well as to provide comparison and context to the case evidence. The diagram in Table 2.1 illustrates the convergence of these elements in the research design.

Table 2-1: Overview of research design

Literature Review	
Audience research and public dialogue ⇩	**Challenges in public dialogue about science** ⇩
Evaluation framework for evaluating the appropriateness of audience research design for the purpose of public dialogue about science	
Evaluation of case of PUB audience research according to evaluation framework	

The use of a case study strategy combined with evaluation and literature review is not unusual. The distinctive place of case studies in evaluation research is pointed out by Stake (1995: 95), where "the programme, person, or agency being evaluated is the case ... [and] the study is, at least in part, a search for merit and shortcoming of that case". The interplay of empirical evidence and literature is a key aspect of case study (Van Wynsberghe & Khan 2007). For example, Jonsson, Danielsson and Joeborn (2005) reflect on a particular research and stakeholder-involvement method. By drawing on experiences from similar studies and stakeholder-involvement projects from the literature, they evaluate to what extent the research fulfilled both the research objectives and the aims of the larger project it intended to serve.

These elements of the research design – case study, evaluation and literature review – are addressed individually below. Guidance for their application is provided by the detailed discussions hereunder, which refer to literature and their use in previous studies.

2.3.2 Case Study

Case study research is a research strategy that closely and holistically examines a single (or sometimes multiple) example or phenomenon in a tightly structured way (Yin 1984; Hofstee 2006). Case studies can make use of various methods and types of evidence (Yin 1984). The "contextualised analysis of an instance in action" (Van Wynsberghe & Khan 2007: 83) is a

defining feature of the case study strategy, allowing an investigation to "retain the holistic and meaningful characteristics of real-life events" (Yin 1984: 14).

A case study strategy is therefore well suited to investigating holistically the available case of real-life audience research in its context, while situating the experiential evidence in a structured framework based on the literature. A case study approach is also valuable as a learning method, as Flyvbjerg (2006: 223) comments: "Cases are important for researchers' own learning processes in developing the skills needed to do good research. If researchers wish to develop their own skills to a high level, then concrete, context-dependent experience is just as central for them as to professionals learning any other specific skills".

Where a case study can make use of either single or multiple case designs, a single case is commonly used and acceptable under several circumstances (Yin 1984: 47). Considering these, taking the PUB study as a single case is justifiable because it presents a unique opportunity to document and analyze in depth a phenomenon that is not commonly accessible to investigation. Patton (1990 in Perry 1998: 794) reminds us, "The validity, meaningfulness and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected and the observational/analytical capabilities of the researcher than with sample size".

The vulnerability to heed in using single-case designs is that they "require careful investigation of the potential case to minimize the chances of misrepresentation and to maximize the access needed to collect the case study evidence" (Yin 1984: 44). On the latter point, access will not be a problem since the researcher is granted permission to use the full body of evidence available (to be detailed in the next section). To minimize misrepresentation, the evidence from the PUB study will not be presented in isolation. Rather, it will be analysed alongside other perspectives and studies in the literature.

Van Wynsberghe and Khan (2007: 86) highlight that a key heuristic of case study lies in "a direct and frequent interplay between theory and data …[which] facilitates a closer matching of conceptual intent and empirical evidence". They suggest that this interplay, combined with the careful delineation of the phenomena for which evidence is collected, and the

researchers' immersion in the context, allow researchers to recognize any flaws in their preconceived notions. Misrepresentation will therefore be reduced in this study through the dialectic interplay between the evidence from the PUB study and the illuminating literature, as well as an explicit commitment to critical and reflexive learning. Since the case study evidence is drawn from the researcher's personal experience, this interplay will occur at the stage of applying the evaluation framework to the case, and not throughout the study, in order to safeguard against potential bias in selecting and analyzing literature.

A number of publications report on studies in which researchers chose a case study strategy. Those presented here relate to aspects of this particular study, such as public engagement and research methodologies. They include the following:

- Ward, Howdle and Hamer (2008) present a case study of a biomedical public engagement project at the University of Leeds, illustrating the barriers and facilitators to engaging the adult public with biomedical research and university communities.

- To contribute an understanding on the application of action research as a phenomenological methodological paradigm in the context of organizational research, Huxham and Vangen (2003) analyse two case studies to extract significant research-design issues.

- Ravallion and Huppi (1991) use a methodological case study strategy for exploring approaches to measuring changes in poverty. They begin by describing the need for such measurement and then illustrate the use of the two instruments by examining the data.

- Fischer (1987) presents a methodological case study of public-policy evaluation research. Through his analysis of the case he demonstrates the research implications of Habermas's critical communications theory (1989), and the links between methodology and epistemology.

- Moore and Yin (1983 in Yin 1984) examine multiple cases of research and development projects to examine the reasons why some research findings become applied in practice.

They make extensive use of documentary evidence, such as project proposals, reports and summaries of meetings, combined with interviews and observations. The multiple sources of data allow them to triangulate evidence to come to reliable conclusions.

- Kristjansen *et al.* (2008) analyse multiple case studies to understand the conditions linking international agricultural research knowledge with action for sustainable poverty alleviation. Their report illustrates how a conceptual framework consisting of certain propositions is applied to multiple cases, the analysis of which offers insights that modify the propositions.

- In Priest's book "Communication Impact: Designing Research that Matters" (2005), a narrative format is used to reflect on experiences of completed research. Several researchers share their experiences of actual research projects through personal narrative descriptions of the methods chosen and the challenges in applying those methods in a real-life context.

These references have served as a source of guidance for this study on the application of the case study strategy.

2.3.3 Evaluation

Evaluation is a form of applied research which aims to "determine the merit, worth or value of something" (Scriven 1991: 139). The process involves "the systematic collection of information about the activities, characteristics, and outcomes of programs for use by specific people to reduce uncertainties, improve effectiveness, and make decisions with regard to what those programs are doing and affecting" (Patton 1987: 11). This study contains a clear component of evaluation research, as the way in which the PUB study was designed and conducted will be systematically assessed in terms of its strengths, weaknesses and lessons learned in order to determine its value and to contribute usefully to the design of similar future projects.

As seen in Patton's definition above, evaluation is most often applied to intervention programmes and projects that aim to tackle some social problem. Much of the evaluation literature to be found is aimed at this sort of application (for example Patton 1997; Scriven 1991). The body of literature on programme evaluation, as it is called, therefore needs to be used adaptively since evaluation in this study is applied in a different context: that of applied research. Guidance has thus been sought in the literature for evaluation of applied research specifically, as explained below.

Evaluation of research takes place within the scientific research and innovations tradition, where the approach to evaluation necessarily differs to some degree between academic and applied research, or what Gibbons *et al.* (1994) distinguish as "Mode-1" and "Mode-2" knowledge production. In Mode 1 (set within the academic community) the process of scientific peer review and citation indexing is used to determine scientific quality and impact of scholarly research. The case of audience research conducted for the PUB programme falls within Mode-2 knowledge production, which is research set in an applied, social context, often done as part of the strategic management of public policy and programmes. Applied research – and the case in this study – should be subject not only to criteria of scientific robustness, but to touchstones of socio-economic relevance and accountability (Arnold 2004; Gibbons *et al.* 1994). A multidimensional approach to evaluation is thus required (Furlong & Oancea 2005), as explained in the next paragraph.

Various sets of dimensions for assessing the quality of applied research have been proposed by a number of authors.

- **Scientific dimension:** All of those reviewed include a scientific dimension, encompassing epistemic quality (Furlong & Oancea 2005), validity (Coryn *et al.* 2007; Mays & Pope 2000), credibility (Coryn *et al.* 2007; Patton 2001), ethicality (Coryn *et al.* 2007) and methodological quality (Boaz & Ashby 2003). This scientific dimension holds that applied research should "ensure rigour [through] systematic, self-conscious research design, data collection, interpretation and communication" (Mays & Pope 2000: 52).

The emphasis by a number of authors on broader social and economic dimensions of research quality supports the view that "methodological quality alone does not provide a sufficient basis for assessing the value and contribution of research to policy and practice" (Boaz & Ashby 2003: 12). These dimensions include the following:

- **Economic dimension:** This dimension intends to account for the cost-effectiveness and auditability of applied research (Coryn *et al.* 2007; Furlong & Oancea 2005).

- **"Capacity development and value for people"** (Furlong & Oancea 2005: 10): These authors include this dimension for assessing research in terms of "the development of tacit knowledge and of the ethical, interactional and critical dimensions of practice".

- **Fitness for purpose and utility**: Resonating most clearly with the research question in the present study is a dimension which, following Patton's (1997) utilization-focused approach to programme evaluation, is all about usefulness. It includes what Furlong and Oancea (2005: 10) call a technological dimension and what Boaz and Ashby (2003: 11) term "fitness for purpose" and "fitness for utility". These all set out to assess whether the research design is appropriate to the purpose and intended use of the study and responsive to the needs and contexts of users (Boaz & Ashby 2003; Furlong & Oancea 2005). The notation "GOAL-METHOD" will be used in this dissertation to refer to this logic.

While all these dimensions are recognized as important for evaluating applied research, it is not possible within the scope of this study to address them all in detail. Since the interest of the research question is in the application of audience research methodology to the particular requirements of public dialogue about science, the focus of the evaluation will be on the dimension of fitness for purpose, in other words the appropriateness of the research design for its intended purpose. The evaluation framework will not address the methodological dimension of how to design and conduct rigorous research since this has been thoroughly addressed in the reported scholarship (for example Henning, Van Rensburg & Smit 2004; Miller & Brewer 2003; Somekh & Lewin 2005). The assumption is made that the dimension of scientific and methodological rigour is a vital requirement for quality

applied research and is the background against which the guidelines developed in this study are to be applied.

But how should this study systematically go about such an assessment of applied research? Following the approach of Rowe and Frewer (2000: 10) a framework for evaluation is considered essential to avoid making ad-hoc or opinion-based judgments and to enable comparison across cases. Programme evaluation research methods often involve the use of indicators (or standards of performance based on criteria of merit) to measure progress towards set objectives (Arnold 2004; Hurteau, Houle & Mongiat 2009). However, several authors guard against a blueprint approach that provides exact indicators or prescribes definitive, universally applicable methods. Instead they advocate for an approach of presenting guidelines which are to be applied critically and flexibly in relation to specific contexts of practice, where environmental factors will mediate the appropriateness of methods (Furlong & Oancea 2005: 11; Mays & Pope 2000: 51; Patton 1999: 330; Rowe & Frewer 2000: 24). This appropriately situates evaluation of applied research in a learning paradigm (Preskill 2008), with a clear focus on "reflection, debate and an ongoing iteration between goals and methods" (Spaapen, Dijstelbloem & Wamelink 2007: 41).

This study will therefore involve the development and application of an evaluation framework consisting of guidelines by which to evaluate, specifically, the design and conduct of audience research for public dialogue about science. The guidelines are to be derived from the literature in a systematic manner and should be based on the principles and purpose of the applicable bodies of knowledge, as other scholars have done. For example, Feek (2009), in developing indicators for measuring the impact of information and communication technology (ICTs) on social change, set certain requirements upfront before developing the indicators, including the scholarly fields they should draw from and how they should be structured for use. Similarly, Barker and Pistrang (2005) proposed a set of criteria for evaluating the pluralistic methodologies used in community psychology, based on discipline-specific values such as: "Sensitivity to people's contexts, respect for diversity among people and settings, giving voice to traditionally underrepresented populations, and promoting social justice" (Barker & Pistrang 2005: 204). In this study we will need to develop a composite set of guidelines made up of the relevant constituent domains of the research

problem, i.e. audience research, public dialogue, and the challenges of science communication. This is the task of the literature review. The requirements for the guidelines in this study are detailed in Section 2.4.2 of the research methods section to follow. Having set out this approach to evaluation, the next section considers the role of the literature review in the research design.

2.3.4 Literature Review

The literature review in this study aims to provide a critical synthesis and analysis of previous research and current knowledge on the topics of relevance. The literature review plays an important role in the research design alongside the case study strategy and evaluation process. Theories, opinions and studies from the literature will: (1) provide understanding of the relevant topic domains with which to develop guidelines for evaluating the case study; and (2) provide a critical perspective with which to compare and reflect on the evidence from the case of the PUB Study.

A literature review should follow a determined structure. Bem (1995: 172) has noted: "Authors of literature reviews are at risk for producing mind-numbing lists of citations and findings that resemble a phone book – impressive case, lots of numbers, but not much plot. [In contrast] a coherent review emerges only from a coherent conceptual structuring of the topic itself". A systematic process would thus involve: defining the key concepts; delineating the boundaries; searching, identifying and reviewing the relevant literature; analyzing and evaluating papers; organizing and presenting the findings. In this process it will be important to heed Mouton's (2001: 180) warning of the main sources of error in literature reviews: "Selectivity in the sources; unfair treatment of authors; misunderstanding of the source; selective interpretation to suit one's own viewpoint; poor organisation and integration of the review".

In this study the literature review is structured in two phases. The relevant domains of the literature are explored in turn to build systematically a framework for critically evaluating the PUB study. Each layer of the literature review explores particular topic areas, each layer

building on the next. Table 2-2 details these layers and the areas of research to be reviewed in each, which follow closely on the sub-questions of the study as set out in Chapter 1.

Table 2-2: Fields of literature reviewed and their alignment with the research questions

Layer of evaluative framework	Fields to be reviewed in the literature	Relevant sub-questions
Public dialogue for audience research	Participatory development communication	*Sub-Question 1* How should audience research be designed and conducted when the objective of a communication programme is to promote public dialogue?
	Public dialogue	
	Audience research	
Challenges of science communication	Science communication	*Sub-Question 2* What are the particular communication challenges inherent in public dialogue about science to which attention should be paid when designing audience research?
	Science and citizenship	

The source materials used for the literature review were searched and compiled systematically over an extended period and include:

- Scholarly literature, as found in books and journal articles, and identified through key databases and database providers such as EbscoHost, ScienceDirect and Wiley Online Library.
- Publications produced within the development practitioner community, such as books, reports, toolkits and websites by donors, university units, development agencies or contract research consultancies. These are important because this study emerges from and seeks to be relevant to the community of applied research and praxis and therefore should also acknowledge the existing state of knowledge within this community.

Analysing these areas of literature will allow the evaluation framework to be founded on a critical understanding of the connections between the goal and context of communication

and the appropriate methods for audience research. The research methods for implementing this research design are described in the following section.

2.4 RESEARCH METHODS

Having described the overall research design for approaching the research question, this section explains how the research design is applied, as well as the techniques used. The scholarly literature on case study research provides clear guidelines for a systematic approach to studying cases. Yin's (1984) suggested components of case study research design provide the structure for discussing the research methods in the following sub-sections. These components include:

- The study questions
- The conceptual framework
- The unit of analysis
- Sources of evidence
- Logic linking the data to the study's conceptual framework or purpose
- Criteria for interpreting the findings

2.4.1 Study questions

The research questions and the rationale for the study have been stated in Chapter 1, where the main research question was formulated as follows:

> *How should audience research be designed and conducted for programmes that aim to promote public dialogue about science, with specific reference to the Public Understanding of Biotechnology Programme (PUB)?*

The sub-questions (detailed in Chapter 1) address the components of this question and guide the process of the enquiry.

2.4.2 Conceptual framework

By articulating a conceptual framework in line with the study's purpose, the goals and boundaries of the study can be focused. Since the intended purpose of this case study is to evaluate and extract lessons from a case of audience research for public dialogue about science, the conceptual framework will take the form of an evaluation framework made up of guidelines.

In line with the preceding discussion of research design, it is intended that the guidelines should meet the following requirements to lend them clear purpose and uniformity:

- Within the scope of this study, they should focus on fitness for purpose – the appropriateness of the design and conduct of audience research for the goal and context of communication i.e. public dialogue about science;
- They should draw on knowledge and experience from relevant literature in the audience research, development communication, and science communication fields;
- They should follow a learning approach, with guidelines to be applied critically and with flexibility to the particular context, not a prescriptive blueprint approach;
- They should be applicable to the PUB case study as well as more widely in the practitioner and scholarly communities;
- The guidelines should be formulated as suggested actions and considerations that can be used both to design audience research, as well as to evaluate such design.

2.4.3 Unit of analysis and introduction to the selected case

The unit of analysis defines what the case is, i.e. "a phenomenon of some sort occurring in a bounded context" (Miles & Huberman 1994 in Baxter & Jack 2008: 545). The terms *unit of analysis* and *case* can thus be used interchangeably. In this study, the unit of analysis is defined as a qualitative audience research project commissioned by SAASTA in 2007 to inform the Public Understanding of Biotechnology programme (further described below). The case will be examined with awareness of its entire "cultural system of action" defined as "sets of interrelated activities engaged in by the actors in a social situation" (Feagin, Orum, Sjoberg 1990 in Tellis 1997: el.). This includes taking account of the research process, including its design, methods, findings and institutional context. A brief description of the

case is provided here, and will be discussed in more detail in Chapter 5 before it is evaluated against the framework of guidelines as presented in Chapter 6.

The commissioned research was intended to inform the design of the Public Understanding of Biotechnology (PUB) programme. The aims of the PUB programme are, in short, to facilitate dialogue and create balanced awareness about biotechnology amongst the South African public (SAASTA 2012). This case is therefore well suited to the research problem in this study, as it provides an opportunity to examine a real-life case of applied audience research for a science communication programme with public dialogue as part of its objectives. SAASTA granted permission for this study to be used for academic and publication purposes (see Appendix A), allowing the researcher to explore its broader significance for scholarship and practice in science communication, audience research, and science-society relations. Chapter 5 will provide a detailed description of the case study, including its institutional context, purpose, research design, methods and outcomes.

The boundaries of this Masters study are loosely defined by the goals and context of the case study. In other words, the case study's context leads to a focus on formative audience research, qualitative methods, dialogical communication, and an interest in the South African situation. While this keeps the study sufficiently focused for a Masters dissertation, the process of developing guidelines from the literature is still cognisant of broader contexts.

2.4.4 Sources of evidence

Case studies can use various methods and types of evidence. Multiple sources of evidence can help to consider the case from various perspectives and increase the reliability of analysis through triangulation of the various sources. Yin (1984: 78-89) notes the following six sources of evidence: documents, archival records, interviews, direct observation, participant-observation, and physical artefacts. This study makes use of two of these: documents and participant-observation.

(a) Documentation

Documentation is widely relevant to case studies and can include letters, agendas and minutes of meetings, written reports, administrative documents and news articles (Yin 1984). To this list we can add websites. The usefulness of documents as evidence, as Yin (1984) tells us, lies in their ability to support and illuminate evidence from other sources. There has been criticism of the overreliance on documents in case study research and researchers are warned to treat documents not as statements of final truth but as constructions created for a particular purpose and context. It is important therefore also to draw on other sources of evidence before reliable conclusions can be drawn.

The following documents related to the PUB case study are available to the researcher as evidence for analysis in this study:

- The PUB website (www.pub.ac.za), which details the programme's objectives, activities and more.
- A report on the outcome of a participatory planning workshop with the PUB team which marked the initiation of and set agreed foundations for the PUB audience research project.
- A comprehensive report compiled on the PUB audience research, which includes sections on the background, objectives, ethical considerations, research design, findings, discussion and recommendations.
- A report on a presentation and feedback workshop which took place at the end of the study (appended to the above report).
- A feedback report compiled by the science communication unit of SAASTA.

This set of documents provides a full overview of the background of the PUB programme as well as the entire process of research. Documents incorporate feedback and input from the client and therefore reflect a reviewed and co-created process. Apart from the website, these documents are not publically available, but could be made available by the researcher on request.

(b) Participant Observation

Participant observation is a qualitative research technique commonly used in social anthropology in which the investigator not only observes the situation being studied but also plays a participating role within the actual situation, e.g. being a resident of the neighbourhood being studied, or working as a member of an organisation under study. It is typical for the participant-observer to keep a journal containing analytical and reflective notes. This immersion in a social setting gives the researcher access to situations, nuances and insights not otherwise accessible and to do so from an insider's point of view. The noteworthy problems associated with this technique are the potential biases produced and the difficulty of balancing the participant and observer roles (Yin 1984).

In this study, the researcher fulfils the dual roles of participant, having conducted the PUB study in 2007, and of observer, critically reflecting on this experience as documented in the project file, which serves as a journal. The insights gained through participant observation illuminate the broader context of the study and allow reflection on the process of research. These will be referred to where necessary alongside other forms of evidence and insights from the literature.

2.4.5 Logic linking the data to the study's purpose

The data from the sources described in the preceding section is linked to the study's purpose through the application of the evaluation framework. At that stage – when evaluating the case study – there will be interplay between the evaluation framework (built from the literature) and the case study evidence. The process of evaluation, on the one hand, examines how the design of audience research in the case study performs against the guidelines, measuring the presence or quality of the characteristics considered important in audience research for public dialogue about science (Rowe & Frewer 2000). On the other hand, it seeks to extract additional lessons from the case study which might not have arisen in the literature. In this way, the case study contributes empirical experience to the guidelines, making them "even more relevant to researchers, policymakers and practitioners in this area" (Kristjanson *et al.* 2008: 9).

2.4.6 Criteria for interpreting the findings

Tellis (1997: el.) notes that these last two components – criteria for interpreting the findings and the logic linking the data to the study's purpose – are the least developed aspects of case studies. This final component of criteria for interpreting the findings is understood to relate to the process of analysis, which defines how the data will be used to arrive at conclusions (Reinharz 1983: 183).

After developing the evaluation framework and then applying it to the case study, the dialectic of lessons from literature and empirical evidence will combine to answer the overall question of how audience research should be designed and conducted when the intended communication objective is to enable public dialogue about science. The final analysis will undertake "to treat the evidence fairly, to produce compelling analytic conclusions, and to rule out alternative interpretations" (Yin 1984: 100).

This section has described the research design and methodology employed in this study. To follow, the challenges and limitations of this approach will be acknowledged.

2.5 CHALLENGES AND LIMITATIONS

A few of the most important challenges and limitations of the research methodology that were predicted from the start of the study are noted here. In the concluding chapter (Chapter 7) the limitations of the study's process and findings will be set out in more detail.

2.5.1 Scope of evaluation

The evaluation in this study is in a sense only theoretical: it applies the theoretical benchmarks of the evaluation framework to the research design 'on paper' only. A more elaborate research design (involving follow-up interviews, for example) could have investigated to what extent the findings of the study were used by the client in subsequent communication strategies, thereby determining usefulness by considering actual use. However, in light of the existing complexity of this research, the resources available and the level of study, it was decided not to undertake such methods.

2.5.2 Wider application

This study offers a set of guidelines which propose how audience research should be designed and conducted for programmes that aim to facilitate public dialogue about science. A systematic and critical engagement with a wide range of relevant literature provides support for the validity of the guidelines, and the use of an empirical case grounds the guidelines in practical experience. This process strives to provide practical guidelines that are applicable to other programmes with public dialogue (particularly around science) as their aim. This is therefore consistent with a search for analytic rather than statistical generalization (Perry 1998: 790). Nevertheless, as stated within this chapter, the guidelines are offered not as normative or blueprint instructions, but to be applied critically and with flexibility in each particular context. The guidelines are in a sense tentative and open to improvement and adaptation by other scholars and applied researchers. It is acknowledged that the guidelines have been developed in particular conditions which reflect the context of the PUB programme, the experience of the commissioned PUB study and the position of the researcher within it. As Reinharz (1983: 177) points out, **"**This is a general epistemological dilemma in the sense that all knowledge is contingent on the situation under which it is formed". This is further reflected in the next point.

2.5.3 The challenge of personal involvement

The epistemological position described at the beginning of this chapter has established that the researcher's personal involvement in the commissioned study is an inseparable and valuable source of knowledge in this research. The research design uses mechanisms to deal with the role of the personal in this research. In Chapters 6 and 7 the researcher reflects on how her own role may have influenced the findings of this study. Such reflexivity follows Reinharz's argument (1983: 175) that biases **"**…are only 'biases' if they are not acknowledged or explored".

2.6 ETHICAL CONSIDERATIONS

Ethical standards guide the conduct of research to ensure that no harm is done in the process (Mouton 2001: 238-248). The most significant potential ethical problem in this study

concerns the right to use the commissioned audience research conducted for PUB as a case study for academic purposes. Furthermore, it would be important to know that the audience research project itself was conducted ethically, for to build a dissertation upon an ethically questionable study would in itself be unethical. However, formal ethical approval has been granted for this study, attesting that proper procedures have been implemented to counter potential problems. These are explained below.

2.6.1 Permission granted by SAASTA to use data for academic purposes

The organisation who commissioned the PUB study, the South African Agency for Science and Technology Advancement (SAASTA) have given their written permission for the data collected during the PUB study to be used for publication and academic dissertation purposes. This permission letter is included as Appendix A.

The permission letter includes certain conditions necessary to maintain the integrity of the information and acknowledge the role of SAASTA, which remains associated with the research project. The conditions, which are complied with in full, are as follows:

- The confidentiality of research participants and key informants shall be protected. This means that the names and contact details of research participants shall not be published.
- The corporate identity of research participants may be used provided that their permission is given and documented.
- Upon publication of the research, SAASTA shall be accredited for having made the research possible. The requested accreditation is addressed in the "Acknowledgements" section of this dissertation.

2.6.2 Ethical procedures followed during the PUB Study

The commissioned audience research project for PUB explicitly acknowledged the importance of ethical considerations. A full excerpt from the PUB research report stating the ethical considerations of the study is included as Appendix B. To summarise here, these included: stipulating no conflict of interest in the use of the findings; the selection of research techniques to support a neutral, unbiased position; transparency towards research

participants about the research purpose, funding and procedures; and informed consent obtained, following the guidelines of the University of Pretoria.

Based on the permission granted by SAASTA to use the data, the compliance with the conditions therein, and the ethical soundness with which the PUB study itself was conducted, it can therefore be concluded that all necessary steps have been taken to avoid any potential ethical pitfalls in this study.

2.7 CHAPTER SUMMARY

This chapter has described how the research question is approached through a research design that makes use of a case study strategy to evaluate an empirical case of commissioned research against a scholarly examination of the challenges and requirements of audience research for public dialogue about science.

The chapters that follow are structured in terms of this methodology, documenting the steps in this investigation. Through a review of literature, the following two chapters will explore the particular domains from which the evaluation framework is built. Chapter 3 will explore the application of audience research to public dialogue generally, leading to a set of guidelines. Chapter 4 then examines the challenges involved in communicating about science, thereby revising the guidelines to consider how audience research for public dialogue about science might deal with these challenges. Chapter 5 then describes in detail the case study of commissioned audience research for PUB. In Chapter 6 the guidelines are applied as an evaluation framework to the case. This process examines the extent to which its design and the manner in which it was conducted build foundations for public dialogue about science. Chapter 7 brings the study to a conclusion.

Chapter 3: Adapting Audience Research for Public Dialogue

3.1 INTRODUCTION

Following the research strategy set out in the previous chapter, the process now begins of developing an evaluation framework for designing and conducting audience research for public dialogue about science. This chapter creates the first layer of this framework, focusing on audience research appropriate to public dialogue generally and widening its application beyond science-related issues alone to include other concerns of public importance. Relevant literature is reviewed and presented to produce methodological guidelines in answer to sub-question 1 of this study:

> *How should audience research be designed and conducted when the objective of a communication programme is to promote public dialogue?*

In Chapter 1, two major communication models were briefly compared: the diffusion and participation paradigms, with public dialogue emerging as a means for engaging citizens' participation in decision-making that affects our lives. Audience research was also introduced as a process of informing the design of a communication strategy based on a systematic understanding of the participants and their needs.

This chapter begins with a more detailed description and critique of the field of audience research, examining the range of approaches that have been used in relation to communication applications. This builds towards the central argument put forward in this chapter: that audience research within a participatory or dialogical communication strategy ought to be different from audience research for diffusion-oriented communication. In other words, when the objective of communication is to facilitate public dialogue, audience research should follow a different set of principles and inform a different set of questions to the diffusion-oriented notion of communication, which asks "*Who says what to whom through what channels (how) and with what effect (why)?*" Although participatory communication does not follow the linear, one-way flow of information suggested by this question, the elements of communication suggested therein – WHO, WHAT, HOW and WHY

– will provide the framework for guidelines on how audience research should inform public dialogue.

These elements are addressed and guidelines developed beginning with the WHY element, in other words: *Why are we communicating?* That is: *What is the intended outcome of communication?* The answers to these questions reveal the goals of communication and the intended use of audience research, and should therefore drive its design. This logic fulfils the requirement set out in Chapter 2 that the guidelines should focus on the appropriateness of the research design for its intended purpose.

Given this study's interest in public dialogue, the discussion proceeds to examine systematically how audience research design relates to public dialogue. In order, the discussion examines the broad research-design decisions that are made, the conceptualisation and investigation of audiences (the WHO and WHOM), the identification and framing of messages or topics for communication (the WHAT), and finally the selection of channels and mechanisms (HOW).

A set of guidelines for designing audience research for public dialogue will be developed throughout this process. As stated in the previous chapter, these guidelines are not prescriptive instructions but are intended to be applied critically and with flexibility to the given purpose and context of application, within a rigorous methodological framework.

3.2 UNDERSTANDING AUDIENCE RESEARCH

3.2.1 Audience research and its relation to communication models

In Chapter 1 the following definition of audience research was developed as appropriate for this study:

> *Audience research is the systematic collection of information about the intended participants in a communication programme, product or system – their knowledge, attitudes, behaviour, information needs and preferences with respect to the topic and channels of communication – so as to inform the design of the communication*

programme to meet its intended objectives and enhance its relevance and appropriateness to the audience's needs.

This definition is relevant to the practical application of audience research in the context of communication strategy design. Applied audience research can be distinguished from the theoretical debates and developments in the academic field of audience studies. For purposes of this study, contributions from audience studies will be considered throughout this chapter insofar as they help to inform the design of applied audience research, which is the main focus of this dissertation.

Applied audience research plays a role in the overall process of designing, implementing and evaluating a communication strategy or intervention. It can take place at different phases of this process (Mody 1991: 62), as described below. The case study of PUB audience research, and hence this study, is focused predominantly on the formative phase:

- **Formative** audience research takes place in the early stages of communication design and planning and focuses on questions of what, how and with whom to communicate in order to achieve the intended communication outcomes, in other words the 'why'. It can also sometimes be referred to as elicitation research, needs assessment, context evaluation or front-end research.
- Audience **monitoring**, or audience measurement, is conducted during implementation to analyse who is reached and how frequently. It can also provide evidence on whether a communication intervention was appropriately designed to reach the intended audience, and adjustments can be made accordingly.
- Audience research can also be done in the **summative** stages of a communication programme, where the focus lies on evaluating the **impact** or effects of communication. In the development communication field this might look at whether a campaign achieved its intended outcomes, for example, increased use of condoms and reduced infection rates after an HIV-awareness campaign.

Audience research has been used in a range of contexts to contribute to the design process of various forms of communication. In Chapter 1, the reader was introduced to the

progression of audience research approaches and the need was shown for audience research that is suitable for participatory development communication strategies rather than to serve the needs of diffusion-oriented communication. To recap that discussion and build upon it in this chapter, the following diagram (Figure 3-1) has been developed by the researcher as a framework for considering approaches to audience research in relation to communication models. The diagram places both audience research approaches and models of communication on a continuum from what Tufte and Mefalopulos (2009: 29-30) call monologic (diffusion-oriented) to dialogic (participatory) modalities.

Figure 3-1: Audience research approaches in relation to communication models

1	2	3	4
NO audience research	Monologic audience research	Dialogic audience research	Dialogic audience research
↓	↓	↓	↓
Monologic communication	Monologic communication	Monologic communication	Dialogic communication
Monologic →			**Dialogic**

The figure shows a progression – discussed in more detail below – from Block 1 in which one-way communication is implemented without any audience research whatsoever, through Block 2 in which one-way communication is based on audience research that embeds within it the top-down paradigm of diffusion approaches. In Block 3 audience research is conducted in a dialogical or participatory fashion, but still in order to inform one-way communication. Block 4 represents the scenario of interest to this study, in which dialogical audience research contributes to participatory communication specifically.

3.2.2 No audience research for one-way communication: Block 1

Early development communication campaigns[3] based on the diffusion-of-innovations theory are criticised for the many assumptions made about what the audiences needed to know and in what form and through what media they should receive messages designed for them (Melkote & Steeves 2001). Such cases correspond to the first block in Figure 3-1, which entails doing no audience research whatsoever in planning one-directional campaigns.

3.2.3 One-way audience research for one-way communication: Block 2

With time, social marketing models (drawing from commercial marketing techniques) tried to relieve the problem represented in Block 1 by systematically considering the needs and interests of various audience segments and then basing communication interventions on such information (Melkote & Steeves 2001). This is represented in Block 2, in which monological audience research (explained below) is carried out to inform monological or diffusion-oriented communication.

A large portion of the literature to be found on audience research is aimed at diffusion-oriented communication, including film, television and radio programming (Cox 1983; Skeggs, Thumin & Wood 2008; Stavitsky 1995) as well as social marketing, health and behaviour change communication (Bull *et al.* 2002; Colle 2002; Slater 1995). Audience research in the development communication and public health fields has been strongly influenced by the origins of audience research in the commercial media and marketing industry, where it has been driven by commercial imperatives and aimed at attracting audiences, selling exposure to certain market segments to advertisers, and persuading consumer-audiences of a particular viewpoint (Yoon 1996: el.). Similarly, social marketing approaches use persuasion techniques to market particular behaviour to consumer-audiences (for example Bull *et al.* 2002: 478), assuming that individuals' knowledge, attitudes and behaviour are to blame for their situation.

[3] Rogers and Storey (1987, in Noar 2006: 22) define a **campaign** as a communication intervention which ''intends to generate specific outcomes or effects …in a relatively large number of individuals …usually within a specified period of time, and …through an organized set of communication activities''.

In these contexts, audience research is carried out within a diffusion-oriented message design and production process to inform the question of "who says what to whom through what channel and with what effect?" Audiences are understood as receivers of messages that are intended to bring about a change in knowledge, attitude or behaviour. Monological audience research methods may embed within them this top-down transmission model which, according to Brendlinger, Dervin and Foreman-Wernet (1999: el.), contributes to the failure of many communication campaigns. This is the case where audience research uses surveys and opinion polls that impose predetermined concepts and assumptions, elicit uninformed opinions and do not allow research subjects the opportunity to share unanticipated views and influence communication planning (Brendlinger, Dervin & Foreman-Wernet 1999; Freimuth & Mettger 1990; Mody 1991; PSP 2012; Yankelovich 1996). These arguments are further discussed in section 4.3 on overall research design guidelines.

3.2.4 Dialogical audience research for one-way communication: Block 3

Block 3 in Figure 3-1 indicates a turn towards audience-participatory research, but nonetheless to inform one-way communication. The trend towards a participatory approach in development communication raised the value of involving the audience in the process of audience analysis rather than simply making them the subjects of analysis (Snyder 2003). Mody (1991) describes this approach as a form of dialogue between audience and message-producer, letting the audience influence the message design. Snyder (2003: 172) describes audience research participation as "conducting intensive research with members of the target audience prior to designing a campaign, using the feedback to refine campaign goals, targets, messages, persuasion strategy, and channels". While talking about audience participation, this phrase is explicit in its reference to concepts of diffusion-oriented communication such as campaigns.

When diffusion-oriented campaigns are the communication strategy required in a given situation, the use of formative audience research can make for more effective outcomes. In a meta-analysis of 10 years (1995 to 2005) of mass-media health communication campaigns, Noar (2006: 25) found that campaigns are more likely to succeed at achieving their intended health outcomes when designers conduct formative audience research and use the findings

(combined with theoretical foundations) to segment audiences, design targeted and creative messages that spark interpersonal discussion, and strategically position campaign messages in the most appropriate channels.

However, when a dialogical communication strategy is required, as Bessette (2004) points out, the focus is no longer on developing messages to be disseminated by a sender via a media channel to a receiver. So while the model proposed by Mody (1991) involves dialogue in the early stages of communication strategy design, it still serves a "top-down [communication model] with the receivers treated as targets for persuasion and change" (Melkote & Steeves 2001: 242). Thus, the need remains for audience research which is appropriate to participatory communication.

3.2.5 Dialogical audience research for dialogical communication: Block 4

The interest of this study lies in the positioning of dialogical audience research for dialogical models of communication, as represented by Block 4 in Figure 3-1. Audience research is needed that will meet the objectives of participatory development communication in which audiences are seen not just as receivers of messages but as senders and actors, participating in various forms and directions of interaction and each bringing unique and valuable perspectives on the issue at hand (Bessette 2004; Melkote & Steeves 2001: 248).

This resonates with trends in scholarly debate in the field of audience studies, in which audience research has been called to seek new directions and relevance in light of changing communication contexts and wider domains, including that of civil society and the public sphere (Livingstone 1998). Opponents of individualistic and consumerist approaches to audience research have sought instead to emphasise the cultural and social imperatives of media (Stavitsky 1995), a more empowering notion of audiences and a greater awareness of the surrounding social and structural forces influencing human development (Freimuth & Mettger 1990).

Formative audience research can therefore become applicable beyond the world of communication campaigns, in other development communication efforts such as

establishing platforms[4] for ongoing communication (Feek 2009) or implementing various forms of projects. Childers and Vajrathan (1968 in Colle 2002: 53), proponents of Development Support Communications, wrote that: "The first 'act' of communication in a development project is in fact research in the project community of human beings". Decades of documented experience in implementing development projects have taught practitioners and researchers the importance of conducting research by engaging with local stakeholders at the beginning of a development project (Anyaegbunam, Mefalopulos & Moetsabi 2004; Yoon 1996: el.). Whether a communication programme will eventually involve information dissemination or dialogue or both, Tufte and Mefalopulos (2009: 14) hold that it is crucial for the research stage of a communication programme to prioritise dialogical communication: "This greatly reduces the possibility of relying on incorrect assumptions and avoids the risk of alienating relevant stakeholders by leaving them out of the decision-making process."

A new set of responsibilities and questions arises for the audience researcher when communication becomes not only about telling but also about listening, considering the existing and diverse conversations at play amongst audience members or stakeholders, and using communication as a means to greater social engagement. When participatory principles are embedded in both the audience research process and the communication programme, as in Block 4, the lines begin to blur between research, communication and action and between researcher, audience and producer (hence the dotted line in the figure). This is evident in approaches such as participatory communication strategy design and participatory media methodologies.

From this "double-dialogical" perspective, it is useful to see formative audience research, in campaign and project settings, as a respectful and inquisitive process of listening, building relationships and collectively setting intentions to make for more relevant, effective and inclusive interventions. Given this valuable role of audience research in contributing to effective communication and ultimately towards development outcomes, it is of crucial importance that, as scholars and practitioners, we engage critically with the methodology

[4] Developing **platforms** as a communication strategy entails establishing a stable ongoing foundation that can be used for a range of communication initiatives rather than running discreet communication activities (see Feek 2009: 7).

and process of audience research in relation to its purpose. Starting with the next section, the specific methodological implications for audience research are discussed and a number of guidelines are set out throughout the process. For audience research to be effective and useful, the researcher ought to engage explicitly with the purpose – the WHY – of the communication intervention it intends to inform. This important first step in audience research is discussed next.

3.3 WHY: CLARIFYING OBJECTIVES

As demonstrated in the discussion of audience research approaches, applied audience research has been developed for use in different communication contexts and driven by varying motivations. The design and conduct of audience research needs to be suitable to its intended use and defined in relation to the objectives of communication. Objectives can also be worded as the intended effect of communication, which is the final factor in the phrase "who says what to whom through what channel (how) and to what effect (why)?"

Although the WHY factor appears last in this phrase, clarifying the objectives of the communication initiative being undertaken is actually an important *first* step in designing and conducting audience research and planning communication. "From this all else, such as the nature of the audience, how to attract them, the structure of the event [or strategy] and how you evaluate it, follows ... The answers [to the WHY questions] set the framework within which you are working and will define the goals that you set" (RCUK 2002: 3).

The importance of defining the intended purpose of applied research was also argued in Chapter 2. "Fitness for purpose" was identified as an important dimension of evaluation in this study. This refers to assessing whether an applied study's research design is appropriate to its purpose and intended use, responsive to the needs and contexts of users, and whether the research gives practitioners new knowledge in a useful way (Boaz & Ashby 2003; Furlong & Oancea 2005; Patton 1997). In this GOAL-METHOD logic, to design research that is appropriate to the goal and context for which it is to be used, it is necessary first to understand the goal or intended use of the research.

On a number of levels, it is therefore important for audience researchers, in collaboration with the intended users and sponsoring agent, to ask at the outset: "*Why are we doing this?*" It is suggested that this question be asked in four different ways, leading to four individual guidelines, addressed in turn below. These are formulated as practicable actions, in line with the requirements for guidelines set out in Chapter 2.

3.3.1 Why this communication? Intended purpose of communication

The intended objective and key priority of communication should be defined for the particular programme (RCUK 2002), which can be stated broadly at first and then refined based on audience participation. For clarity in planning and evaluation, it is generally accepted practice that objectives should be SMART: specific, measurable, achievable, relevant and time-bound (Tufte & Mefalopulos 2009: 29-30). At early stages of audience research, it is useful to locate the intended objective broadly within the range of communication paradigms. This can help to reveal the underlying ideologies and intended goals of the initiative, and which in turn should guide the approach to audience research. In the conceptual background provided in Chapter 1, the diffusion and participation paradigms were compared and summarised as follows:

> Whereas the diffusion paradigm emphasises telling, information, education and persuasion, the participatory paradigm emphasises listening, exchanges and action amongst diverse actors around a common issue. While the former is able to reach large audiences with a particular message often through mass media, the latter is the more empowering and transformative approach, as it equips citizens to participate in decisions that affect their lives and values the contribution of their experience and knowledge.

When clarifying the intentions for communication, the audience researcher should strive to make explicit what the intended users mean by the concepts they use. For example, different forms of participation can be distinguished. On one end of a scale is a conservative, passive version of participation as an extractive process to encourage people's involvement and uptake of externally created projects. A stronger interpretation views participation as

empowerment whereby the people affected are the decision-makers and role-players in their own initiatives, with support provided by outside players (De Beer & Swanepoel 2000: 270–272; Melkote & Steeves 2001: 336; Tufte & Mefalopulos 2009: 6-7). Similarly, when speaking about public or citizen participation, the intended meaning can be located amongst a range of different strategies (Cornwall & Gaventa 2001: 9), from user approaches (in which users or consumers of public services are engaged in consultative processes) to social advocacy movements (where citizens demand social provisioning from the state as a social right) and accountability approaches (where citizens participate actively in forms of participative governance that highlight accountability between service providers and citizens).

By clarifying the goals of communication and the paradigm in which they are located, the audience researcher can design methods and ask questions which generate useful and relevant knowledge. The intended objectives of communication will necessarily be influenced by the issue at hand and the particular context. These issues are addressed in the following guideline.

3.3.2 Why public dialogue and not another approach? Feasibility for context and issue

Although this study's emphasis is on public dialogue, the notion of participation should not be naïvely applauded. The feasibility of a public dialogue approach should be tested in relation to the nature of the issue at hand, local contextual factors and the availability of resources. Public dialogue can take different forms and degrees, and can use diffusion and participation methods. These statements are explained further.

According to some authors (e.g. Glicken 2000: 307; Rowe & Frewer 2000: 6) the more complex the issue and the greater the participants' stake in the outcomes of a decision, the more important experiential and value-based (based on social or political interests) information become, and the higher the level of public participation required. In comparison, lower-level participation may be justified in the case of more purely technical matters that pose less risk and impact and require only specialised information.

The setting of objectives should also take into account local contextual factors that can influence the possibilities and dynamics of participatory processes, such as "the histories of organization and participation, the political–economic context, and organizational strategies" (García-López & Arizpe 2010: 204). Furthermore, it is important to set realistic goals based on the availability of funding. Deliberative dialogue processes may achieve broader social goals than dissemination of information, but can also be more time-consuming and expensive to implement (Beierle & Cayford 2002; Food & Agriculture Organisation [FAO] 2005; UK 2006). Although there are costs in not involving the public in decisions (Johnson 1987; UK 2006), public participation will compete for resources with other priorities, especially in developing countries (FAO 2005). The benefits of public participation must therefore be clearly justified. Nevertheless, "cost considerations may limit planners to a process that is less than ideal" (Beierle & Cayford 2002: 69).

Although participatory communication appears to be the approach which can bring about transformation most deeply in the long-term, it is not a cure-all solution on its own and should be applied with reflexivity and careful consideration of its limitations and appropriateness in each context (Asian Development Bank 2004; Yoon 1996). The diffusion approach, on the other hand, while criticised for its biases and one-directional limitation, offers a much broader reach and manageability. Certain instances, such as the outbreak of an epidemic, call for the rapid and wide dissemination of a message rather than the patient, participatory process of building relationships and hearing what different groups have to say. Furthermore, where a diffusion approach may be appropriate for conveying particular information, its reach and impact can be enhanced by interpersonal dialogue amongst the audience members about that information (Noar 2006: 33).

It is more valuable to consider participation and diffusion as complementary rather than competing approaches, drawing on their relative strengths, addressing their limitations and using the methods of each as appropriate for the purpose and context of communication. This follows Singhal (2005) and Colle (2002) who argue that the tendency to dichotomize dialogue and dissemination is neither useful nor productive, and that both are necessary and should co-exist dynamically in order for social change to occur.

Both dialogue and dissemination are required in the context of public dialogue and deliberation. Deliberation is defined as "the use of critical thinking and reasoned argument as a way for citizens to make decisions on public policy" (McCoy & Scully 2002: 117). During this process citizens will need opportunities for interactive discussion as well as information about problems, alternative solutions and their consequences (Yankelovich 1996: 7; Wadsworth 1997). Recognizing that there will always be multiple values and analyses at play which compete for persuasion (Wadsworth 1997), Friedman (2010) advocates for diverse, honest presentations of particular points of view combined with deliberative dialogue. This combination, he believes, will allow citizens "to sort through a variety of competing arguments and solutions so they can figure out what's most important to them and where they stand on issues" (Friedman 2010: 5).

3.3.3 Why would the public participate? Stakeholders' motivations

The objectives of communication might often be driven by the wishes of the organising agency which commissions and is to use the audience research. However, Cox, Kazubowski-Houston and Nisker (2009) raise the important point that the planning and evaluation of public participation processes need to be based on the desired outcomes according to the various parties involved and affected, and not only those of the sponsor. When we talk about making applied research relevant to the needs of the intended user, the users of research for a public entity should include not only the commissioning agency but the public (tax-paying citizens) to whom the public agency is accountable, hence the notion of social accountability of applied research (Arnold 2004; Gibbons *et al.* 1994). So, while the question "*Why are we doing this?"* should be put to the commissioning agent at the start of applied audience research, later steps in the research should also aim to gauge various stakeholders' views of what they would consider the important outcomes of a public engagement exercise.

Investigating stakeholders' motivations to participate in public engagement should conceptualise participation not only in terms of formal processes initiated by the state or some institution, but in terms of what people, the media and civil society groups are *already* actively communicating about. Cornwall and Gaventa (2001) refer to the notions of "invited

spaces" and "invented spaces", which correspond with what García-López and Arizpe (2010: 199) call "top-down" initiatives and "bottom-up or grassroots mobilisation". Similarly, Beierle and Cayford (2002: 6) look at "mechanisms intentionally suited to involve the lay public or their representatives in administrative decision-making" compared with other forms such as lobbying, citizen lawsuits, striking and picketing, and violence.

3.3.4 Why audience research? Purpose and role of audience research

Lastly, the researcher and the commissioning agent need to define explicitly and agree upon the purpose and scope of the audience research and to understand the role it will play within the broader context of the communication programme it intends to serve. Situating the research within this context will enhance the appropriateness of the audience research design and enhance the usability and relevance of the findings (see Social Research Agency 2002).

This discussion about clarifying the objectives of communication and of audience research has led to the following guidelines in relation to the WHY question of communication:

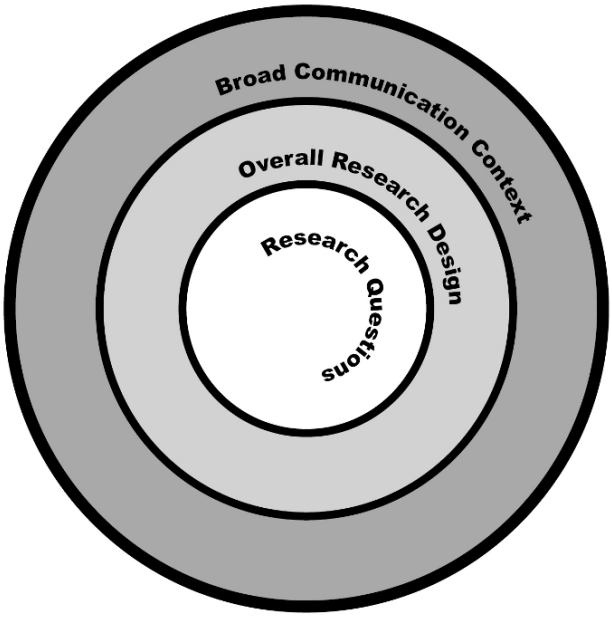
WHY Guidelines: Clarifying Objectives

- Clarify the intended purpose of communication for which audience research is required.
- Consider the feasibility of public dialogue for the particular context, issue and available resources.
- Investigate various stakeholders' motivations for communicating about issues.
- Define the purpose and role of audience research within the broader communication programme.

These considerations all pertain to "big picture" questions about the objectives and context of communication, which drive the appropriate design and conduct of audience research. Visually, as depicted in Figure 3-2, this broader context can be represented as an outer circle containing a smaller circle, which represents the overall research design. Within that research design, the innermost circle represents the specific research questions to be

addressed. The following section describes the overall research design implications when audience research is required to inform a programme with public dialogue as its objective.

Figure 3-2: Spheres of audience research design



3.4 GENERAL: OVERALL RESEARCH DESIGN

Just as the broad research design for this academic study was outlined in Chapter 2, followed by the specific research methods, so guidelines are developed here which address the overall research strategies with which audience research can respond to dialogical communication objectives. As argued in the previous section, the intended goals and context of communication should guide the design of audience research. This section therefore looks at what is required of the overall approach of audience research when it is carried out as a foundation for dialogical communication such as public dialogue. As stated previously, this study does not aim to prescribe step-by-step instructions or methods. Rather, the guidelines provided here should be applied critically and with flexibility to the particular issue and context at hand within a rigorous methodological framework.

3.4.1 How communication models call for different approaches to audience research

As explained previously, audience research plays a preparatory role within the process of communication strategy design and planning. To illustrate how different purposes and models of communication imply different approaches to communication planning, it is useful to look at the steps in communication strategy design presented by Tufte and Mefalopulos (2009: 29-30), as presented in Table 3-1.

Table 3-1: Steps in communication-strategy design
(Tufte & Mefalopulos 2009: 29-30)

Monologic modality	Dialogic modality
1. Define specific, measurable, achievable, relevant, time-bound (SMART) objective/s 2. Identify primary and secondary **audience** 3. Define level/type of change (i.e., **awareness, knowledge, attitude, or behavior**) 4. Select communication approaches and activities 5. Select appropriate **channels and media** 6. Design **messages** 7. Articulate expected outputs and/or outcomes	1. Define key priority and SMART objectives 2. Identify relevant **stakeholders or actors** 3. Define level/type of change or scope of strategy (e.g., **collaboration, mobilization, mediation, partnership building**, etc.) 4. Select communication approaches and activities 5. Define **partners, channels** and, eventually, **venues** 6. Refine **target issues** 7. Articulate expected outputs and/or outcomes

As the table shows, the steps in communication strategy design have different foci depending on whether one is operating in monologic (diffusion-oriented) or dialogic (participatory) modalities. Several key differences can be noted. Audiences in the monologic mode are replaced by the more active notion of stakeholders or actors in the dialogic mode. Whereas the expected outcome in the monologic mode is a change in awareness, knowledge or behaviour, the dialogic mode aims to build collaboration or partnerships for engagement, mobilization and action. Where the monologic mode aims to design messages for dissemination, the dialogic mode identifies key issues for engagement. Plus, in dialogic modality, the key priority issue is ideally defined broadly at first so that, during audience

research, the audience can contribute to defining the priorities and objectives of engagement and how issues should be framed. This contrasts with information dissemination approaches, which set precise objectives for communication and message design.

If audience research is to be relevant and useful, it must take account of these fundamentally different ways of conceptualizing the desired effect of communication. When audiences are viewed in an appreciative and empowering light and communication is aimed at promoting partnerships and mobilizing participation as citizenship, the design and methodologies of audience research should engage with participants in a way that lets them share their views and influence the communication planning process, and that builds a foundation for ongoing dialogue and action.

Dialogical audience research for dialogical communication can take different forms, with different degrees of participation depending on the possibilities and intentions of the given context. These three areas pertain to the three levels or circles represented in Figure 3-2. Participation might entail:

- Active participation of audience-participants in communication strategy design and production (outer circle, broader communication context)
- Dialogical principles embodied in the design and conduct of audience research (middle circle, overall research design)
- Designing key research questions that inform public dialogue (inner circle, research questions)

These are explained further in the sections that follow.

3.4.2 Active participation in communication strategy design and production

When the people whom a communication campaign or project is intended to serve play an active role in the design and implementation of a communication strategy (Melkote & Steeves 2001: 248) the lines between research and implementation and between

researcher, producer and audience become blurred (e.g. Lunch 2004; Parker 1997; Melkote & Steeves 2001: 249-269). This approach is taken in Participatory Rural Communication Appraisal (PRCA) and Participatory Communication Strategy Design, which seek to involve and empower the marginalised as partners in a multidirectional process of research, planning and action to improve their livelihood (Anyaegbunam, Mefalopulos & Moetsabi 2004; Mefalopulos & Kamlongera 2004: 1). Such methods "serve the important purpose of correcting the imbalance of power between the power holders and the people" (Yoon 1996: el.).

Audience participation in communication strategy design can take different forms:

- Research and production happen simultaneously when participants are facilitated and supported in the use of media and other methods of participatory action research to analyse their situations and create their own communication content and plans (e.g. Lunch 2004; Melkote & Steeves 2001: 249-269; Parker 1997). Examples of such methodologies include Theatre of the Oppressed, Participatory Video and PhotoVoice (Yoon 1996). When audiences become producers, "using their language, beliefs, experiences and social networks" (Freimuth & Mettger 1990: 236), the resulting materials are likely to be well suited to the audience's language, framing and contexts.

- In participatory and interactive media, "letters from readers or listeners, quizzes, phone-ins, outside broadcast units, roving reporters, etc" (Yoon 1996: el.) let audiences interact directly with media workers. Through these means people can not only give feedback in reaction to programmes, but more ideally can give "feedforward" which entails contributing to production and broadcasting decisions. A project for women farmers in Nigeria to engage through radio within a listener's club (GenARDIS 2012) illustrates an innovative combination of multiple interactive channels in which meaning is shared and transmitted for research, production and ultimately collective action for social change.

In this form of audience participation, the role of the audience researcher expands to that of facilitator to enable the processes described. The texts cited above provide guidance on that role. When considering the question of *"Why audience research?"* as described in the

previous section, the audience researcher should be able to gauge the potential for implementing an approach which embeds this participatory approach in the overall communication strategy.

However, in some cases an audience researcher, possibly an external consultant, is commissioned to undertake a time-bound, clearly delineated research task and provide a set of findings and recommendations to a client who may implement the findings at his/her own discretion. In such cases, the audience researcher can go as far as designing and conducting the research in a way that embodies the principles of dialogue and which answers key questions to inform the design and implementation of public dialogue, as explained in the next sections.

3.4.3 Embodying the principles of dialogue in audience research design

As quoted earlier from Erskine and Vajrathan (1968): "The first 'act' of communication in a development project is in fact research in the project community of human beings" (in Colle 2002: 53). In this sense, the audience research process is an act of communication, and if designed and carried out appropriately can embody within it the principles of participation and build foundations for a process of ongoing dialogue. But what are these principles and what should public dialogue entail? The following set of principles for inclusive and constructive public engagement was compiled by synthesising principles suggested by Pruitt and Thomas (2007), Cornwall and Gaventa (2001) and Wadsworth (1997):

- Create ongoing incremental processes, not isolated events, which reflect patience, build trust and allow time for informed, careful discussion.
- Connect the engagement process to government, policymaking, and governance so as to build direct links between civil society and the state.
- Engage with a broad and inclusive constituency to create meaningful participation and bring a range of perspectives to the table, rather than limited and confrontational debate between leaders and "the usual suspects".
- Invite people to participate in a way that highlights the value of their contribution, connects to their experiences, and allows them to see themselves as actors.

- Frame issues in a way that allows for deliberation, assisting the public to develop their own informed opinions by understanding and analysing the alternatives, supported by evidence of the costs, benefits and consequences.
- Listen and understand public concerns as expressed in people's own language and in terms of their personal experiences. Encourage multiple forms of speech and communication to ensure that all kinds of people have the opportunity to speak.
- Make listening as important as speaking. Experts and leaders should avoid jargon and present information in clear, straightforward language, without overwhelming people with more information than they can assimilate. They should respect the intelligence in people's views and engage in calm, nonpartisan discussion of questions.
- Listen to disagreements and deal with obstacles and resistance – don't ignore them – by allowing sufficient time and opportunity for reasoned discussion and resolution.

Inclusivity is a core theme in the principles of dialogue, which includes inclusivity of the participants, perspectives, framing of issues, languages and forms of communication. This inclusivity can be operationalised in audience research design in a number of ways.

Audience research must avoid the risk of closing down the dialogue at the early stages of the process (Petts 2008: 829) through bias, assumptions and interests entering into the research design. Researchers are advised to ensure diverse representation of the audience in participant selection, objective question design and the use of multiple methods of data collection (Mody 1991: 124). Reflexivity can help researchers to identify and address subjectivities and inherent power differentials in the research process, which can influence "project construction, observations and interviews, and data analysis" (Lotz 2000: 453). Lotz (2000: 457) suggests that audience researchers look to anthropological and feminist theoretical and methodological innovations for tools "that intentionally address the ways traditional research processes can reproduce structures of power and validate some types of knowledge over others". Livingstone (2004: 82) points to a range of methods in audience research developed to "challenge *a priori* assumptions, generalizations and misconceptions about 'the audience'".

Tufte and Mefalopulos (2009: 23) advise that audience research design follow a "funnel approach" that begins with a broad, open-ended enquiry to avoid imposing assumptions and predetermined concepts, and then gradually narrows in on more specific issues. This is reminiscent of the early steps of participatory development communication programmes at community level (Tufte & Mefalopulos 2009; Yoon 1996). These steps involve facilitating a situational analysis to understand broadly the socio-cultural context, define key issues, and identify stakeholders, accompanied by emphasis on building trust and relationships.

The value of different methodological approaches must be assessed in the context of public dialogue. Formative audience research for health communication campaigns has used a variety of methods including analysis of archival data, quantitative surveys, focus groups and qualitative interviews (Noar 2006: 23). Audience research can use either or a combination of qualitative and quantitative methods, each of which has strengths and limitations. Patton (1999: 1206-1207) pragmatically notes: "The issue is the appropriateness of methods for a specific evaluation research purpose and question, not adherence to some absolute orthodoxy that declares one or the other approach to be inherently preferred… The point, however, is not to be anti-numbers. The point is to be *pro-meaningfulness*".

At a stage in audience studies when textual and social science approaches to understanding audiences began to merge, recognition grew of the value of qualitative and particularly ethnographic methods to understand the social and cultural context of message reception (Jensen 1987; Höijer 2008; Priest 2005). Irwin and Michael (2003: 104) explain: "The whole point of the ethnographic approach is that local people should themselves prioritize and structure issues rather than passively responding to pre-prepared questions which may be totally unfamiliar and unconsidered". The use of ethnographic methods emphasises the importance of understanding audiences on a context-by-context basis and not considering a particular locality as representative of wider national opinions and communication needs (Irwin & Michael 2003: 104). At the same time the limited potential for generalisation presents a disadvantage of qualitative research for issues that require national governance, which need to balance regional considerations in decision-making.

The strength of quantitative methods, such as survey questionnaires and public opinion polls, lies in their ability to assess the prevalence and distribution of specified variables amongst a large representative sample of the population. The analysis of data through a variety of statistical techniques also lets researchers explain how variables relate to one another, which is particularly useful for audience segmentation (Slater 1996) (See Section 1.5.3).

There are numerous limitations to quantitative methods, which effectively "[limit] the amount and richness of audience information that can be fed into the program and message design processes" (USA 2012: el.). Survey questions mostly use closed questions on predetermined concepts with limited alternatives for responses. Audiences are placed in a reactive role and are not given the opportunity to share views which might not have been anticipated by the researcher (Freimuth & Mettger 1990: 236). The range of perspectives that can be assessed through quantitative research is limited by the fact that questions impose the researcher's or sponsoring institution's definitions and ontological assumptions. "In other words, respondents are asked to place themselves on a 'map' that has been 'created' by the institution and its researchers, rather than on 'maps' that reflect their own worldviews, experiential conditions, and life struggles" (Brendlinger, Dervin & Foreman-Wernet 1999: el.). Furthermore, surveys often elicit uninformed opinions about subjects that may be unfamiliar to participants, and do not provide any opportunity for them to reflect, ask questions or find out more information (PSP 2012). The results of surveys provide incomplete, snapshot conceptions of audiences, which can be misleading if taken as conclusive statements of public opinion (Yankelovich 1996).

Considering these shortcomings, the authors cited above call for appropriate audience research techniques which create a dialogue amongst pro-active participants and use open-ended methods to understand how audiences make sense of concepts in the context of their daily lives, in the language they use and in terms of their values (Freimuth & Mettger 1990: 236). They suggest that interactivity be integrated in the research process "so that respondents are given balanced information and have time to reflect and discuss the issue" (PSP 2012: el.). While dialogical audience research should capture the range of concerns and opinions participants have about the issues at hand, the findings should not be considered

conclusive measurements of public opinion but as an agenda for a continued process of public dialogue. What may be ideal is an initial qualitative phase to gain a wide view of issues, followed by a quantitative phase to survey the prevalence of these variables and distribution of opinions.

Based on the discussions above, the following guidelines have been formulated in relation to the overall research design:

GENERAL Guidelines: Overall research design

- Promote active participation of stakeholders in communication strategy design.
- Consider audience research as one step in an ongoing process of communication, not a tool to determine conclusive public opinion.
- Employ multiple methods, reflexivity and broad participant-selection to optimise inclusivity and minimise the influence of *a priori* assumptions, bias and power differentials.
- Use open-ended methods to uncover participants' language-use, values and framing of issues in the context of their daily lives.
- Allow time and interactivity in the research process for participants to consider a range of views, develop opinions and pose questions and concerns.

3.4.4 Answering key questions to guide the planning of public dialogue

Audience research can further serve the objectives of dialogical communication through the way in which it conceptualizes and investigates particular elements of the communication process. Asking and appropriately designing key questions can generate findings and recommendations that can directly inform the planning of public dialogue. In the concentric circles of dialogical audience research, this level is represented by the innermost circle in Figure 3-2. The key questions relate to the elements in the phrase "*Who says what to whom through what channel (how) and to what effect (why)?*"

Having addressed the WHY element of communication, the subsequent sections examine the remaining elements in the communication equation:

WHO/WHOM: conceptualizing and investigating audiences;

WHAT: framing the issues from multiple perspectives; and

HOW: selecting channels and mechanisms for communication.

3.5 WHO: INVESTIGATING COMMUNICATION PARTICIPANTS

> *According to the deficit model, the public is defined as "mere recipients of information" whereas [in the dialogue model] the public is defined as "contributors to social intelligence, fulfilling their responsibilities as citizens ... shaped by common values, concerns, and aspirations" (Gregory, Agar, Lock & Harris 2007).*

The WHO element in communication is of central interest to the process of audience research and is given considerable attention in this section. As the citation above conveys, audiences (or the public) are conceptualised differently within different communication models. How audiences are conceptualised influences how audience research is designed and conducted. This section reviews the literature to develop guidelines for how audiences can be conceptualised and investigated in a dialogical communication model.

3.5.1 Appreciating audiences as actors and participants

An evolving understanding of how audiences are viewed in the communication process can be traced in the audience- and media-studies fields (see Collins 1997; Livingstone 2004; Stromer-Galley & Schiappa 1998, amongst others). A key development was the shift in emphasis from text to reader. Sub-fields such as textual analysis, rhetorical studies and effects studies focused mostly on texts, which were held to have fixed meanings with linear, causal effects on a passive and homogenous mass audience (Livingstone 2004). Research showed such arguments to be problematic and provided evidence that diverse, plural audiences are active in interpreting and imparting their own meanings to texts based on their cultural and personal contexts (for example Collins 1997). These views underlie the fields of reception studies, cultural studies and ethnographic studies, which aim to

understand audiences as a basis for any successful communication effort (Livingstone 2004; Noar 2006). Livingstone (1998: 199, citing Silverstone 1990) describes how through this shift the audience has become recognised as "a potentially crucial pivot for understanding a whole range of social and cultural processes that bear on the central questions of public communication".

Participatory development communication literature goes further in problematising the notion of audiences. The very term 'audience' is questioned, as Bessette (2004: el.) rightly asserts that "it is important to change the way we refer to the specific groups with whom we are working, if we want to modify our way of establishing a relation with them". Bessette (2004) prefers the term 'stakeholders', arguing that the word 'audience' and 'target audience' imply the passive reception of messages and are therefore inappropriate within the participatory development communication paradigm. Similarly, Harindranath (2006: el.) argues that "the category of 'audience' alone is far too media-centric and consequently inadequate for the examination of the public sphere". He suggests the use of the words "publics" or "citizens" which denote interacting social agents. The notion of publics was introduced by John Dewey (1927 in Slater 1996: 268), denoting "subgroups or subpopulations that shared similar values or interests with respect to a given issue" and whose formation and activities were believed to largely shape public opinions. In the methods of Participatory Rural Communication Assessment, the term "interaction groups" is used to refer to the community segments that are affected by a given problem (Anyaegbunam, Mefalopulos & Moetsabi 2004: 12). Similarly, it is recommended by Olson (2010: 23) that stakeholders be seen as partners in communication planning, especially when organisations wish to create conditions for democratic dialogue with broad ownership, accountability and non-discrimination. With awareness of these different interpretations, the range of terms will be used loosely as appropriate for the context.

The term used is a matter not only of semantics but of politics, as the chosen term carries assumptions about the relative value and power of participants in the communication relationship. In the context of health communication, Freimuth and Mettger (1990: 232) critique discriminatory portrayals of "hard-to-reach" audiences, generally of low literacy and socio-economic status, as "powerless, apathetic and isolated", not to mention responsible

for their life circumstances. Instead, they advocate for alternative, more productive conceptualizations which emphasise difference rather than deficits, hold social systems rather than individuals responsible for their problems, and view communication and information as constructed through dialogue rather than a truth transmitted by a knowing source to a needy receiver (Freimuth & Mettger 1990: 235 – 236).

Thus, an appreciative rather than deficit view of audiences is required, as captured in Freire's words: "Faith in people is an *a priori* requirement for dialogue" (Freire 1994: 71). Audience researchers in the dialogical mode should enter the enquiry not asking what their audiences lack or whether their views are right or wrong, but how their views can contribute to the discussion.

The construction of audiences as not only receivers but also senders involves a 'flattening' of the communication process into a more horizontal relationship. By implication, the traditional senders also become receivers of the messages which the 'audience' (or public) is sending. This then raises the questions of who is listening to the public, what is their willingness to respond, and how best can the public's questions, concerns and views be communicated and channelled to where they matter. The public agencies and other institutions which are accountable to the public and ultimately responsible for decision-making therefore become an 'audience' in public dialogue while legal and formal mechanisms for public participation become channels. In this scheme, citizens, the state and decision-makers are all participants and actors.

This discussion leads to the following guideline:

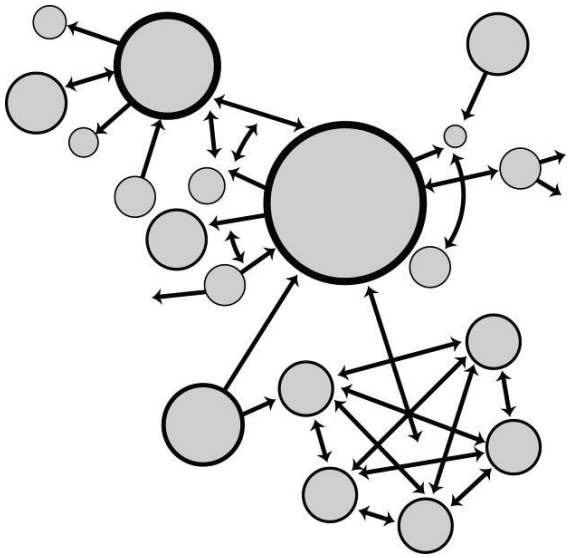
WHO: Appreciating audiences as actors and participants

Recognise audiences as active, diverse, contributing stakeholders, where citizens, decision-makers and the state are all considered participants in public dialogue.

3.5.2 Mapping the multiple stakeholders in a system of dialogue

The term 'dialogue' is often misunderstood to mean a conversation between two parties, which obscures the multiplicity of stakeholders which interact in public engagement. Dialogical communication requires a shift from a linear view of sender-message-receiver, and an implied "us and them", to a more complex terrain in which a number of stakeholders participate, some more vocal and powerful than others, each with their own views and contributions to make, with links to other communication networks and contexts, and a web of relationships amongst them. Figure 3-3 illustrates this concept.

Figure 3-3: A multi-directional network of stakeholders



Audience research is advised to undertake a process of stakeholder mapping in an attempt to discover and describe this terrain. Understanding the context and the relationships amongst the multiple participating stakeholders is a primary foundation for creating an inviting and appropriate space for meaningful and constructive engagement (Olson 2010).

Each stakeholder's own communication processes and networks are valuable to explore. Olson (2010: 23) suggests that organisations wishing to facilitate democratic public dialogue should work with the communication partner's existing processes for dialogue and consensus-building, rather than replicating or initiating entirely new processes. In addition,

communication partners such as civil society groups may also serve as gateways for channelling communication between their constituencies and the platform for public dialogue (National Cancer Institute 2004; Slater 1995: 204). When selecting such groups it is important to be mindful of the legitimacy of representativeness and how identity and solidarity influence people's engagement with public debate (Livingstone 1998: 10-11).

A challenge for democratic public dialogue is to create a level playing field with maximum inclusivity, where there is "adequate opportunity for all parties to enter the public debate and place their own perspectives in the marketplace of ideas" (Friedman 2010: 5). In turn, the challenge for audience research is to recognize and observe the potential power dynamics at play amongst stakeholders and recommend appropriate strategies for dealing with these in public dialogue.

The degree to which participants are able to contribute to and affect the public agenda will be influenced by differences in power, wealth, worldview, disciplinary perspectives and communication resources (Eguren 2008). In South Africa, it has been stressed that a critical and accessible public sphere is limited by such inequalities (Hicks 2008; Kaarsholm 2009: 411). Maila (2011) tells how in public Integrated Development Planning (IDP) meetings at local government level, hierarchies of voice and access are sometimes inadvertently set up by the domination of discussions by more confident individuals, by the use of English rather than local languages, by the use of technical concepts and advanced vocabulary, and by the use of technology such as PowerPoint presentations which can alienate the unfamiliar and less educated.

If not adequately dealt with, such power dynamics can act to skew and delegitimize formal participation processes. This can further the interests of certain powerful stakeholders who have the ability to frame their arguments for persuasion (Friedman 2010; Lee 2007). It can also exclude the valuable contributions of less powerful or less vocal participants from the programme and policy decisions that are taken in these forums. Ivan-Smith and Johnson (1998: 299), in the context of programmes intended to benefit children and youth, emphasise: "If we are unaware of the problems and issues that concern children and young people we cannot hope to devise strategies or solutions that will address their concerns, and

will constantly be struggling to make sense of the world without some of the vital information we need".

In mapping the multiple stakeholders in a dialogue platform, audience researchers therefore need to consider several factors that influence the potential power relations: the varying degrees of influence and access to information of individuals and groups in the process; the feasibility of facilitating open discussions amongst polarised parties (Olson 2010); and strategies for ensuring that the voices of people in poverty and exclusion be adequately heard (Chambers 1997).

This discussion leads to the following guideline:

WHO: Stakeholder mapping

Map the multiple stakeholders in a system of dialogue, including the web of interactions, existing communication networks and power dynamics among them.

3.5.3 Investigating communication variables and segmenting audiences

It has been established that audiences are active, diverse and central to making use and meaning of communication. To be effective and relevant, any communication effort should be based on a thorough understanding of a range of communication variables which influence the participants' interpretation of issues in relation to their context and their contribution to the public agenda. This step in audience research can help to "map stakeholders' preferred communication channels, identify cost-effective, culturally appropriate ways to engage the groups affected by the programme and ensure that communications reflect each group's priority concerns" (Olson 2010: 22; also see Noar 2006: 28 and Slater 1996: 267).

The identification and analysis of communication variables is central to audience segmentation, a systematic analytical process that is widely recognised as essential for enabling effective communication efforts and is especially used in health communication and social marketing approaches (Slater 1996; Grunig 1989). According to Grunig (1989:

202): "The basic idea of segmentation is simple: divide a population, market, or audience into groups whose members are more like each other than members of other segments".

Variables should be investigated in relation to a specific topic and can include demographic, psychographic and theoretically based variables. Demographic variables might include ethnicity, socioeconomic position, gender, age group, language, religion, education, and geographical location, all of which might be associated with variations in access to communication resources, values, interests, worldview, and experience in relation to the topic, and could influence their relative contributions to the public agenda (Eguren 2008; Noar 2006). Demographic variables alone may, however, be too broad and may not account for nuanced differences and needs amongst audience segments (Slater 1996: 269).

More sophisticated segmentation techniques use behavioural, psychographic and so-called inferred variables (Noar 2006: 29; Slater 1996: 270). These are able to produce richer, more detailed portraits of audience groups and also better inform message development and delivery (Freimuth & Mettger 1990: 237). They do, however, require more complex methods and more resources in data collection and analysis (Slater 1996).

Theory can be useful for providing conceptual foundations to inform segmentation variables (Noar 2006: 26). Grunig's (1989) Situational Theory of Publics, for example, guides understanding of people's communication behaviour based on three variables: problem recognition, issue involvement and constraint recognition. Health and behaviour change communication have based segmentation variables on the theory of social and behavioural change, the information-motivation-behavioural skills model and social cognitive theory, amongst others (Noar 2006: 27). In South Africa, the Living Standards Measure (LSM) is a segmentation typology widely used by marketers, advertising agencies and media owners to define their target audiences (Boehme, Mulaudzi & Haupt 2007).

The concept of audience segmentation originated in marketing and social marketing models (Slater 1996: 269). Interesting questions are raised about the application of audience segmentation in the context of inclusive public dialogue, where the goals of communication

are not to influence knowledge, behaviour or attitudes but to promote social engagement for democratic decision-making and collaborative action.

Participatory communication efforts also need to identify groupings of stakeholders with common interests and networks (Anyaegbunam, Mefalopulos & Moetsabi 2004; Yoon 1996). The concept of segmentation remains useful in this context, as long as appropriate variables are used. For example, a forestry-management education initiative used benefit-based segmentation to identify meaningful subgroups of nonindustrial private forest landowners who share similar goals for their forest property and would respond to similar communication strategies (Salmon, Brunson & Kuhns 2006: 419).

In cases where audiences are active stakeholders in participatory communication strategies, the need for precise upfront segmentation may be unnecessary, argues Caballero (2010: el.). He suggests that encouraging stakeholders to own and sustain the communication process from start to finish allows for an evolving and adaptive communication strategy which is led by the participants themselves according to their needs.

In a similar vein, others suggest that truly inclusive public dialogue should not overly predetermine audiences, or be closed to anyone. PSP (2012: el.) remarks that "unless the entire population has an opportunity to comment, the exercise is not truly a public consultation". McCoy and Scully (2002: 130) assert a similar point:

> Our response to the key question of "Who should be in the conversation?" is *everyone.* That answer (and our literal, if ultimate, goal) has translated into a search for processes and principles that will bring large numbers of people into a diverse, democratic conversation that is an ongoing part of public life. To welcome everyone, such a conversation must be intentionally linked to all kinds and levels of action and change.

While the inclusivity of this approach appears attractive for participatory communication, the practical questions remain of how to ensure the access and inclusion of 'everyone' in

such a continuing public discussion – an issue as yet unresolved. The possibilities and value of segmentation in audience research are also affected by methodological approaches.

Methodologies for understanding audiences have been influenced by eclectic combinations of various social science and humanities disciplines, which carry different epistemological and ontological assumptions (Hoijer 2008). Audience research remains an attempt to construct knowledge about something 'out there', as opposed to textual analysis which has a tangible object to analyse. Though we may strive for the best way to research audiences, no method can be perfect.

Quantitative and qualitative methods have already been compared in general in Section 4.3. For purposes of audience segmentation, quantitative methods offer complex statistical analyses to create segments based on multiple variables, but pose several limitations, as described previously. Segmentation in qualitative research appears to face a number of challenges related to representation and generalisation. Qualitative techniques such as focus groups and interviews can generate rich information and understanding of potential audience segments in their particular context. These goals are considered worthwhile and sufficient within a situationalist ontology, which considers a research participant (or respondent) representative only of him or herself at that particular time (Hoijer 2008). On that basis, findings cannot be generalized to a wider population, nor are they intended to be. An alternative, structuralist ontology is problematic in another sense: it considers research respondents more or less representative of some social grouping or institution (Hoijer 2008; Slater 1995), an assumption with questionable accuracy. The matter is further compounded by the fact that *a priori* categories of audiences are already imposed when selecting the research participants. The resulting segments, rather than being developed *post hoc* based on audience data, are therefore prone to systematic sampling bias (Slater 1995).

These problems are not easily resolved, although two suggestions are made here: (a) that the findings of any research, regardless of the methodological approach, should be presented with an honest statement of their limitations and interpreted with caution; and (b) that a mixed-method approach combining qualitative and quantitative techniques could help to address the limitations of each. For example, Slater (1996) argues that the problem

of sampling bias in qualitative techniques can be addressed by basing the selection of research participants (and therefore the initial segmentation scheme) on a "rigorous, quantitatively based segmentation strategy. Then, individuals can be recruited who in fact fit the definition of the segment, and rich qualitative data can be obtained and be more meaningfully and usefully interpreted" (Slater 1996: 270). On the other hand, or in addition, quantitative methods can use the themes generated by a qualitative study to measure the distribution of such themes amongst a broader population.

While the answers to these dilemmas require further research and reflection, for the purposes of establishing a framework for designing and evaluating audience research for public dialogue, the following guidelines are offered:

WHO Guidelines: Communication variables and audience segments

- Investigate the range of variables that may influence participants' roles in public dialogue, such as their interests, values and concerns.
- Systematically use these communication variables to propose audience segments or stakeholder groups, with awareness of the possibilities and limitations of various methodological approaches, and a commitment to continued revision and inclusivity.

This brings to a close the discussion of the WHO element of communication. The guidelines developed here, for how audience research should consider and investigate the audiences in public dialogue, have addressed: the conceptualization of audiences as active and diverse actors and participants; the mapping of multiple stakeholders in a system of dialogue; the investigation of communication variables that influence audience's interpretation and communication preferences; and the reflexive use of audience segmentation techniques. The next section looks at the WHAT element of communication.

3.6 WHAT: FRAMING ISSUES FROM MULTIPLE PERSPECTIVES

Attention now turns to the WHAT element in the phrase "Who says what to whom through what channel and with what affect". In diffusion-oriented communication this WHAT would

usually be associated with designing a predetermined message for dissemination. However, dialogical communication would ideally entail a collaborative defining of the issue. Depending on the context, audience research might set out with a relatively open theme in mind and then draw on participants' input to refine a range of issues, perspectives, questions and concerns to be explored through dialogue (Tufte & Mefalopulos 2009). This process entails determining what issues should be addressed, from what range of perspectives, and in what form. Audience researchers can explore:

- What are the various perspectives that are contributed to the discussion? What are all the sides of the story?
- What are people's questions, concerns and interests about the issues?
- How do people's contexts, personal experiences and values influence their perspectives? What matters to them?
- What language and framing is used to discuss the issues at hand?

The views expressed during audience research should be taken as only a beginning of an ongoing conversation, a foundation or initial 'agenda' for later deliberative dialogue. It is not an opinion poll: people are not required to develop and express informed opinions. Instead the objective is to inform the appropriate framing of issues for discussion that includes the range of relevant perspectives at play.

The concept of 'framing' requires explanation, and Friedman's (2010) work on "reframing framing" is particularly useful here. According to Friedman (2010: 1), "Broadly speaking, framing refers to how information and messages—such as media stories, political arguments and policy positions—are defined, constructed and presented in order to have certain impacts rather than others". He explains that the way in which narratives are constructed can define the terms of a debate, promote particular interpretations and thereby influence public opinion and policymaking. Framing involves choices about inclusion, exclusion and emphasis, explains Hallahan (1999: 207), who quotes Entman (1993) as saying: "Frames, then, define problems…; diagnose causes…; make moral judgments…; and suggest remedies". Since such an approach can impose particular perspectives, Friedman (2010)

recommends non-partisan "framing-for-deliberation" rather than "framing-for-persuasion" as more conducive to fostering democratic dialogue.

While framing here refers to how issues are defined for public dialogue, these principles can be usefully applied to the design of research questions to avoid promoting any particular view. Since the objective at this stage is to assess how research participants understand and frame the issues on their terms, and to inform framing-for-deliberation, it is crucial that researchers avoid bias entering the research and influencing responses. Researchers' own views and assumptions can contaminate the results through question design, through researchers' communication during the data collection process, and at analysis stage. Mody (1991: 121-3) warns: "The kinds of questions asked of the audience, the phrasing of questions, the topics of the questions, and the issues not included on the list of things to observe are a reflection of research bias".

Since the researchers' questions and language are in themselves a construction of a message, techniques are needed to avoid the risk of bias and maintain open enquiry that continues to tease out participants' perspectives. Tufte and Mefalopulos (2009: 23) recommend that a "funnel approach" be applied by starting with questions that are as broad and open as possible so as to access people's own perspectives as purely as possible. Follow-up questions can probe and unpack participants' responses. As the interview or focus group proceeds, questions can focus on particular issues, always posed in the most balanced way possible and probing participants' intended meaning in their responses.

By facilitating interactive discussions about the issues raised, participants are given time to reflect on and discuss the issues, while the audience researcher can note how issues are spoken of, what language is used, what values come into play, and so on. This follows PSP's (2012) recommendation to develop interactivity in the research process. Following the principles of inclusivity, the framing of issues within audience research and in the subsequent communication strategy "…needs to be accessible and understandable to poor people living at the margins of society. It needs to be in a language they can understand and in a form they can access on their own terms. It needs to relate to their personal situations**"** (McCall 2010: 10-11).

Based on this discussion, the following three WHAT guidelines have been formulated.

WHAT Guidelines: Framing the issues from multiple perspectives

- Explore the range of perspectives and framing of the issues, including participants' opinions, questions and concerns, to inform the inclusive framing-for-deliberation in ongoing discussions.
- Avoid bias by designing questions to start broad and open and gradually focus inwards, framing questions and probing responses in a balanced, open way.
- Facilitate and observe interactive discussions to understand how issues are spoken of, what language is used and what values come into play.

3.7 HOW: INVESTIGATING CHANNELS AND MECHANISMS FOR PUBLIC DIALOGUE

Finally, the remaining element is addressed in the phrase, "Who says what to whom through what channels and with what effect" – the question of "what channels", or HOW communication takes place. This section considers guidelines for how audience research can conceptualise and investigate the channels, forms and mechanisms of communication through which deliberative public dialogue can take place.

Fifty years of audience studies, Livingstone (2004: 76) laments, have maintained a limited concept of communication channels by researching a very narrowly defined kind of television audience in a particular context: "national, often public-service, mass-broadcast, non-interactive television along with a nationally conceived, consensus-oriented, sit-back-on-the-couch, family audience in the living room" (Livingstone 2004: 76). Audience research is called to look beyond this singular channel of communication and notion of audience, and establish a renewed relevance to changing communication contexts and the multiplicity of means of expression.

It has been established that legitimate public dialogue should be as inclusive as possible and that it can require platforms for dialogue as well as information dissemination through which

diverse participants can both receive and share information. It is important that audience researchers cast their analytical nets widely in order to challenge their own assumptions about media usage and understand the range of channels, mechanisms and spaces through which diverse audiences communicate in multiple directions, and which could enable legitimate and inclusive public dialogue in a particular locality. To avoid the exclusion of any particular groups in public dialogue, assessments of communication preferences must include analysis of the varied access, voice and visibility people have within a mediated public sphere, keeping in mind different languages, levels of literacy and access to communication technologies (Food and Agriculture Organisation 2005; Tufte & Mefalopulos 2009).

As Tufte and Mefalopulos (2009: 14) recommend, a dialogical approach to audience research would entail an open-ended investigation of communication preferences, whereafter approaches of both monological and dialogical modes can be used in later stages of communication according to the needs and scope of the initiative. Both Participatory Communication Strategy Design and ethnographic methods in communication research follow the approach of identifying the existing communication systems and social networks in a community that can be used to interact with people during a programme, rather than inventing new mechanisms (Anyaegbunam, Mefalopulos & Moetsabi 2004: 12; Wulff & Fiske 1987). Similarly, “communication resource mapping” (Tufte & Mefalopulos 2009: 12) begins broadly by identifying the range of ways and preferred channels through which stakeholders can receive information and share their views, as well as how information flows among various stakeholders and institutions. Thereafter, the enquiry focuses on eliciting participants’ advice about the most appropriate ways to communicate about the topic under question, including trusted sources of information and means of representation.

A dialogical enquiry will therefore conceptualise communication media or channels broadly, seeking whatever means are available and appropriate to promote public dialogue. For example, Tufte and Mefalopulos (2009: 12-13) suggest a number of media-related factors to consider in developing participatory communication strategies. There are various types of media, from “folk, community, and mass media to the new media of internet and satellite communication”, which operate at different levels, from “local and community-based media

to national and transnational media", and driven by commercial or non-profit economic logics. The nature of media might be electronic, printed, performed, visual or face-to-face; it could be diffusion-oriented or interactive or combine both. In addition, channels could make use of mobile-phone technology and radio, or might work through locally appropriate representatives and respected leaders, like teachers, women's groups, community elders or community-health forums (Food and Agriculture Organisation 2005). Channels for public dialogue might include top-down institutional and legal frameworks for public participation and formal opportunities for public comment, as well as bottom-up civil expressions such as social advocacy movements, public protests, petitions, lobbying and strikes (Beierle & Cayford 2002; Cornwall & Gaventa 2001; García-López & Arizpe 2010).

As a "centralized source pre-packaging information and disseminating it in a linear manner to a set of passive receivers" (Freimuth & Mettger 1990: 237), the mass media has been criticized by opponents of the diffusion paradigm as being a potential tool for oppression. However, appropriately used, the tools of mass communication can be harnessed not only as a channel of communication but as a dynamic, empowering and needs-responsive catalyst of critical debate, mobilization and social change. They can allow both information dissemination and participation by using techniques and allowing time for interaction, audience feedback and feed-forward, and complementary outreach and action components (Bessette 2004; Freimuth & Mettger 1990; Lead SA 2011; McCall 2010; RCUK 2002; Tufte & Mefalopulos 2009: 12; Yoon 1996).

Besides the dynamic possibilities of using existing media, a variety of structured processes and mechanisms has been developed to support public participation and dialogue (Cornwall & Gaventa 2001; Eguren 2008; McCall 2010). Practitioners planning public engagement processes can draw from this range of tools, combining and tailoring them to each specific topic, purpose, context and type of audience (Glicken 2000; Pruitt & Thomas 2007; RCUK 2002). These processes provide more productive alternatives to formal meeting structures by allowing in-depth deliberation and letting the collective intelligence of large groups of participants emerge. Table C-1 in Appendix C describes a selection of these, such as Deliberative Polling, Citizens' Jury and Participatory Budgeting (drawn from Bojer, Knuth & Magner 2006; Pruitt & Thomas 2007; RCUK 2002; and www.peopleandparticipation.net).

This discussion leads to the formulation of the following guidelines in relation to HOW communication takes place in public dialogue:

HOW Guidelines: Investigating channels and mechanisms for public dialogue

- Assess communication preferences and possible channels in terms of both dialogue and information dissemination – how to tell, listen, enable interactivity and facilitate existing initiatives.
- Use open-ended enquiry to map the range of existing and potential communication resources, networks and mechanisms through which people receive and send information, then consider their appropriateness for the particular topic, context and nature of audiences.
- In pursuit of inclusivity and diversity in public dialogue, identify communication channels that allow the accessibility and visibility of all languages, cultural contexts and levels of literacy, especially those groups often marginalised.
- Consider the suitability for the given situation of using structured processes for public engagement that allow deliberation, dialogue and the emergence of collective intelligence.

3.8 CHAPTER SUMMARY AND PRESENTATION OF CONSOLIDATED GUIDELINES

This discussion has shown that a suitable approach to audience research is needed in order to lay foundations for public dialogue, as opposed to communication programmes which intend only to disseminate information. The process of developing guidelines for this purpose followed the elements suggested by the phrase, "*Who says what to whom through what channel (how) and to what effect (why)?*"

The framework begins with the end in mind, considering firstly the WHY by clarifying the objectives of communication and audience research. Since the purpose and intended use of the audience research guide the approach to research, the next set of GENERAL guidelines considered the overall research design. Thereafter, guidelines were developed for the WHO element by considering how audiences should be conceptualised and investigated in a

dialogical approach. The WHAT question is addressed by guidelines about how the topic of communication can be framed in a dialogical way. Lastly, the investigation of channels of communication is addressed by a set of HOW guidelines. Together these guidelines, presented in Table 3-4 below, make up the first layer of a framework which can be used for guiding the design and evaluation of audience research for public dialogue generally.

Table 3-2: Guidelines for designing and conducting audience research for public dialogue

WHY Guidelines: Clarifying objectives ▪ Clarify the intended purpose of communication for which audience research is required. ▪ Consider the feasibility of public dialogue for the particular context, issue and available resources. ▪ Investigate various stakeholders' motivations for communicating about issues. ▪ Define the purpose and role of audience research within the broader communication programme.
GENERAL Guidelines: Overall research design ▪ Promote active participation of stakeholders in communication strategy design. ▪ Consider audience research as one step in an ongoing process of communication, not a tool to determine conclusive public opinion. ▪ Employ multiple methods, reflexivity and broad participant-selection to optimise inclusivity and minimise the influence of *a priori* assumptions, bias and power differentials. ▪ Use open-ended methods to uncover participants' language-use, values and framing of issues in the context of their daily lives. ▪ Allow time and interactivity in the research process for participants to consider a range of views, develop opinions and pose questions and concerns.
WHO Guidelines: Understanding communication participants ▪ Recognise audiences as active, diverse, contributing stakeholders, where citizens, decision-makers and the state are all considered participants in public dialogue. ▪ Map the multiple stakeholders in a system of dialogue, including the web of interactions, existing communication networks and power dynamics among them. ▪ Investigate the range of variables that may influence participants' roles in public dialogue, such as their interests, values and concerns. ▪ Systematically use these communication variables to propose audience segments or stakeholder groups, with awareness of the possibilities and limitations of various methodological approaches, and a commitment to continued revision and inclusivity.

WHAT Guidelines: Framing issues from multiple perspectives ▪ Explore the range of perspectives and framing of the issues, including participants' opinions, questions and concerns, to inform the inclusive framing-for-deliberation in ongoing discussions. ▪ Avoid bias by designing questions to start broad and open and gradually focus inwards, framing questions and probing responses in a balanced, open way. ▪ Facilitate and observe interactive discussions to understand how issues are spoken of, what language is used and what values come into play.
HOW Guidelines: Investigating channels and spaces for public dialogue ▪ Assess communication preferences and possible channels in terms of both dialogue and information dissemination – how to tell, listen, enable interactivity and facilitate existing initiatives. ▪ Use open-ended enquiry to map the range of existing and potential communication resources, networks and mechanisms through which people receive and send information, then consider their appropriateness for the particular topic, context and nature of audiences. ▪ In pursuit of inclusivity and diversity in public dialogue, identify communication channels that allow the accessibility and visibility of all languages, cultural contexts and levels of literacy, especially those groups often marginalised. ▪ Consider the suitability for the given situation of using structured processes for public engagement that allow deliberation, dialogue and the emergence of collective intelligence.

Through the process of developing guidelines, this chapter has answered research sub-question 1: *How should audience research be designed and conducted when the objective of a communication programme is to promote public dialogue?*

The next chapter will explore the application of these guidelines in the context of public dialogue about science and the challenges that this presents. Based on the implications of this context, the guidelines will be adapted and refined.

Chapter 4: The Challenges of Public Dialogue about Science

4.1 INTRODUCTION

> *We should be on our guard not to overestimate science and scientific methods when it is a question of human problems: and we should not assume that experts are the only ones who have a right to express themselves on questions affecting the organization of society (Einstein 1949: 15).*

In Chapter 1 the need was established for public dialogue to guide decision-making about complex science-related issues that are essentially, in Albert Einstein's words, human problems. With guidelines developed in Chapter 3 for how audience research can be designed to guide the planning of public dialogue generally, this chapter examines the application and revision of these guidelines in the context of science-related issues specifically. The intersection of these two areas is underpinned by a number of connections, which have been described in Chapter 1 and are recalled in the next paragraph.

The use of science and technology has long been of interest in Development Studies and development communication. This is evident in literature and practice in these fields which focus on, for example, agricultural extension, health promotion and technology uptake (Melkote & Steeves 2001: 67). In the last decade, the call to democratise science has positioned science and technology as a public policy issue inseparable from broader socioeconomic, political and ethical factors. The conceptual background in section 1.6 of Chapter 1 demonstrated that in both development communication and science communication there has been a trend from monological to dialogical approaches. The comparison of the diffusion and participation paradigms in development communication is paralleled conceptually by the cognitive-deficit versus democratic or interactive models in science communication. In both fields it is considered wise to use the approaches of these models in a complementary fashion. In addition, both fields echo the need for appropriate methods for planning, designing and implementing deliberative processes that engage a diversity of citizens, decision-makers and technical experts in policy and programming

decisions. In both fields, audience research can offer a systematic means of planning such communication to enhance its effectiveness and relevance to the participants' interests.

Given these parallels, it is suggested that the audience research guidelines about general public issues developed in the previous chapter can also be applicable to public dialogue about scientific matters. However, communication about science presents its own challenges which require special consideration in the design of audience research. This chapter therefore builds on the previous one, considering systematically how the guidelines developed thus far for public dialogue can be applied and refined in the context of science, given the challenges involved. It therefore addresses research sub-question 2 posed for this study:

> *What are the particular communication challenges inherent in public dialogue about science to which attention should be paid when designing audience research?*

This question is answered through a structured analytical process that integrates (i) the foundation of Chapter 3, (ii) deductive analysis, and (iii) the use of literature concerned with the planning and implementation of communication and engagement about science. This includes a consideration of theory, methods, practical experiences and findings of previous studies related to biotechnology as well as other disciplines and applications of science.

The chapter is structured as follows. Firstly, the discussion examines the challenges involved in public dialogue about science to which attention should be paid in designing and conducting audience research. The methodological implications of each of these challenges are drawn out, which cut across the various elements of communication and consequently of audience research. These echo the elements introduced in Chapter 3: WHY, GENERAL, WHO, WHAT and HOW. The remainder of the chapter is dedicated to examining and revising the guidelines developed in the previous chapter in light of the challenges of public dialogue about science. A revised set of guidelines resulting from this chapter will then be applied to a case study for the purposes of its evaluation in the chapters to follow.

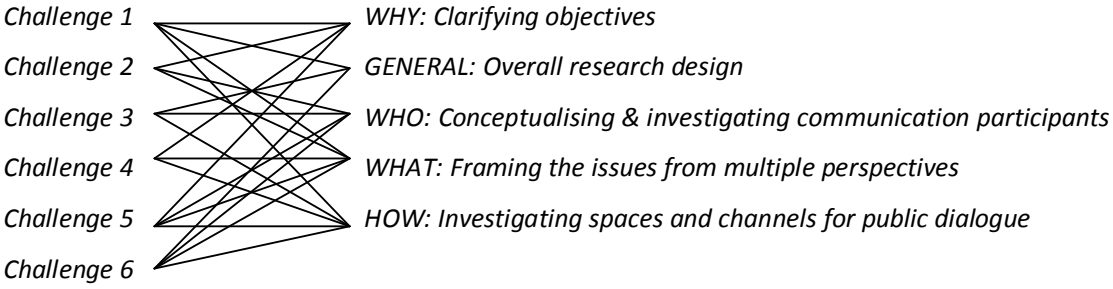
As stated at the beginning of this dissertation, it is not the researcher's intention to argue for or against any particular stand on the potentially controversial and value-laden matters of complex and uncertain sciences like modern biotechnology. The focus is to be maintained on planning for effective and inclusive communication of such issues, while remaining aware of any potential influence of personal values and opinions about the topic.

4.2 THE CHALLENGES OF PUBLIC DIALOGUE ABOUT SCIENCE

The nature and context of science-related issues present a number of challenges for communication, particularly when the objective is public dialogue. These challenges should be considered when designing and conducting audience research that aims to inform and guide such communication. Since audience research itself is an act of communication, it will need to heed these challenges within the process of research and produce useful recommendations for addressing the challenges within communication strategy design.

Six specific challenges could be identified in the literature and will be presented in this section. For each of the challenges, attention will also be paid to assessing their implications for communication planning and audience research. The implications are found to cut across the elements of audience research that were introduced and discussed in Chapter 3, as depicted in Figure 4-1. Thus, each of the sub-sections to follow presents the challenge followed by its relationship to the WHY, GENERAL, WHO, WHAT and HOW elements.

Figure 4-1: Connecting the challenges of public dialogue about science to the elements of audience research



Following this discussion, a table will be presented which captures the particular details of all these intersections. This table (Table 4-1) helps to visualise and analyse – in Section 4.3 – what these challenges mean for our audience research guidelines. But first, the challenges.

4.2.1 The challenge of specialised technical knowledge

The specialised and technical nature of scientific knowledge is one of the most obvious challenges for communication about science and for the audience research carried out to inform its planning. The input of scientific information is of central importance to a public-engagement process but often involves advanced knowledge, abstract notions and difficult terms that have few reference points in everyday life and are unfamiliar to non-scientists, particularly in populations with low science literacy (Petts 2008: 829). If not managed, the domination of scientific language and worldview in communication can be uninviting and exclude lay people from the discussion. This not only creates a divide between 'those who know' and 'those who don't know', but inhibits the contribution of other valuable forms of knowledge and expertise, limiting the possibilities for legitimate, inclusive participation. The indigenous and experiential knowledge of an African farmer expressed in the vernacular, for example, may struggle to be heard amidst the hegemony and jargon of Occidental science. As Johnson (1987: 106) explains: "Expertise acts as a technical sieve for consensus on facts, but it also labels certain paths to knowledge (and certain path-takers) as better than others".

A strong caveat to this position is that certain issues require clear scientific authority. The potential value of lay and alternative interpretations must be determined and carefully weighed against the nature and urgency of the issue. In South Africa, thousands of HIV-positive lives could have been saved while a decisive rollout of antiretroviral drugs was delayed due to ongoing political deliberations, dissent and denial (Robins 2004).

Using further insights from the literature, the previous chapter, and deductive logic, the following points demonstrate how this challenge is experienced and can be addressed in relation to all elements of communication and audience research.

WHY:

In relation to the intended objectives of communication and the suitability of communication approaches:

- The need for the input of scientific expertise versus contributions by the lay public in a participation process will be influenced by the rationale or desired outcomes of a communication process, the nature of the issue at hand and the particular context. The question "WHY" can therefore apply to considering what degree of public participation is a feasible goal given the circumstances.
- In considering the appropriateness of participatory and diffusion models, a position which favours the complementary use of information dissemination and dialogue, as conveyed in Chapter 3, is particularly pertinent when the topic under discussion is complex and possibly unfamiliar to participants (Einsiedel & Thorne 1999: 50; Rowe & Frewer 2000: 6).

OVERALL RESEARCH DESIGN:

The challenge of specialised technical knowledge must be heeded within the overall design of audience research:

- Audience researchers can expect to face this very challenge in the process of research. They will need to familiarise themselves with the issues from diverse perspectives and explore ways to communicate and ask questions about these in an accessible and balanced way. Research methods might involve giving balanced information combined with interactive discussion.
- The use of open-ended, interactive methods (as suggested in Chapter 3) could uncover alternative forms and framings of knowledge about the issues, and thereby provide guidance on the range of perspectives to consider during communication.

WHO:

The investigation of audiences or communication participants can be responsive to this challenge in the following ways:

- Since the public will rely on information they get from experts rather than trying to process all of the details themselves, the issue of trust is paramount (Priest 2004). Audience research should investigate who is trusted to provide honest information about the science-related issue at hand. This is a frequently asked question in surveys on public

opinion on biotechnology (for example AfricaBio 2001, University of Pretoria 2003-4 in PUB CD-ROM[5]; Rule & Langa 2005).

- Given that other forms of knowledge should be provided for in communication, one should consider what other kinds of experts might be invited into the dialogue, such as social scientists for example (Doubleday 2007; Omamo & von Grebmer 2005: 7). This was reflected in the United Kingdom's Chief Scientific Adviser recommendation in 1997 (in Dyball & King 2002: 12) to: "Involve at least some experts from other not necessarily scientific disciplines to ensure that the evidence is subjected to a sufficiently questioning review from a wide-ranging set of viewpoints".
- To understand the potential contribution of the public to the conversation, the audience research process can help to assess (1) the extent to which potential participants are familiar with the technical information, and (2) the forms of "situated expertise" (Irwin & Michael 2003: 102) in relation to the topic, in other words how participants make sense of the topic in relation to their culture, lived experiences and local context.

WHAT:

The collaborative framing of issues and messages must heed the challenge of technical complexity:

- Within public engagement, technical information will need to be translated into simple, clear language that is accessible and meaningful to a lay audience, helping them to process the information and address their questions (Johnson 1987: 104; UK 2006). Audience research could investigate language usage about science issues and make suitable recommendations.
- Scientific information needs to be balanced alongside other forms of knowledge. Evidence has shown that effective communication about science and risk requires not only technical facts but also an appreciation of the social context through which people filter technical information, including "social networks, economic resources, political rights and responsibilities, histories and ideologies" (Johnson 1987: 103-109; also Priest 2004). Audience research could also investigate these various contexts.

[5] This citation refers to a CD-ROM containing a number of papers and surveys on biotechnology in South Africa. These were once available on the PUB website but are no longer there, except for the Rule and Langa (2005) report. This CD-ROM was compiled by University of Cape Town's Government Publications Library (at an unknown date) and is available there.

- In designing research questions and interacting with participants, audience researchers will need to convey some message or explanation about the scientific topic. This is itself an act of science communication and should heed the same caution. Explanations should be carefully constructed to make the terms understood, acknowledge the benefits, risks and uncertainties, and avoid biasing the process by giving balanced, honest information (Davison, Brans & Schibeci 1997; Welp *et al.* 2006).

HOW:

This challenge has implications for investigating the appropriate communication channels, methods and formats:

- For dialogue about technically complex issues, the communication process should combine information and education methods with interactive processes that allow participants time and space to process the information, discuss it and ask questions before contributing their views to a decision-making process (Beierle & Cayford 2002: 65; Nisker *et al.* 2006; Omamo & von Grebmer 2005: 28).
- The effective communication of technical information requires an appropriate format. Long, complex and wordy written documents like environmental impact assessment reports fail to help people understand and visualise the implications of proposed projects (e.g. Mak *et al.* 2006; Thuyspunt Alliance 2010). Instead, alternative visual presentations such as maps, animations, photos, graphics and videos can be used to convey potential impacts clearly and help people discuss and respond to these (Mak *et al.* 2006).
- Considering the above, audience research should investigate the most appropriate channels and formats for effectively sharing and eliciting information about science.

Having considered the implications of this first challenge for each of the elements of audience research, the same process is followed for the remaining challenges.

4.2.2 The challenge of complexity and multidimensionality

As stated previously, the application of science in society is dependent not only on technical factors but takes place at a complex intersection of environmental, economic, social, political, ethical and cultural dimensions (Keeley 2003: 2; Omamo & von Grebmer 2005: 1).

Emerging, uncertain science such as biotechnology can be considered complex along three dimensions, following Kahane (2010: 5):

> A challenge is *dynamically complex* when cause and effect are interdependent and far apart in space and time; such challenges cannot successfully be addressed piece by piece, but only by seeing the system as a whole. A challenge is *socially complex* when the actors involved have different perspectives and interests; such challenges cannot successfully be addressed by experts or authorities, but only with the engagement of the actors themselves. And a challenge is *generatively complex* when its future is fundamentally unfamiliar and undetermined; such challenges cannot successfully be addressed by applying 'best practice' solutions from the past, but only by growing new, 'next practice' solutions (italics in original).

When these complexities enter a communication arena, misunderstandings and conflicts can result. Omamo and Von Grebmer (2005: 3-7) describe three elements of divergence which characterise controversies surrounding genetically modified (GM) food in addressing southern Africa's food security needs. *Disciplinary* divergence arises from the differing epistemological and methodological approaches in the biophysical sciences, the social sciences and the humanities. *Paradigmatic* differences relate to divergent views on the role of science and technology in human development: modernism, which considers science inevitably beneficial for human progress, and post-modernism which questions the assumed certainty and objectivity of scientific endeavours and gives precedence to multiplicity. *Political* divergence arises from contrasting "political myths" (2005: 6) predominant in countries of the North, where the mindset persists that they have the answers to the problems of poverty and hunger, versus the South, which resists the appearance of technology-driven exploitation and dependence. In addition to these, it can be said that at the heart of biotechnology disputes lies an *ethical* dimension, as parties differ in their views on the values at stake in "highly contentious issues such as stem-cell technology, reproductive cloning, in-vitro fertilisation but also on more general issues such as land use and environmental issues" (Osseweijer 2006: 591).

The complexity of science-related issues has a number of implications for communication that should be considered in audience research, which are discussed below under each of the five elements.

WHY:

- In determining the appropriateness of communication models, the complex and value-laden nature of science-related issues lends itself to inclusive multi-stakeholder participation and deliberation from various perspectives (Beierle & Cayford 2002: 5; Keeley 2003; Omamo & Von Grebmer 2005: 1). This justifies an interactive or democratic model of science communication. Managerialist decision-making by authorities on behalf of the public, based on "simple cost-benefit analysis, law or 'sound science' alone" (Keeley 2003: 2) is not considered adequate (Beierle & Cayford 2002: 5).

OVERALL RESEARCH DESIGN:

- As shown in the previous chapter about audience research for public dialogue generally, appropriate open-ended and interactive methods in audience research and in the communication itself can allow the emergence and connection of diverse and unanticipated dimensions.
- Reflexivity, triangulation and the use of multiple methods (also discussed in Chapter 3) can be applied to avoid researchers' predetermined concepts limiting the range of perspectives, particularly when a techno-scientific lens can easily dominate the framing of science-related issues.

WHO:

- Dialogue involving parties with opposing views about emotionally charged issues can easily result in conflict and power struggles (Bohm 1996: 4). It is recommended that communication planning include some form of conflict analysis in order to understand the potential divergences, alliances, influences and interests within the stakeholder environment. Such findings could help to segment and engage various stakeholder groups more effectively and harmoniously (Ankenya & Dodds 2008; Tam, Zeng & Tong 2009; Wylie 2005).

WHAT:

- The challenge of complexity has similar implications to the previous challenge, in that the topic of communication should be framed collaboratively to reflect the various dimensions at play. Complex science-related issues can be framed in a range of ways that can highlight their relevance to different publics, such as in terms of social progress, economic development/competitiveness, morality/ethics, scientific/technical uncertainty, and public accountability/governance (Nisbet & Scheufele 2007).

HOW:

- Rather than communicating a predetermined message, appropriate channels and mechanisms are needed to facilitate deliberative multi-stakeholder processes, such as those presented in Appendix C, for example Science Cafes and Citizen Councils.

4.2.3 The challenge of neutrality amidst commercial interests in science

Commercial interests in science present a further challenge for communicating about science issues in a democratic paradigm. Research and development in science and technology – such as in the industries of healthcare, food, energy, agriculture, forestry and mining – are embedded within a context of global economic competition (Seshia & Scoones 2003; Smith 1996: 1; Worthington 2007: 476). Many countries have identified biotechnology in particular as a key driver of economic growth and international competitiveness (Davison, Brans & Schibeci 1997: 317). These circumstances are associated with the commodification of knowledge production and commercial control over intellectual property (Worthington 2007: 476). The independence of science comes under pressure as universities and public research institutions' have become increasingly dependent on private funding. A dislocation looms between the powerful profit-driven forces behind novel science and technology and wider public values and social priorities (Macnaughten 2008; Newell 2009). When stakeholders are shareholders, critics raise doubts about science's claims to neutrality. They question the interests and accountability of science governance and mistrust information that comes from sources with powerful interests.

Amongst other authors, Einsiedel and Thorne (1999: 54) and Priest (2004) have observed that the communication environment around science-related issues is strongly influenced by the marketing and public-relations efforts of industry and government sources which have an interest in promoting their acceptance. They therefore tend to frame information to downplay uncertainties and risks and emphasise economic or health benefits. In public engagement forums, not only is such framing misleading, it limits the possibility for balanced, deliberative processes (Wakeford & Pimbert 2003: 2) and is contrary to the scientific principles of openness and disinterestedness. Public engagement exercises have been used "less as a tool for promoting democratic consensus and more as a means to legitimate particular forms of governance and privilege narrowly defined economic goals at the expense of citizen rights and values" (Masuda, McGee & Garvin 2008: 359). Similarly, public opinion polls have been criticised for advancing commercial interests (Davison, Brans & Schibeci 1997: 318; Welp *et al.* 2006) for reasons elaborated in Section 4.3.2 on Overall Research Design.

How are the audience researcher and communication planner to respond to this challenge of commercial interests in science, when guided by principles of inclusivity and democracy? The implications are considered here in relation to the five elements of audience research:

WHY:

- Audience researchers are to carefully consider the rationale for public engagement and the motives of the sponsoring institution. If findings are to be used as "audience intelligence" (Mody 1991: 121) to persuade people of a certain viewpoint or to bias the results of public opinion surveys to favour industry, the ethical audience researcher should choose whether or not he or she wants to become involved in a public relations exercise on an issue of public interest (see for example Davison, Brans & Schibeci 1997: 327-8). As an example, two advisors resigned from the steering group for a public dialogue related to genetically modified (GM) food when they saw that the consultation was to be deliberately designed – in the interests of the GM industry – to demonstrate reduced consumer opposition to GM food (Poulter 2010; Lancaster University Department of Sociology 2010).

- Commercial motivations for engaging the public should be balanced with an assessment of other stakeholders' interests and desired outcomes of a deliberative process, as argued in Chapter 3 (Cox, Kazubowski-Houston & Nisker 2009).

OVERALL RESEARCH DESIGN:

- Once again, audience research methods should strive to minimise bias through the balanced framing of questions and issues that acknowledges risks and uncertainties.
- Commercial interests in science communication could be balanced by conceptualising and approaching audience research participants as belonging to a society of citizens rather than as a market of self-interested consumers (Davison, Brans & Schibeci 1997).

WHO:

- Stakeholders with commercial motives should be identified as such in public dialogue and in audience research. The interests, influences and networks of these stakeholders should be understood as a characteristic of their participation.
- In investigating information preferences, participants should be asked who they would trust to give them information about science.

WHAT:

- Referring to Friedman's (2010) concepts of "framing-for-persuasion" versus "framing-for-deliberation", persuasion-directed objectives may seek to influence favourably the framing of issues. In the interests of the democratic values of public dialogue, commercial interests in promoting a particular technology should be balanced with other perspectives to enable deliberation and acknowledgement of uncertainties and risks.

HOW:

- Mechanisms and methods for public engagement must be sought, in both communication and audience research, which can be considered inclusive, fair and legitimate, and are not carried out to serve particular interests.

4.2.4 The challenge to hold science accountable to social priorities

The commercial interest in science research and development is criticised in light of the urgent need to address poverty alleviation and sustainable development throughout the world. Another challenge for science in society that is highlighted in the literature is that of ensuring that the voices of the poor and marginalised are heard in the process of science so that policy and developments in science and technology can take their priorities and rights into consideration (Keeley 2003; Scoones, Leach & Cockburn 2006; UK 2001; Wakeford & Pimbert 2003). This is particularly applicable amidst controversy about the uncertain impacts of modern agricultural biotechnology on the livelihoods and agro-ecosystems of poor farmers in developing countries (Keeley 2003: 1). As argued by numerous stakeholders consulted in a Food and Agriculture Organisation (FAO) discussion (2005: el.): "The fact that farmers in many countries are uneducated or illiterate is no excuse for not consulting them and taking them into full confidence before introducing new technologies".

There are numerous ways in which science development and governance processes can be made more socially accountable. Appropriate methods of public engagement about science can serve to make planning processes transparent, link researchers and end-users of innovations, identify majority needs, define research priorities, understand local socio-economic and agronomic constraints on farmers and consumers, provide extension support for the application of technologies and generally bridge the gap between scientific knowledge and sustainable poverty alleviation (Glover 2003: 2; Keeley 2003: 2; Kristjanson *et al.* 2008: 3; Meyer 1997: 195; Wakeford & Pimbert 2003: 1-2). Community-based participatory research has been found effective in promoting the adoption of technologies (Glover 2003), identifying optimal rice varieties suitable to the harsh hill conditions of Nepalese farmers (Fowlie 1999), increasing the accountability of researchers and governments to the public in environmental health management in China (Ali, Olden & Xu 2008), and in the establishment of Science Shops – non-profit organisations that mediate or perform research on request by civil society (Worthington 2007: 475). These strategies go beyond merely conducting audience research to inform a campaign or project, but place participatory communication at the centre of a broader process of relationships and action. This was indicated by the outer circle in Figure 3.2 of Chapter 3.

The response to this challenge falls across the elements of communication and audience research:

WHY:

- In a democratic model of science communication, an ethos of holding science accountable to social priorities should be supported as an objective for public engagement about science.

OVERALL RESEARCH DESIGN:

- Audience research should ideally be used as merely one foundational step in a larger ongoing process of continuous partnerships, participation and action, not just to inform once-off campaigns and projects.

WHO:

- Involving social scientists and activists may help to represent social priorities better and understand the social contexts of issues in debates (Doubleday 2007; Omamo & Von Grebmer 2005: 7).
- The previous chapter suggested engaging with communication partners such as civil society groups as a means to communicate with their networks. It could be particularly useful to work with intermediaries and facilitators who can represent the poor in debates and help them access and make sense of technical issues and their consequences (for example see Treasure the Karoo 2012).

WHAT:

- By appreciating the interests, concerns, framing, values and language used by those who are often underrepresented in decision-making, engagement processes can be made more inviting and accessible and their contributions more visible.
- Collaboratively framing science-related issues within a social justice perspective could help to prioritise social needs.

HOW:

- Audience research should investigate and advise on how to access marginalised voices and also make information accessible to them in suitable forms.
- Suitable mechanisms are needed for bridging communication and participation between scientists and end users, such as the strategies discussed above.

4.2.5 The challenge of uninterested publics

The lack of interest of a large majority of the public in science issues is an often-overlooked challenge in discussions about securing broad participation in the decision-making process (FAO 2005; Osseweijer 2006: 591). Poor participation means that not all affected stakeholders and interest groups are represented in decision-making and therefore reduces its legitimacy (Osseweijer 2006). Reasons for the public's lack of interest may be that they have no direct stake in the issue, that they are not interested in contributing to discussions about it, or that the issue competes for saliency with other priorities (Belden Russonello Strategists 1995). The narrowly technical framing of an issue may obscure its relevance for people's lives or the value of their contribution (Doubleday 2007). In addition, research has shown that establishing a genuine link between public participation and its influence on decision-making is an important factor in encouraging participation (Beierle & Cayford 2002; Petts 2008; UK 2001).

The Situational Theory of Publics (Grunig 1989) provides a useful theoretical framework for segmenting publics or audiences according to their relationship to an issue. Widely used in public relations, the model has also been applied to understanding participants in communication about climate change (Featherstone *et al.* 2009) amongst other issues. Publics can be classified as active information-seekers or passive processors of information based on three independent variables:

- **Problem recognition**, the extent to which individuals recognize an issue as a problem. According to this theory, people do not stop to think about a situation unless they perceive that something needs to be done to improve it.

- **Constraint recognition**, the extent to which individuals consider their response to an issue as being limited by factors beyond their control. The greater the perceived constraints, the less likely they are to act on information.
- **Level of involvement** increases the likelihood of individuals listening to and acting on messages, based on how personally and emotionally relevant a problem is for them.

Audience research and communication planning need to be cognisant of and responsive to this challenge in order to attract broad, legitimate participation. Some of the implications are described as follows in relation to the elements of audience research.

WHY:

- Although the intended outcomes of communication may often be defined by a sponsoring agency, audience research should also investigate what would motivate various members of the public to participate in communication. Communication can be framed accordingly.
- The potential for public opinion to influence policy and programmes should be determined, as this is known to encourage participant motivation.

GENERAL:

No direct implications for overall research design are discernible.

WHO:

- In line with the WHY above, the state or sponsoring institution should also be considered a participant and their willingness to listen to the public determined.
- Grunig's (1989) model can be applied to understand different stakeholders or publics and their varying degrees of interestedness in a topic.
- To avoid exclusion and enable legitimate public engagement processes, strategies should be developed that actively seek to access affected groups.

WHAT:

- Based on Grunig's (1989) model, the framing of a topic can be adjusted to highlight problem recognition and involvement, and to address constraint recognition. As already argued, technical issues need to be framed within a meaningful and relevant social

context. Audience research can attempt to uncover people's own framing of issues and identify what is of interest and concern to them. Belden Russonello Strategists (1995) did focus-group research to explore people's lack of concern for biodiversity communication. They made recommendations for how a communication strategy could overcome the cognitive barriers by using particular approaches, messages and language.

- Communication should avoid confusing, boring or overwhelming people with information, or their interest might easily be lost.

HOW:

- Using the appropriate channels and spaces can further help to attract interest and participation in an issue. Osseweijer (2006: 591-593) proposes a solution in the form of the "Three-E Model" as an approach to biotechnology communication, where *entertainment* aims to attract interest, *emotion* aims to trigger involvement in the topic, and *education* then allows sharing of information and skills for decision-making.

4.2.6 The challenge of technical experts' resistance towards dialogue

Overcoming the reluctance of the public to participate in science debates is one challenge; another is encouraging the meaningful, open-minded participation of scientists and decision-makers in public dialogue about science. Their involvement is influenced by various factors including attitudes, norms and skills as well as the nature of the issue at hand (Beierle & Cayford 2002: 64; Poliakoff & Webb 2007; Rogers-Hayden & Pidgeon 2008: 1010).

Legitimate public participation requires that sponsoring and decision-making agencies recognise the legitimacy of the public's views, are open-minded and responsive to the public's input, are willing to open up the framing of technical issues to wider perspectives, and are honest about areas of uncertainty (Beierle & Cayford 2002: 64; Goven & Langer 2009: 921). Such attitudes can be difficult to achieve due to the persistence of the cognitive-deficit model (Petts 2008: 828) and the need it creates for conceding power to other stakeholders (Johnson 1987: 109). It also requires a bridging of paradigmatic, disciplinary and political divergence (Omamo & von Grember 2007), which may be a tougher but not impossible task.

Appreciating all these factors can help contribute to the design of interventions to promote public dialogue, positioning and equipping scientists as participants with a crucial role in its success. This challenge is felt across a number of elements of communication.

WHY:

- When determining the rationale for public engagement, the issue and circumstances at hand should guide what degree of public dialogue is appropriate and what contribution the lay public can valuably offer. A naïve celebration of dialogue about science may alienate scientists. The value as well as limitations of scientific expertise should be highlighted alongside other forms of knowledge.
- However, the unjustified resistance of scientists and decision-makers towards dialogue can limit the legitimacy and value of a public engagement exercise. An honest statement of intent for public engagement will avoid disappointed expectations and controversy amongst publics.

WHO:

- Following the above recommendations, an assessment of various publics' familiarity with technical issues and information processing capacities can help decision-makers determine and appreciate what the lay public and other stakeholders can realistically contribute to a rational dialogue about science, thereby challenging the deficit model. For example, audience research by May (2008) determined that publics in a particular borough of London were capable of making rationing decisions for health budgets. In a risk-assessment study cited by Irwin and Michael (2003: 102), officials watched a video produced as a research outcome and were surprised at the "generally intelligent and reflective terms" in which they witnessed lay participants discussing the issues at hand.
- By positioning scientists and decision-makers as active participants in communication, their characteristics and influence on the engagement process can be investigated, including:
    - Their attitudes to public dialogue and willingness to engage in deliberative processes.
    - Their competency in the skills required for public dialogue. The engagement of government officials and scientists in public dialogue "requires skills they lack and

discounts those they have" (Johnson 1987: 109; also see Glicken 2000: 308). Fortunately, skills can be learned and science communication workshops have been developed to equip scientists with the necessary tools for public engagement and develop their awareness of broader perspectives on science (Miller & Fahy 2009).

- The required role to be played by scientists and decision-makers at any particular time. Dialogue may require them to play a number of different roles: "observational, listening, presentational, discussion, debating" (Petts 2008: 828) or that of "informer, negotiator, listener, advocate or facilitator" (Metcalfe 2002).

HOW:

- Depending on the chosen methods and channels of communication for public dialogue about science, the need may exist to equip experts for the broader communication roles required in deliberative dialogue, as described above.

No direct implications of this challenge were discerned for the *General* or *Who* elements.

4.2.7 Summary and analysis of challenges

The preceding discussion has highlighted six challenges inherent in communication about science, particularly within a democratic model which upholds the ideal of public dialogue. There are a few points to note about these challenges and their implications.

- The implications apply to audience research but also to communication generally. Returning to the concentric circles introduced in the previous chapter in Figure 3.2, some of the implications might be located and addressed within the broader communication environment, some at the level of the overall design of audience research, and others in the specific research methods and questions to be asked.

- A clear observation at this stage is that there appear to be many recommendations and questions to take up. It would be overambitious to explore every one of these within an applied audience research study with limited time and resources. Rather, they might be

taken as indications of important issues to be aware of, but which may require a response more widely than within the tasks of audience research.

As seen above, the challenges have cross-cutting implications for all aspects of communication and for audience research. To capture these, the relationships between the challenges and the methodological implications are cross-tabulated in Table 4-1 below, with key words referring back to the implications discussed above. This table provides a framework for beginning to analyse, by a reading of the vertical columns, what these challenges mean for the guidelines developed in the previous chapter. This is the task of the section to follow.

Table 4-1: Connecting the challenges in public dialogue about science to the elements of audience research design

Challenges in public dialogue about science	**Implications for audience research**				
	WHY	**Overall design**	**WHO**	**WHAT**	**HOW**
1. Scientific/ technical nature	Determine feasible role for public participation Complementary diffusion & dialogue	Address technical complexities in data collection Open-ended, interactive methods to uncover alternative perspectives	Trusted sources Other forms of expertise Assess technical understanding and situated expertise	Simple language Framing in social context Honest, balanced information	Investigate accessible channels and formats for complementary diffusion and dialogue
2. Complexity and multi-dimensionality	Conducive to deliberative dialogue	Open-ended, interactive methods to enable multiplicity and emergence Researcher reflexivity to avoid limiting scope	Conflict analysis Map and segment by divergence and alliance	Collaborative multi-dimensional framing	Seek channels and mechanisms to enable deliberative multi-stakeholder processes
3. Commercial interests	Determine motives of sponsors Ethical caution of persuasive objectives	Avoid bias. Balanced framing Audiences as citizens not consumers	Note influences and interests of commercially involved stakeholders Identify trusted sources of information	Balance framing-for-persuasion with acknowledging uncertainties and risks and presenting other perspectives	Beware of methods biased for public relations and persuasion

Table 4-1 continued: Connecting the challenges in public dialogue about science to the elements of audience research design

Challenges in public dialogue about science	Implications for audience research				
	WHY	**Overall design**	**WHO**	**WHAT**	**HOW**
4. Social accountability	Support social accountability motives	Audience research as part of ongoing process of partnerships, participation and action	Incorporate social scientists and activists Intermediaries and representatives	Framing and formats that enhance access of those often excluded Collaborative framing with social justice perspective	Channels accessible to marginalised voices Participatory platforms to link scientists and end users
5. Uninterested public	Public's motives to participate Establish the state's willingness for public input to influence decisions		State or sponsor as participant Map degrees of interest and relationship to issue Minimise exclusion	Framing to highlight relevance and recognition Avoid overwhelming people with info	Channels, formats and style to attract interest, overcome barriers and trigger involvement
6. Resistance of experts to public dialogue	Feasible goal dependent on issue and context Honest statement of intention		Assess potential value of public's contribution Scientists as participants: determine attitude, skills, roles		Equip experts for broader communication roles in deliberative dialogue

4.3 THE IMPLICATIONS FOR AUDIENCE RESEARCH FOR PUBLIC DIALOGUE ABOUT SCIENCE

Given that there are so many challenges to public engagement with science, the careful and adequate planning thereof is essential to ensure that it elicits useful, balanced information pointing to necessary areas for attention in decision-making. Glicken (2000: 308) notes that "participatory processes often suffer from a lack of planning and forethought". She argues (2000: 306) that just as it is necessary to "get the science right and do the right science", so must risk managers "get the participation right and get the right participation", referring respectively to the selection of appropriate methods and the involvement of all the appropriate stakeholders. In addition to representativeness and adequate methods, to be effective multi-stakeholder participation processes require clear objectives, suitable timing, fairness, accurate information, links to official decision-making, resource accessibility, transparency, and cost-effectiveness (Cox, Kazubowski-Houston & Nisker 2009; Glover & Keeley 2009: 4; Omamo & von Grebmer 2005: 10; Petts 2008; Rowe & Frewer 2000; UK 2001). Audience research can inform the careful planning and management of public participation, in order to "get it right".

The guidelines developed in Chapter 3 already provide a framework for how audience research can be appropriately designed to inform public dialogue. Having considered in the preceding section the challenges inherent in public dialogue about science, the task in this section is to consider how these guidelines can be applied and, where necessary, revised in the context of science. Each of the elements of audience research design – WHY, GENERAL, WHO, WHAT and HOW – will be presented in turn in the sub-sections below, with the format of analysis consisting of the following steps:

- Recall the guidelines developed in Chapter 3 (recaptured in a white box);
- Appraise in general how these are affected by the science challenges, consolidating the implications developed in the challenges discussion (the vertical columns of Table 4-1);
- Note additional insights and considerations from the science communication literature;
- Formulate the necessary revisions to the guidelines for the science context (in a grey box).

4.3.1 WHY: Defining the rationale for public engagement about science

In the previous chapter the first set of guidelines on audience research for public dialogue focused on clarifying the intended objectives of communication and of audience research. These are recalled here:

***Recaptured* WHY Guidelines: Clarifying objectives**

- Clarify the intended purpose of communication for which audience research is required.
- Consider the feasibility of public dialogue for the particular context, issue and available resources.
- Investigate various stakeholders' motivations for communicating about issues.
- Define the purpose and role of audience research within the broader communication programme.

When considering the WHY implications of all the science challenges described, a theme which emerges clearly is the importance of determining the intended purpose for engaging the public with science. This resonates with the first WHY guideline developed in Chapter 3. This guideline is particularly important for science engagement, given the technical nature, complexity and multidimensionality of science-related issues, the potential discord in views amongst scientists, other stakeholders and publics, and variation between commercial and social interests in the outcomes of science decision-making.

From an analysis of the science-engagement literature, a number of salient issues are highlighted which pertain to communication planning and which influence the guidelines.

Clear objectives assist effectiveness and planning of science engagement

A widely recommended first step in planning for public engagement with science is to clarify the rationale or intended objective of such an exercise. A clearly defined, honest statement of purpose is known to contribute to the effectiveness of public-engagement exercises, engendering trust and respect in the process and enabling more constructive outcomes (Beierle & Cayford 2002: 64; Glicken 2000; UK 2001: 2). As pointed out in the challenges, a genuine link between public input and the decision-making process is known to enhance the

public's motivation to participate in public engagement (Beierle & Cayford 2002; Petts 2008; UK 2001). It is therefore important to establish the decision-makers' willingness to listen and respond to public input and to note the legal deliberative frameworks relevant to the issue at hand. The need to consider the public's motivations to participate in engagement is of particular relevance with science issues, given the challenge of uninterestedness. For purposes of communication planning, the rationale for communication will shape the communication-strategy design, the kind of engagement considered appropriate and the framing or message construction (Johnson 1987: 107-109).

Rationales for public engagement in science

An analysis of the literature revealed a range of reasons why scholars and institutions consider it important to engage the public in matters of science in general and biotechnology specifically. Amongst these are reasons which can be broadly considered as: (i) instrumental (public 'buy-in' is a requirement for policy-making to proceed), (ii) normative (public participation is the 'right thing to do'), or (iii) substantive (public contributions make for better decisions) (Beierle & Cayford 2002: 64). The various rationales are driven by varying mixes of economic, social, ethical, political and legal imperatives and are premised on particular understandings of the relationship between science, society and development. The reasons found in the literature were distilled into the following categories:

- To attract learners to science careers and build the science skills base for a competitive, knowledge-based economy (Einsiedel & Thorne 1999: 50; Gascoigne & Metcalfe 2001: 1-6; Le Comber 2008: 205)
- Fostering public acceptance of science and avoiding market impediments (Klerck & Sweeney 2007; Knight, Mather & Holdsworth 2005; South Africa 2001: 36, 59; Vermeulen, 2004: vi)
- Enabling citizens to have a say in the science their taxes pay for and which affects them (Le Comber 2008: 205; Priest 1999: 98; Sclove, 1998: 1283)
- Supporting democracy and the democratization of science governance (Glover 2003; Keely 2003; Meyer 1997: 194; Priest 1999: 98; Sclove 1998: 1283; UK 2001: 4)
- Broadening the knowledge base for better decision-making (Keeley 2003: 2; Omamo & von Grebmer 2005: 1; Scott & Hudson 2005; UK 2001: 5)

- Compliance with legislative and policy frameworks and international protocols such as, in the case of biotechnology in South Africa: consumer rights outlined in the Consumer Protection Act (68 of 2008), The National Biotechnology Strategy (Glover & Keely 2009; South Africa 2001), the Genetically Modified Organisms Act (15 of 1997), and the Cartagena Protocol on Biosafety (Convention on Biological Diversity 2000)

Feasibility of communication approaches for the context and issue

Determining the appropriate communication strategy to be used for the given issue and context is particularly important in the context of science. As presented in the challenges, the technical complexity will certainly require the provision of balanced information to enable informed engagement, while the value-laden, multi-dimensional nature of issues calls especially for valid deliberative processes. Science-and-technology decisions occur at such a wide range of levels that the appropriate approach must be considered for the particular issue and context. According to Petts (2008), the feasibility of public influence on policy is higher for local, immediate decisions (such as determining the site for a power plant) than for upstream decisions on the direction of science and technology (such as what form of power a country should invest in).

On the basis of this discussion, all the WHY guidelines set out are relevant when applied to science dialogue. In the following revised guidelines, minor amendments are made and indicated in italics to emphasise better certain considerations in relation to science:

***REVISED* WHY Guidelines: Clarifying objectives**

- Clarify the intended purpose of communication for which audience research is required, *considering the range of rationales for public engagement with science.*
- *Determine the intention of the state or other relevant authority to respond to and incorporate public input in decision-making.*
- Consider *the relative value and feasibility* of public dialogue *and information dissemination* strategies for the particular context, issue and available resources.
- Investigate various stakeholders' motivations for communicating about issues *and explore how the lay public's motivation to participate can be enhanced.*

- Define the purpose and role of audience research within the broader communication programme *and note any ethical considerations thereof.*

4.3.2 GENERAL: Overall research design

It was established in the previous chapter that the intended objective of communication should largely direct the design of audience research in terms of the overall methodology and the way it conceptualises and investigates elements of communication. The following general guidelines for overall research design were developed with respect to participatory objectives for communication:

***Recaptured* GENERAL Guidelines: Overall research design**

- Promote active participation of stakeholders in communication-strategy design.
- Consider audience research as one step in an ongoing process of communication, not a tool to determine conclusive public opinion.
- Employ multiple methods, reflexivity and broad participant-selection to optimise inclusivity and minimise the influence of *a priori* assumptions, bias and power differentials.
- Use open-ended methods to uncover participants' language-use, values and framing of issues in the context of their daily lives.
- Allow time and interactivity in the research process for participants to consider a range of views, develop opinions and pose questions and concerns.

These GENERAL guidelines appear particularly applicable following an examination of the challenges to science communication and their implications. The challenges suggest that, to inform inclusive democratic dialogue about science, audience research should be designed to enable the emergence of multiple and unanticipated perspectives on science-related issues through open-ended, interactive methods, balanced framing and the conscious avoidance of bias. The power differentials referred to in the guidelines become starker in the context of science issues, characterised by the politics of knowledge, commercial interests, different levels of science literacy, and by disciplinary, paradigmatic and political divergence. Research designs should be avoided that legitimate commercial interests in science or that

position respondents as consumers rather than citizens. In addition, the potentially excluding technical nature of scientific issues requires careful attention in research design. To enhance the relevance of science to social priorities, ongoing participatory processes that link scientists and end-users are recommended in the broader communication context, resonating with the first guideline to promote the active participation of stakeholders. Salient issues from the literature contribute further to this discussion, as elaborated in the points below.

Weighing up qualitative, quantitative and mixed methods

With regard to the choice of research design and methods, the possibilities and limitations of quantitative and qualitative methods were compared in the previous chapter. While a mixed-method approach was suggested as most appropriate, the value of qualitative approaches was emphasised for enabling in-depth and localised insights into the social context in which citizens make sense of issues and form opinions. To elaborate on that discussion in the challenging terrain of science, we can consider various critiques of quantitative methods for assessing public opinion about science, as presented in the following paragraphs.

The report by UK (2001) critiques traditional methods such as questionnaires, opinion polls, and invitations for written submissions, saying that they fail to inspire enthusiasm or encourage deliberation and can under-represent certain groups. Davison, Brans & Schibeci (1997) question the validity and primacy of surveys for gauging public opinion on biotechnology. Through their critique of numerous major biotechnology opinion surveys conducted around the world, they argue that public opinion surveys are "blunt instruments for exploring the range of attitudes toward public policy in a complex society" (Davison, Brans & Schibeci 1997: 318). They suggest that such surveys "construct public opinion in a way that legitimates the commercialisation of biotechnology without necessarily enabling effective public debate" (Davison, Brans & Schibeci 1997: 318). These limitations do not meet well with the challenges noted earlier in this chapter. Davison, Brans & Schibeci (2007: 318) further argue that public opinion surveys "should only be one tool among many used to facilitate the effective participation of a range of interested publics in genuinely dialogical policy-making processes".

To support this, four main criticisms of surveys gauging public opinion of biotechnology are described below. Illustrations are drawn from a number of surveys[6] carried out in South Africa to assess public opinions about biotechnology. An understanding of these critiques can serve as guidance for designing appropriate methods for audience research for public dialogue about science.

Critique 1: Responses biased by positive framing of questions

A major critique of public opinion surveys is that they may elicit positive responses through the partial framing of questions. Empirical studies have shown that "the framing of an issue by using a positive or negative description has a strong influence on the answers people give" (Gardner & Stern 1996 in Welp *et al.* 2006: 176). Wynne (2005 in Welp *et al.* 2006: 176) warns that constructing complex and uncertain issues in a limited way can lead to public mistrust of opinion research and participation processes. Further, by omitting aspects related to risk and uncertainty in the framing of research questions, the public are being misled and denied the opportunity to assess important debates (Welp *et al.* 2006: 176).

In examples from South African research, a GM Food Survey (Joubert 2001 in PUB CD-ROM) and the HSRC/PUB Client Survey (Rule & Langa 2005) both asked respondents if they would eat genetically modified foods if these were healthier, contained more vitamins and less fat than other food, or tasted better. The questions did not ask whether respondents would do so if these foods carried an unknown risk to one's health or to the environment. A more balanced approach is used in a University of Pretoria survey (2003-4 in PUB CD-ROM) which asks respondents to rank the importance of items in a list of risks as well as benefits.

To respond to this critique, audience research design should strive in its formulation of questions neither to condone nor disapprove of the technologies under discussion, but provide and elicit balanced information about the benefits and risks, interests and concerns about the issues.

[6] Reports on these surveys were previously available on the PUB website, but only the Rule & Langa report on the 2004 HSRC survey remain there. The others are accessible on a CD-ROM at the UCT Government Publications library, date of compilation unknown.

Critique 2: Elicitation of uninformed views

Although market research techniques and opinion polls are useful for canvassing the views of large, representative samples of the population (PSP 2012: el.), they typically ask questions about complex subjects unfamiliar to many respondents, do not provide time for reflection, debate and acquiring more information, and generate responses which may be no more than reflex reactions, based on a quick glance, that reveal nothing about respondents' reasoning in selecting their answer (Priest 1999: 98-99; PSP 2012: el.).

This is illustrated by the case of an industry-commissioned survey conducted in the United States by Hoban (1994 in Davison, Brans & Schibeci 1997: 326) about consumer attitudes about the use of genetically engineered BST (bovine somatotropic) hormone to stimulate cows' milk production. Hoban concluded that the majority of consumers considered the technology acceptable and that the use of BST would not affect milk sales. However, elsewhere in the findings he noted that 82 per cent of respondents knew little or nothing about BST. Their views are therefore uninformed, yet these findings were used to give industry the thumbs-up on BST. This case also illustrates the commercial interests and consumer-orientation of this survey.

This critique is applicable to some of the South African surveys examined. Respondents are asked 'big' questions such as whether they consider biotechnology a risk to society, or morally acceptable (Rule & Langa 2005), yet they are not given any background information or time to think about their response. In addition, if respondents know little about GM foods then later questions seem inappropriate, such as whether GM foods are safe and whether they would buy them (AfricaBio 2001 in PUB CD-ROM).

Taking guidance from these limitations, audience research methods could provide some balanced and open background information on the issues and allow participants time to discuss and pose questions. For example, in a South African qualitative study on consumer perspectives on GM foods (Kempen, Scholtz & Jerling 2003 in PUB CD-ROM) the researchers used a document and website review to inform themselves about biotechnology and guide the design of their focus group discussion. However, the document review was derived largely from a pro-biotechnology industry-supported organisation and could have been

better balanced with information from critical sources. Thus, even qualitative methods can be guilty of narrowly framing the research questions and influence the range of responses, warn Irwin and Michael (2003: 104).

Furthermore, opinions expressed during audience research should not be taken as conclusive measurements of public opinion but as indications of the range of values, questions and concerns to address in further communication. This is also seen in the Kempen, Scholtz & Jerling study (2003 in PUB CD-ROM) which provides as a research finding a set of questions about GMOs which consumers would like addressed, data which could not have been anticipated or have emerged through closed questions.

Critique 3: Presumption of a cognitive-deficit approach

The assumptions of the cognitive-deficit paradigm underlie surveys which set out to test the gaps in respondents' knowledge, with Occidental scientific literacy narrowly presumed as the standard (Davison, Brans & Schibeci 1997). This criticism is likely to apply to studies that are carried out to inform a diffusion-based communication campaign, such as an AfricaBio survey (2001 in PUB CD-ROM) whose aim was "to assess how much consumers know about genetically modified foods (gene technology) and to see how they can be *informed and educated"* (own emphasis) – presuming that the public is ignorant.

In their report on the HSRC/PUB quantitative survey, Rule and Langa (2005) reach the conclusion that: "From the results, it emerges that on average nearly eight out of ten respondents interviewed did not know or have any knowledge about biotechnology". This conclusion, however, is drawn from the question "What do you think of when you hear the term biotechnology?" to which 80% answered that they did not know. The interpretation of this finding confounds knowledge of biotechnology (as taken in the interpretation) with familiarity with the word biotechnology or the ability to provide an immediate response. Also, it is not known whether the word was translated into other South African languages for the survey.

Rather than presuming the publics' ignorance, dialogical audience research methods should be designed to recognise other forms of life-world experiences and experiential knowledge

which influence publics' "interest, willingness to learn and ability to understand" (Davison, Brans & Schibeci 2007: 333). Rather than merely stating what respondents know or don't know, the open-endedness of qualitative methods can indicate more nuanced descriptive information. For example, the qualitative study on consumer perspectives on GM foods (Kempen, Scholtz & Jerling 2003 in PUB CD-ROM) provided insights into the reasons for respondents' views on GMOs and the particular fears and misconceptions which consumers have and which need to be addressed through consumer-education programmes.

Critique 4: Surveys as once-off conclusive events

A key difference between the opinion surveys critiqued here and the dialogical audience research methods proposed is how they fit into the broader communication context. While surveys and other methods are often carried out as a one-step process to measure public opinion, the audience research suggested should be carried out as just the beginning of an ongoing process, to inform further steps in dialogical communication and enhance its effectiveness and inclusivity. To address the challenge of ensuring the social accountability of developments in science, an ongoing process will ideally engage relevant parties and stakeholders as actively contributing and collaborating participants. Kirk and Metcalfe (2000) provide an excellent example of an ongoing participatory process which highlighted relationship-building, used a wide range of consultation and participation techniques, and allowed groups to identify their own perceptions, involvement and desired outcomes regarding the initiative. The resulting communication strategy was developed with the close involvement of the communication partners. It reflected their needs and then helped them to implement the strategy using their own networks and action plans.

Based on these critiques and suggested responses and given the challenges of science communication, the GENERAL guidelines developed in the previous chapter require only minor revision as they already account for the challenges of science dialogue.

***REVISED* GENERAL Guidelines: Overall research design**

- Promote active participation of stakeholders in communication-strategy design *and implementation*.
- Consider audience research as one step in an ongoing process of communication, not a tool to determine conclusive public opinion, *emphasising that ongoing communication processes are required for reaching informed opinions*.
- Employ multiple methods, reflexivity and broad participant-selection to optimise inclusivity and minimise the influence of a priori assumptions, bias and power differentials, *particularly in acknowledgement of the complexity and uncertainty of scientific issues.*
- Use open-ended methods to uncover participants' language use, values and framing of issues in the context of their daily lives.
- Allow time and interactivity in the research process for participants to consider a *balanced* range of *simply stated* views, *consider both risks and benefits*, develop opinions and pose questions and concerns.

4.3.3 WHO: investigating participants in public dialogue about science

Developing an understanding of the participants involved is central to communication planning. The following guidelines were developed in Chapter 4 for audience research that sets out to inform public dialogue.

***Restated* WHO Guidelines: Understanding communication participants**

- Recognise audiences as active, diverse, contributing stakeholders, where citizens, decision-makers and the state are all considered participants in public dialogue.
- Map the multiple stakeholders in a system of dialogue, including the web of interactions, existing communication networks and power dynamics among them.
- Investigate the range of variables that may influence participants' roles in public dialogue, such as their interests, values and concerns.
- Systematically use these communication variables to propose audience segments or stakeholder groups, with awareness of the possibilities and limitations of various methodological approaches, and a commitment to continued revision and inclusivity.

The challenges identified and their implications for the WHO element can be grouped into four general themes. In terms of (1) *lay citizens* as participants, audience research is required to understand the degrees of their interest and relationship to the issue and assess their situated expertise, technical understanding and potential contribution to dialogue. It should also strive to minimise exclusion and seek intermediaries and representatives. In relation to (2) *the 'experts'*, communication planning needs to view scientists as participants, determine their attitude, skills and required roles in dialogue, consider other forms of expertise including that of social scientists and activists, and identify trusted sources of information. Audience research should also consider (3) *the state or sponsoring agency* as a participant, and assess its intended responsiveness to public engagement. Finally, (4) issues of *power and interest* amongst all participants must be considered, analysing the areas of potential conflict, divergence and alliance, and noting the influences of commercially involved stakeholders.

Scholarship in participatory science communication helps to examine the connection of these challenges to the WHO guidelines for audience research. This is reflected in the paragraphs to follow, where the following salient issues are highlighted in relation to the guidelines: (1) broadening the range of actors in science engagement, (2) the role of the state, (3) citizen participation and representation, and (4) the issue of segmentation. Based on the discussion to follow, the guidelines will be adapted.

Broadening the range of actors in science engagement

'Broadening' here means acknowledging that choices about (and impacts of) science and technology involve actors at many levels: researchers, designers and engineers in universities, public research institutions and private industry, working in laboratories, offices and in communities; the policy makers and regulatory bodies who govern the direction of science research and development; the donors and investors whose funding and influence are critical; and the technical specialists and service-providers on the ground who deliver the products and services. The global population is also a major role-player in science and technology as end-users, producers, consumers and citizens, whether as individuals or part of formal or informal associations.

It is argued that multi-stakeholder participation involving civil society can contribute other forms of knowledge, experience and values to help understand issues, evaluate solutions, balance technical and socio-political priorities, and frame the context in which any technology would be considered and used (Keeley 2003: 2; Omamo & von Grebmer 2005: 1; Scott & Hudson 2005; UK 2001: 5).

García-López and Arizpe (2010: 197-199) prompt us to ask critically: Who organises the participatory process? Who participates? What counts as participation? Who has the power? This brings our attention to the power dynamics amongst unequal actors in participation. The notion of invented versus invited spaces (Cornwall & Gaventa 2001) or top-down and bottom-up processes, discussed in Chapter 3, is recalled here. This prompts us to question the role of the state compared with that of civil society in any given case of public participation (Beierle & Cayford 2002).

The role of the state

Glover and Keeley (2009: 2-3) highlight that government can play two different roles in public participation: "to initiate participatory and awareness-raising activities ... [or] to create an enabling environment for *others* – civil society and business – to take the initiative". Different countries, ministries or particular situations might employ different approaches to public participation: the managerial view, in which the state is entrusted with making decisions that serve the public interest; the pluralist view, which positions government as an arbiter in negotiation among different public interests on an issue; and the popular democratic view, a more intensive, participatory perspective in which different interests interact not only to influence decision-making but to build civic capacity and social capital in implementing decisions (Beierle & Cayford 2002: 2-4).

It was noted in the challenges that a clear intention by the state and decision-makers to listen and respond to the public's views enhances the legitimate participation of citizens in science engagement. It is therefore important that the state's position be defined at planning stages. Thus, the first WHO guideline should be emphasised, which recommends considering the state as participant.

Citizen participation and representation

Audience research can play a role in identifying the participants for public engagement with science. This is identified as a vital step in effective planning and should include considering a suitable scope of participation and adequate forms of representation (Beierle & Cayford 2002: 63-73; Glicken 2000; Glover & Keeley 2009: 3-4), discussed in turn in the next paragraphs.

Participants are sometimes selected for consultation and participation through top-down processes with limited or selective views of the range of interested stakeholders (García-López & Arizpe 2010; Glover & Keeley 2009: 4). The methods of identifying participants will have different effects on the outcomes. Beierle and Cayford (2002: 63-73) note that while 'the public' ideally includes everybody, participation processes require selecting a smaller group of people as a proxy or sample of the larger affected population. Depending on the rationale for the participation process, representation can either be defined in terms of socioeconomic characteristics, which would reflect broad public values, or in terms of various interest groups affected by the issue, which would enable greater influence on the process (Beierle & Cayford 2002: 67). Likewise, Glicken (2000: 308) notes that the "self-identified" attendance at a public meeting will "yield a different stakeholder map" than would a careful "other-identified" survey of the social landscape surrounding an issue. The latter approach is recommended by Glicken (2000: 308) to avoid the exclusion of stakeholders from the process, especially those parts of the population who are often underrepresented.

Well-defined civil society associations – like NGOs, trade unions, social movements, farmers' associations and think tanks – are often recommended and used as representatives of and means of access to groups of citizens (Davison, Brans & Schibeci 1997; FAO 2005; Meyer 1997; Wallis 2007). It is important, however, to consider the legitimacy of representation and whether these groups in fact allow for an adequate and accurate expression of views and concerns (FAO 2005; Glover & Keeley 2009: 4; Irwin & Michael 2003: 104). In South Africa a number of NGOs are active and informed stakeholders in the debate about modern agricultural biotechnology, such as Biowatch, Safeage, the African Centre for Biosafety (ACB), and AfricaBio (see for example ACB 2012; Biowatch 2009; Kahn 2009). Examples of non-

scientists who have contributed significantly to science policy include women's organizations who have redirected medical research agendas to reduce gender biases (Sclove 1998: 1284) and the Treatment Action Campaign's successful efforts to influence AIDS policy in South Africa (Robins 2004).

Segmentation

Glicken (2000: 307) emphasizes that stakeholders are identified and defined *relative* to a specific issue. Variables used for segmentation must derive from the intended purpose of communication and the relationship of the participants to the issues at stake. Reported below are a few cases from the science literature that illustrate approaches to segmentation and add to what was discussed in the previous chapter.

Through content analysis of responses to open-ended qualitative interviews and focus groups, Te Momo (2007: 1183) categorised seven different views on biotechnology amongst Maori communities in New Zealand: "purists, religious, anti, pro, no, uncertain, and middle Maori views". Similarly, in target audience analysis of how to target households to encourage recycling, households were segmented, using sociological profiles and waste behaviours, according to different action types: "'active green', 'verbal green', 'no-future type', 'environmentally ignorant', 'hardliner', and 'indifferent'" (Salhoffer & Isaac 2002: 70).

Rather than simply allocating individuals to one camp or another, Irwin and Michael (2003: 108) identify a more fluid approach to social groups in what they term "ethno-epistemic assemblages". These refer to transitory alliances of, for example, "particular groups of residents, national environmental organisations, scientists, factory inspectors and local newspapers" (Irwin & Michael 2003: 108). In developing a communication strategy for an integrated river-catchment management programme in Australia, Kirk and Metcalfe (2000) developed not audience segments but partner categories, capturing which kind of groups belong to these categories, and what their desired relationship is with the communication initiative.

Considering the above discussions and the challenges of science in relation to the potential participants in public dialogue about science, the WHO guidelines developed in the previous chapter can be revised and refined as follows, with the addition of a new guideline:

***REVISED* WHO Guidelines: Understanding communication participants**

- Recognise audiences as active, diverse, contributing stakeholders, where citizens, *representative civil society groups*, decision-makers, *technical experts* and the state are all considered participants *with varying roles* in public dialogue.
- Map the multiple stakeholders in a system of dialogue including the web of interactions, *areas of divergence and alliance*, existing communication networks and power dynamics amongst them.
- *Identify who are considered trusted sources of information amongst technical experts from a range of relevant disciplines, including social scientists and activists, and explore their preparedness for public dialogue about science.*
- Investigate the range of variables that influence participants' potential role in public dialogue *about science*, such as *their interests, values, concerns, technical aptitude and situated expertise in relation to the issue*.
- Systematically use these communication variables to propose audience segments or stakeholder groups in relation to the purpose and topic, with awareness of the possibilities and limitations of various methodological approaches, and a commitment to continued revision and inclusivity.

4.3.4 WHAT: Framing the issues from multiple perspectives

More than simply defining and designing messages for dissemination, the WHAT element in dialogical communication requires collaborative framing of issues for discussion based on a range of perspectives, which can be discerned through audience research. These are the guidelines developed in the previous chapter in relation to the WHAT element:

***Recaptured* WHAT Guidelines: Framing issues from multiple perspectives**

- Explore the range of perspectives and framing of the issues, including participants' opinions, questions and concerns, to inform the inclusive framing-for-deliberation in ongoing discussions.
- Avoid bias by designing questions to start broad and open and gradually focus inwards, framing questions and probing responses in a balanced, open way.
- Facilitate and observe interactive discussions to understand how issues are spoken of, what language is used and what values come into play.

The analysis of the science challenges and their implications for the WHAT element of communication all lead to the important issue of framing. In Chapter 3 the discussion of framing brought attention to the breadth of possible ways to define the topic of dialogue. In a similar vein, a sociology of science perspectives highlights that science is about more than just science: the technical complexity, multi-dimensionality and divergence of interests in science issues call for a sophisticated approach to framing that can serve the democratic principles of inclusion, representation, social accountability and transparency in public dialogue. Audience research will need to heed these challenges both in the process of communicating with research participants and in designing the research to gather useful insights that inform the appropriate framing of issues for public dialogue. A number of valuable insights are offered by the literature, such as the importance of framing science in social context, determining the information required, and the appropriate treatment thereof. These three points are reflected in the discussion to follow.

Framing science in social context

In relation to the topic and framing of public dialogue, audience research should explore the surrounding social context and belief systems around science-related issues, including factors such as contextualised practical knowledge, existing beliefs and values, local history and cultural identity. In relation to issues like climate change, risk assessment and stem cell research, research has shown that these factors provide an inseparable backdrop to people's assessment of the issues and have a greater influence on the reception of messages than scientific information (Davison, Brans & Schibeci 1997; Dunwoody 2007; Ho, Brossard & Scheufele 2008; Irwin & Michael 2003). Audience research findings can therefore inform the

framing of technical information within these social contexts, conveying what biotechnology (for example) means for the participants' lives.

Empirical evidence shows that multidimensional, contextually sensitive framing also has the potential to allay suspicions of incomplete information, thereby engendering trust and respect in the process and preventing potential controversy (Doubleday 2007; Petts 2008: 829-830). Priest (2004) and Doubleday (2007) advise that public engagement exercises limit themselves detrimentally by setting overly narrow terms and side-stepping the wider public issues at play.

Required information according to whom?

Identifying what to communicate about and what scope of information is required is a key part of the information-gathering process in planning participation around science engagement (Glover & Keeley 2009: 3-4). As Johnson (1987: 107-109) points out, communicators often assume that they know what recipients need to know, but lay people may hold different notions of what constitutes pertinent information. Open-ended approaches like ethnographic methods and interactive group discussions in audience research "enable local people themselves [to] prioritize and structure issues rather than passively responding to pre-prepared questions which may be totally unfamiliar and unconsidered" (Irwin & Michael 2003: 104).

Any engagement process needs to be cautious of not providing too much information, which can "overwhelm the analytic capacities of recipients" (Johnson 1987: 108). In addition, engagement processes should not be so open that they lack direction. As Petts (2008: 830) states: "Indeed a lack of control is just as likely to lose people's trust in the process as constrained framing of the questions and issues discussed… A tortuous and skilled path has to be trod in terms of managing a discussion while providing for as open a framing as possible". To guard against overwhelming amounts of information and to provide the necessary direction in subsequent discussions, audience research could help to indicate the key concerns and questions amongst research participants about the science and technology issue at stake (Glover & Keeley 2009: 3-4). For example, it could point to societal questions and conversations surrounding high-risk technologies, which typically include: "'why this

option rather than that one?', 'why here rather than there?', 'who will benefit?', 'who will pay?', 'what if we find a better technology in the future?', 'what will be the environmental impact?', 'who controls it?'" (Petts 2008: 829).

When technical information is expressed within a narrative that meets with the public's definition of the key issues, the distance between expert and lay person is reduced and communication is made more effective.

Treatment: Language, style, format

The challenge of the technical nature of scientific issues applies to the language used in communication, both during audience research and subsequent stages. Technical terms must be translated into simple, accessible language that highlights the relevance of the issues to people's lives, inspires the participation of a range of citizens in engagement processes and suits their capacity for processing information. As Dunwoody (2007: 96) cautions: "audiences who specialise in 'fast and frugal' information processing are poor targets for complex science explanations".

As recommended in one of the WHAT guidelines, audience research can employ interactive techniques that let the researcher observe the language used by participants about the issues. In the science context, Jonsson, Danielsson and Joeborn (2005) used such an approach, in which the research itself involved dialogue. These researchers designed stimulus material which was presented to focus-group participants to gain their input on the issues presented. Audience research can recommend the appropriate language, style and format in which to communicate issues so as to be accessible to a wide range of citizens (Glover & Keeley 2009: 3-4).

These discussions allow the revision of the guidelines developed for public dialogue generally, with the addition of a new guideline specific to the science context. As before, the changes are indicated in italics.

***REVISED* WHAT Guidelines: Framing the issues**

- Explore the range of perspectives and framing of the issues, including participants' opinions, questions and concerns, to inform the inclusive framing-for-deliberation in ongoing discussions.
- *Investigate the social context, practical experience and existing belief and value systems through which technical issues are understood and assessed.*
- Avoid bias *or limiting the scope of issues* by designing questions to start broad and open and gradually focus inwards, framing questions and probing responses in a balanced, open way.
- Facilitate and observe interactive discussions in order to understand how issues are spoken of, what language is used and what values come into play, *in order to convey technical issues in easy, socially relevant, lay terms and accessible language and style.*

4.3.5 HOW: Investigating channels and spaces for public dialogue about science

The final set of guidelines developed in the previous chapter suggest how audience research can conceptualise and investigate the channels, forms and mechanisms of communication through which deliberative public dialogue can take place.

***Recaptured* HOW Guidelines: Investigating channels and spaces for public dialogue**

- Assess communication preferences and possible channels in terms of both dialogue and information dissemination – how to tell, listen, enable interactivity and facilitate existing initiatives.
- Use open-ended enquiry to map the range of existing and potential communication resources, networks and mechanisms through which people receive and send information, then consider their appropriateness for the particular topic, context and nature of audiences.
- In pursuit of inclusivity and diversity in public dialogue, identify communication channels that allow the accessibility and visibility of all languages, cultural contexts and levels of literacy, especially those groups often marginalised.
- Consider the suitability for the given situation of using structured processes for public engagement that allow deliberation, dialogue and the emergence of collective intelligence.

The challenges to science communication point to a number of required responses in communication planning and audience research. The technical and complex nature of science issues gives rise to a particular need to complement deliberative dialogue processes with balanced, honest information about the issues at hand so that participants can express informed, considered opinions. To maintain inclusivity, transparency and social accountability and guard against one-sided persuasive communication, channels and mechanisms are required that enable a multiplicity of viewpoints to be expressed and considered. To avoid the exclusion of relevant actors and overcome the lack of publics' interest, the channels, format and style of communication should aim to attract interest, overcome barriers and trigger involvement. Ideally, participatory platforms will be established to link scientists and end users and account for existing initiatives of communication and action. Selection of methods will also require attention to the skills and willingness of scientists and decision-makers to engage in public dialogue.

The literature on planning public participation processes makes clear mention of determining what kind of engagement is required (Beierle & Cayford 2002: 63-73) and what access the interested public has to different kinds of information or media (Glover & Keeley 2009: 3-4), and identifying appropriate information-elicitation tools for the purpose (Glicken 2000). The question of HOW must be considered in relation to those of WHY – as the purpose of communication will influence the kind of channels required – and WHO – as particular audiences' communication behaviour and preferences must be taken into consideration. As Dunwoody (2007: 92-94) says, "all information channels are not created equal". Qualitative and specifically more in-depth ethnographic research can help to gain insight into the local culture of communication. For example, Irwin and Michael (2003: 103) describe a study that discovered a local culture of robust discussion and sceptical treatment of all sources of information. On that basis the researchers suggested a pluralist approach to public debate rather than presenting any one authoritative source of information. On the other hand, access to media and levels of literacy may be restricted amongst interested stakeholders, such as small-scale farmers, and appropriate contextualised means must be found for ensuring their access to and visibility in the engagement process (FAO 2005: el.).

As discussed in Chapter 3, both monological and dialogical communication can take place through a variety of media, channels and mechanisms. The structured processes to enable deliberative dialogue which are mentioned in Appendix C may apply as well to issues of science. In the science literature, methods for public engagement have been described with terms such as those presented in Table 5.1 below. Priest (1999: 98-99) argues that "public opinion about science is formed most meaningfully in what is sometimes described as a public space, that is, as a result of open and informed interpersonal discussion among citizens".

Table 4-2: Typologies of methods for public engagement in science

Typologies and their authors	**Monologue ----------->---------- Dialogue**		
Continuum of science communication approaches (Dyball & King 2002)	**Information dissemination** (one-way, one-to-many)	**Consultation** (two-way, formal, one-to-one)	**Engagement** (two-way, informal, many-to-one) **Dialogue** (multi-way, informal, many-to-many)
Tools distinguished for participation, consultation, information, and education (Omamo & von Grebmer 2005)	**Information and education**	**Consultation**	**Participation**
Public engagement typology based on nature and flow of info between sponsors and participants (Rowe & Frewer 2005)	**Public communication** (info conveyed from sponsor to public)	**Public consultation** (info gathered from a sample of the public by the sponsor; initiated by sponsor; no formal dialogue)	**Public participation** (info exchanged between public and sponsor; some degree of dialogue, opinions might transform and be negotiated)
	Examples of mechanisms:		
	Brochures, television, posters, science museums	Public hearings, public-opinion surveys, routine opportunities for public comment	Citizen's Jury, consensus conference, community-based participatory research, public petitions, design charettes

In planning communication, the question need not be what communication initiatives need to be initiated, but rather what communication initiatives already exist. For example, in relation to proposed hydraulic fracturing ('fracking') activities in South Africa, there are several sources and forms of public engagement and resistance underway. The oil company Shell facilitated its own round of public consultations, the television programme 50/50 has screened journalistic exposés on the matter, public protests and petitions have taken place, various social-media platforms focus on the issue and brochures have been distributed to a range of audiences. Non-governmental organisations Treasure Karoo Action Group, the Centre for Environmental Rights and Earthwatch Africa have mounted responses of civil legal action and organized resistance, including calls to boycott Shell filling stations. This activity is in addition to the formal application processes in which Shell and other applying businesses and government engage (see Treasure the Karoo 2012).

The guidelines developed in Chapter 3 are therefore equally applicable to public dialogue generally as to public dialogue about science specifically. However, the challenges and context of science require the emphasis of additional considerations, as indicated in italics.

***REVISED* HOW Guidelines: Investigating channels and spaces for public dialogue**

- Assess communication preferences and possible channels in terms of both dialogue and information dissemination – how to *provide balanced, open information, elicit a wide range of views*, enable interactivity and facilitate existing initiatives.
- Use open-ended enquiry to map the range of existing and potential communication resources, networks and mechanisms through which people both receive and send information, then consider their appropriateness for the particular topic, context and nature of audiences.
- In pursuit of inclusivity and diversity in public dialogue *about science*, identify communication channels that allow the accessibility and visibility of all languages, cultural contexts and levels of literacy, especially those groups often marginalised *and those who may at first not express interest in the topic*.
- Consider the suitability for the given situation of using structured processes for public engagement that enable deliberation, dialogue and the emergence of collective intelligence.

4.4 SUMMARY AND CONSOLIDATION OF REVISED GUIDELINES

This chapter has built on the previous one by considering the application of audience research to public dialogue in the context of science policy, planning and programmes which impact on society at large. A number of challenges were identified and discussed, outlining how these are to be taken into consideration when designing and planning communication. It was seen that the challenges have cross-cutting implications for communication and audience research. Each set of guidelines developed in the previous chapter was revisited in light of these challenges and their implications. The guidelines were generally directly applicable to the science context as they are for public dialogue generally. However, the particular challenges of science communication required slight revisions of and additions to the guidelines to emphasise certain issues for attention.

This concludes the development of the guidelines for designing audience research for public dialogue about science. Through the process of analysis in Chapters 3 and 4, we have systematically answered sub-question 3, namely:

> *Based on the findings of sub-questions (1) and (2), what guidelines can be used to evaluate the appropriateness of the design and conduct of audience research for public dialogue about science?*

It emerges that the challenges to communication presented by the science context are reasons for audience research to be designed and conducted with utmost care and awareness of the appropriateness for its intended purposes. Since audience research is itself communication about science, it will need to heed these same challenges in the process of design and conduct, as well as produce useful recommendations for the communication strategy to address the challenges. The intersection of the development communication and science communication fields therefore offers the opportunity for learning that is mutually enriching to each.

The guidelines point to numerous recommendations and questions to be taken up in planning communication. It would be overambitious to explore every one of these within an

applied audience research study with limited time and resources. Rather, they might be taken as indications of important issues to be aware of, but which may require a response more widely than what is in the scope of audience research.

In the next two chapters, these guidelines will be used as a framework for evaluating a case study of commissioned, qualitative audience research conducted for the PUB programme. Chapter 5 introduces and describes the case study with respect to its background, purpose, research design, methods and outcomes. In Chapter 6 the study will be evaluated by applying the framework of guidelines. To close this chapter, the complete set of revised guidelines is presented in Table 4-3 below.

Table 4-3: Guidelines for designing and conducting audience research for public dialogue about science

***REVISED* WHY Guidelines: Clarifying objectives** ▪ Clarify the intended purpose of communication for which audience research is required, considering the range of rationales for public engagement with science. ▪ Determine the intention of the state or other relevant authority to respond to and incorporate public input in decision-making. ▪ Consider the relative value and feasibility of public dialogue and information dissemination strategies for the particular context, issue and available resources. ▪ Investigate various stakeholders' motivations for communicating about issues and explore how the lay public's motivation to participate can be enhanced. ▪ Define the purpose and role of audience research within the broader communication programme and note any ethical considerations thereof.
***REVISED* GENERAL Guidelines: Overall research design** ▪ Promote active participation of stakeholders in communication-strategy design and implementation. ▪ Consider audience research as one step in an ongoing process of communication, not a tool to determine conclusive public opinion, emphasising that ongoing communication processes are required for reaching informed opinions. ▪ Employ multiple methods, reflexivity and broad participant-selection to optimise inclusivity and minimise the influence of a priori assumptions, bias and power differentials, particularly in acknowledgement of the complexity and uncertainty of scientific issues. ▪ Use open-ended methods to uncover participants' language use, values and framing of issues in the context of their daily lives.

- Allow time and interactivity in the research process for participants to consider a balanced range of simply stated views, consider both risks and benefits, develop opinions and pose questions and concerns.

***REVISED* WHO Guidelines: Understanding communication participants**

- Recognise audiences as active, diverse, contributing stakeholders, where citizens, representative civil society groups, decision-makers, technical experts and the state are all considered participants with varying roles in public dialogue.
- Map the multiple stakeholders in a system of dialogue including the web of interactions, areas of divergence and alliance, existing communication networks and power dynamics amongst them.
- Identify who are considered trusted sources of information amongst technical experts from a range of relevant disciplines, including social scientists and activists, and explore their preparedness for public dialogue about science.
- Investigate the range of variables that influence participants' potential role in public dialogue about science, such as their interests, values, concerns, technical aptitude and situated expertise in relation to the issue.
- Systematically use these communication variables to propose audience segments or stakeholder groups in relation to the purpose and topic, with awareness of the possibilities and limitations of various methodological approaches, and a commitment to continued revision and inclusivity.

***REVISED* WHAT Guidelines: Framing the issues**

- Explore the range of perspectives and framing of the issues, including participants' opinions, questions and concerns, to inform the inclusive framing-for-deliberation in ongoing discussions.
- Investigate the social context, practical experience and existing belief and value systems through which technical issues are understood and assessed.
- Avoid bias or limiting the scope of issues by designing questions to start broad and open and gradually focus inwards, framing questions and probing responses in a balanced, open way.
- Facilitate and observe interactive discussions in order to understand how issues are spoken of, what language is used and what values come into play, in order to convey technical issues in easy, socially relevant, lay terms and accessible language and style.

***REVISED* HOW Guidelines: Investigating channels and spaces for public dialogue**

- Assess communication preferences and possible channels in terms of both dialogue and information dissemination – how to provide balanced, open information, elicit a wide range of views, enable interactivity and facilitate existing initiatives.
- Use open-ended enquiry to map the range of existing and potential communication resources, networks and mechanisms through which people both receive and send information, then consider their appropriateness for the particular topic, context and nature of audiences.
- In pursuit of inclusivity and diversity in public dialogue about science, identify communication channels that allow the accessibility and visibility of all languages, cultural contexts and levels of literacy, especially those groups often marginalised and those who may at first not express interest in the topic.
- Consider the suitability for the given situation of using structured processes for public engagement that enable deliberation, dialogue and the emergence of collective intelligence.

Chapter 5: The case of commissioned audience research for the Public Understanding of Biotechnology (PUB) programme

5.1 INTRODUCTION

The previous two chapters led to the creation of a framework of guidelines for designing and conducting audience research for public dialogue about science. This framework will be applied to a case of applied audience research in the next chapter. The present chapter takes a step back from the analytical process to describe that case, a commissioned qualitative audience research study conducted by the researcher in 2007 for the Public Understanding of Biotechnology (PUB) programme, which was briefly introduced in Chapter 2, and which will be referred to in short as the PUB study. To recall the definition developed in Chapter 1 (section 1.5.5), commissioned research can be described as:

> *Specific research carried out as a paid service on formal appointment by a public authority in response to a particular real-world situation and which forms the basis for informing the planning, development and implementation of a particular programme or policy.*

The present chapter introduces the PUB programme and its objectives, the background to the commissioning of audience research and the purpose and research questions of the PUB study. The study presented particular challenges which were noted at the time (and will be described here) and a suitable research design was sought which would deal with these challenges. From an overview of the research design employed in the PUB study, the research methodology is then laid out step by step, stating the rationale and outcomes of each and also noting important issues that arose during implementation. In addition, a summary of the outcomes of the study is given.

The content of this chapter is drawn from the PUB website (SAASTA 2012), research reports produced for the study, the researcher's experiential knowledge of the study as captured in

the project file and on the feedback given by the client and other stakeholders on completion of the study.

5.2 PUB: THE PUBLIC UNDERSTANDING OF BIOTECHNOLOGY PROGRAMME

In Chapter 1 the following definition was formulated for biotechnology:

> *Biotechnology is a broad term referring to the development, application and (where applicable) commercialisation of technologies that use biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use. The term includes traditional and modern biotechnology (the latter involving genetic manipulation) and encompasses agricultural, medical, industrial, environmental and food-processing applications.*

The PUB programme is a public-communication programme initiated in 2003 by South Africa's Department of Science and Technology. PUB is implemented by the science communication Unit of South African Agency for Science & Technology Advancement (SAASTA), a business unit of the National Research Foundation (NRF). The programme's website can be visited at www.pub.ac.za (SAASTA 2012), although it must be noted that its content, understandably, has changed since the time of the commissioned study in 2007.

PUB is one of the instruments through which South Africa's National Biotechnology Strategy (NBS) (South Africa 2001) is implemented. The NBS demonstrates the South African government's commitment to biotechnology as a major tool to facilitate economic growth and improve quality of life. At the same time the government recognises its responsibility to ensure that new biotechnology developments are not harmful to the environment or human life, nor undermine ethics and human rights (South Africa 2001: v, 5, 33-36). The NBS espouses the belief that public understanding and acceptance are essential for the responsible development of this technology, which is expected to have an increasing impact on people's lives. PUB is officially tasked with the implementation of this public-awareness aspect of the strategy.

The PUB programme's stated aims are not to promote biotechnology, but rather to:

- Promote broad public awareness and balanced understanding of the potential of biotechnology, including the scientific principles and related ethical, moral and social issues; and
- Create meaningful opportunities for public dialogue and debate on current and potential biotechnology applications within our society to enable informed decision-making (SAASTA 2012).

Whereas the other instruments of the NBS act as platforms to facilitate the advancement of biotechnology innovation and commercialisation, PUB differs in that it is intended to have an independent role and neutral mandate and to operate at 'arm's length' from government (SAASTA 2012). Whether this is in fact possible, given the institutional context, was a question raised in the commissioned study.

SAASTA has recognized that the PUB programme faces a number of challenges in South Africa, including: "diversity of people and culture, remote rural areas, eleven official languages, illiteracy and poverty, infrastructure and no 'history of dialogue'" (SAASTA 2012: el.). After PUB's initial three years of communication activities targeted at educators and learners, the decision was made in 2006 to extend the intended audience to include 'the general public' so as to engage people at all levels of society, involve multiple stakeholders and build capacity in communicating this complex issue (SAASTA 2012: el.). This shift in focus led to the commissioning by SAASTA of audience research in order to guide the design of such a communication strategy.

5.3 THE COMMISSIONING OF QUALITATIVE AUDIENCE RESEARCH FOR PUB

This section describes the commissioning by SAASTA of qualitative audience research for the PUB programme. It states the purpose of the study and highlights some of the research challenges that were recognised at the start and which needed to be addressed in the research design.

5.3.1 Background and implementation of the commission

Recognising that 'the general public' is too broad an audience to target, SAASTA decided to commission a qualitative audience research study to inform its communication strategy. This research was intended to complement the findings of a large quantitative survey conducted in 2004 by SAASTA and the Human Sciences Research Council (HSRC) to gauge public opinion and awareness of biotechnology (Rule & Langa 2005). It was requested by SAASTA at the outset that the PUB study use qualitative methods and specifically focus group discussions. The survey questionnaire, tables of raw data and a brief report of findings of the quantitative survey (Rule & Langa 2005) were made available as a basis for this qualitative research, although it was not expected within the scope of the study to conduct a full analysis of the survey findings.

The researcher submitted a proposal to conduct the study and was awarded the contract. For the duration of the research project, from July to November 2007, she immersed herself in the organization, in particular the science communication Unit, and worked in an office on their premises. This let her maintain close communication, both formal and informal, with the PUB team, involve them in various ways at all stages of the study and gain insight into the dynamics of their work. A research assistant was appointed during the fieldwork phase to help facilitate focus groups in various languages.

5.3.2 Purpose of the commissioned PUB study

The stated purpose of the PUB study was: "to identify and analyse target audiences as participants in biotechnology communication, seeking to understand their perceptions, information needs and preferred communication channels" (Kruger 2007b: 9). Through an interactive process between the researcher and the PUB team, this main aim was broken down into a set of research questions (included as Appendix D). These questions relate to:

- Identifying the range of stakeholders in the biotechnology arena and understanding their communication efforts.

- Identifying who the South African public is in relation to biotechnology, then segmenting this audience and recommending which segments to prioritise as participants of biotechnology communication.

Then, for these segments, the study was required to gain an understanding of:

- Their existing knowledge, questions and concerns about biotechnology, as well as the contextual influences on these.
- Preferred channels through which to engage (both to receive messages and send feedback) as well as trusted sources of information.
- How to frame priority issues to motivate the participation of audiences and render messages relevant, understandable, trustworthy, and useful.

It was intended that the findings, together with the findings of the earlier quantitative study, would ultimately guide the design of a targeted communication strategy in line with PUB's objectives and principles.

5.3.3 Approach to the research challenges

Given the purpose of the study and with a preliminary reading of literature and the surrounding context, a number of challenges were recognised which informed the approach taken to the design of the research. This approach was set out in the initial proposal to SAASTA and in the final research report. It is summarised here:

- Biotechnology was understood to involve a wide range of political, economic, social, scientific and ethical considerations. The study aimed to understand the matter in its complexity and take a multidisciplinary and contextualised perspective on the subject.
- It was acknowledged that biotechnology debates are multidimensional, complex and can be emotionally and politically charged. In keeping with the neutral and balanced mandate of PUB, the research was undertaken with a conscious commitment to neutrality, such as in the framing of research questions and selection of participants. It did not presuppose that any specific view of biotechnology is better than another.

- Given that the quantitative survey indicated that 8 out of 10 South Africans know nothing about biotechnology, a key challenge was: How do we ask people what they think about something they know nothing or little about? And if we are to tell them what biotechnology is, how do we do so without leading and biasing their responses? An appropriate research design was required to respond to this challenge.
- It was emphasised that this research and participants' responses should be considered not the end but the beginning of a continued dialogue which would be able to yield richer opinions once participants were better informed through awareness efforts.

How these challenges and the corresponding approach translated into the research design is described further in the following section.

5.4 RESEARCH DESIGN AND METHODOLOGY IN THE PUB STUDY

As already mentioned, the use of a qualitative approach and of focus group discussions was requested at the outset by SAASTA. This choice was driven by the need to acquire in-depth understanding of respondents' perceptions and communication preferences, complementing the findings of the quantitative survey previously conducted. Based on the purpose of the study, the research questions, the challenges identified and the time available, the research design described in this section was developed and implemented.

5.4.1 Overview of research design and description of methods

The qualitative study used a phased approach. The first phase consisted of a planning workshop with the PUB team, a desktop research (or document review), and a series of semi-structured, open-ended interviews with stakeholders. An analysis of the findings of this phase led to an initial segmentation framework which was presented to the client for feedback. The second phase focused on the design and conduct of focus group discussions with groups selected on the basis of the initial segmentation framework. The findings of both phases of research were coded, analysed and written up in a draft report. Based on feedback from the client, the report was finalised and accepted. Figure 5-2 (Kruger 2007b: 16) below provides an overview of the steps followed in the research process. The research

methodology is then explained step by step in more detail by means of Table 5-1 which follows.

Figure 5-1: Overview of the research process for the PUB study

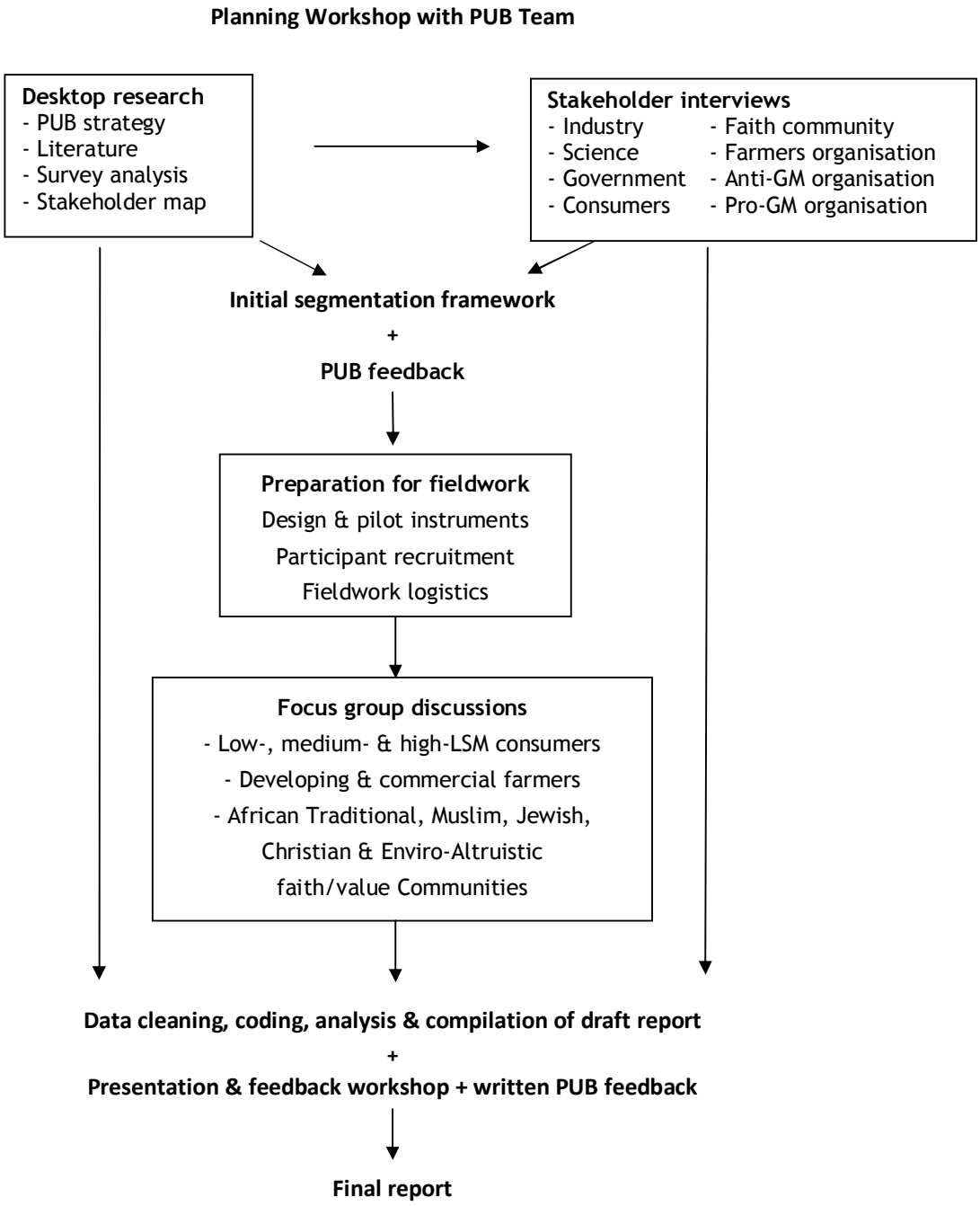


Table 5-1: PUB audience research methodology

Steps in research process		Outcomes	Rationale of method at the time	Issues arising in implementation
1	**Research planning workshop with members of PUB team**	A participatory workshop leading to: - A shared, clear understanding of the research objectives, background and issues at stake - A set of research questions - Brainstorm analysis of the biotechnology scene and various stakeholders - Agreed norms for collaboration and reporting	Creates a shared foundation and clear expectations for working together An opportunity to 'interview' the client as informant and begin with what they know and don't know Close client-involvement facilitates understanding, 'ownership' and use of research findings	PUB team not familiar with social science and qualitative methods. Researcher not very familiar with biotechnology Disciplinary differences indicate potential for misunderstanding and need for clear communication
2	**Desk research**	Overall outcomes for sub-steps below: - Inform selection of interview respondents - Initial audience segmentation framework - Inform selection of focus-group participants - Inform further research design decisions	The findings of this phase of research inform decisions for the next stage. An initial segmentation of audiences informs the populations from which the focus-group participants will be drawn	
2.1	Familiarisation with PUB strategic documents and communication materials	Situates this research within PUB's broader objectives and strategy Understanding of PUB's communication objectives provides some basis for identifying and segmenting audiences	Again, facilitates use and relevance of research findings Allows research design to 'talk to' their objectives	PUB's strategy did not articulate the ultimate desired impact or benefit of greater biotechnology awareness amongst the public: makes segmentation difficult

Steps in research process		Outcomes	Rationale of method at the time	Issues arising in implementation
2.2	Literature review	Gained insights about: - Biotechnology basics - Theory and practice about public engagement with science and biotechnology communication - Audience research and segmentation methods - Communication-strategy design	Acknowledgement of influences in literature selection: - Researcher's social science and development studies background - UK scholarship on science and citizenship and experiences of public dialogue in science. - US strategy guidelines for health-communication programs (NCI) - Audience segmentation: Slater, OCC, Grunig's Situational Theory of Publics, Living Standards Measure	Very short time available. Limited review. Little qualitative audience research material found
2.3	Rapid thematic and demographic analysis of 2004 PUB/HSRC Quantitative Survey. Sources: - Data tables presenting findings for demographical variables and biotechnology responses - Report with some analysis by HSRC's Rule and Langa (2005) - Additional cross-tabulations requested from HSRC	Not in scope of this study to statistically analyse the survey A rapid descriptive analysis indicated possible audience segments and themes relating to biotechnology Limitations of the survey and areas for further qualitative investigation were identified		Noted important areas of relative strength in qualitative versus quantitative approaches. Report provides opinion on "Limitations of Survey" Statistical cluster analysis is required to understand fully the complex relationships between variables
2.4	Stakeholder mapping, drawing on desk research and PUB team's experience	Identified the range of stakeholders already actively engaged in biotechnology; With PUB, created a list of contact persons amongst stakeholder groups as potential interview respondents	To include a broad range of relevant participants in the stakeholder interview stage of research	Individual contact persons selected as interview respondents cannot be considered representative of that whole stakeholder group to which they belong

Steps in research process		Outcomes	Rationale of method at the time	Issues arising in implementation
3	**Stakeholder interviews** plus participant observation and informal interviewing at a public event organised by a stakeholder Respondents from the following stakeholder groups: - Anti-GM lobby organisation - Farmers' organisation - Faith community - Government and publicly funded organisations - Pro-biotechnology organisation - Academic biotechnology science community - Consumer-rights organisation - Private industry	Semi-structured interviews explored: - Who are stakeholders in biotechnology scene? - What are they communicating to the public? - Through what channels do they communicate and receive feedback? - To whom are they communicating? - What motivates them to communicate about biotechnology? - What lessons can be learned for communicating with the public about biotech? (See full interview guide in Appendix E)	Purpose of stakeholder interviews: - Understand the biotechnology scene and debate through input of diverse role-players - Understand existing biotechnology communication amongst stakeholders and their audiences: their values, motivations, networks, channels, challenges, etc - Relate PUB's role and strategy to this bigger picture of biotech conversations at play - On this basis, design FGD guide with jargon-free language and inclusive of diverse perspectives on biotechnology, thereby reducing bias in framing of questions - Build trust in the research process and PUB as a whole. Belief that stakeholders will be more willing to participate in PUB-led dialogue if their input is heard in its planning	Used opportunity of public breakfast meeting as a naturally occurring communicative event to observe Selection of respondents led by convenience and availability –not intended to cover full spectrum of stakeholders
4	**Initial segmentation framework**	Based on above steps, integrating theoretical insights, survey findings and stakeholder interview findings: an initial segmentation framework was established. Interim report submitted for feedback	Issues that meet with high problem-recognition and issue-involvement and low constraint-recognition (based on Grunig 1989) are found to be food (and its relation to health and environment) and values	Difficulties and limitations recognised in methodology for development of segmentation framework

Steps in research process		Outcomes	Rationale of method at the time	Issues arising in implementation
5	**Preparation for focus group discussions**			
5.1	Design and pilot instruments	Developed and refined a focus group discussion guide for use in all focus groups See discussion guide in Appendix F-1 Two pilot discussions held to test and refine guide	A key instrument in the research design. A questioning strategy had to gauge participants´ own perceptions and language usage around biotechnology and avoid leading or biasing responses with the researcher's own framing of issues	
5.2	Participant selection and recruitment Groups defined as: commercial farmers, developing farmers; Muslim, Jewish, Christian and enviro-altruistic faith/value groups; low, medium and high LSM (Living Standards Measure)	Identification of accessible groups representative of audience segments (one focus group per segment) Invited people to participate in focus group discussions by means of telephonic contact and written introduction	Combination of (1) purposive and (2) convenience sampling in that (1) specifically required people with characteristics of audience segments, and (2) relied on existing networks and organisations to assist in arranging groups and recruiting participants	Avoided telling people what biotechnology is so as not to prime responses Encountered generally reluctant response to invitation as people did not consider the topic relevant or their knowledge thereof valuable. Confirms challenge of low issue involvement
5.3	Fieldwork logistics	Arrangement of venues, participant transport, researcher transport and accommodation		
5.4	Researcher preparation	Research assistant appointed Both researchers personally prepared and trained in standardised facilitation strategy, and clear data-collection and recording protocols Pilot served as training for researchers		Important for researchers to recognise their own prior opinions and views on biotechnology so as to allow reflexivity and minimise bias

Steps in research process		Outcomes	Rationale of method at the time	Issues arising in implementation
6	**Focus group discussions conducted**	Focus groups facilitated according to discussion guide Written informed consent obtained from participants Discussions were recorded for later transcription and process notes taken		
7	**Data cleaning, coding, analysis and compilation of report**	- Discussion recordings transcribed verbatim and transcriptions checked for clarity - Researchers brainstormed findings and shared reflections and interpretations - Coding scheme developed according to research questions and themes arising - Interview and focus-group data coded by applying thematic categories to the text - Coded data collated and analysed - Comprehensive report developed and submitted as discussion draft	A rigorous process of data analysis was important in accounting for sound findings and logically developed conclusions Report is structured according to research questions and concludes with recommendations for audience segmentation and PUB´s communication strategy	Long report provides comprehensive insights but limits wider readability
8	**Presentation and feedback workshop**	After submission of draft report, PUB team, SAASTA director and DST representative invited to give feedback on findings Researcher gives presentation and facilitates discussion	A workshop at end of research process is intended to bring clients´ insight into the final report and assist their understanding and use of the findings	A number of important strategic issues were raised by the research
9	**Finalisation of report**	Feedback incorporated into final report		

5.4.2 Selection of participants

Participants in the PUB audience research study were selected and involved in a phased manner. This first level of interaction was with the members of the PUB team at SAASTA in a research planning workshop. Then interviews were conducted with a range of stakeholders as identified through a stakeholder mapping process based on a desktop review and suggestions made by the PUB team. This stage led to a preliminary segmentation framework consisting of broad population segments. These segments were the basis for the selection of focus group participants, with one focus group conducted per segment. Participants were selected through a combination of purposive and convenience sampling. Focus groups took place in Gauteng, Kwazulu-Natal, Free State, and North West Province, and were conducted in English, Afrikaans, Zulu and translation from Sotho and Tswana. The details of all these participants are provided in the table below:

Table 5-2: Participants in PUB study

Step in research process	Number of participants	Background
Research planning workshop	3	Members of the PUB team at SAASTA
Stakeholder interviews and participant observation at public event	11	8 stakeholder groups: Anti-GM lobby network, African farmers union, faith-based environmental organisation, Department of Science & Technology, pro-biotechnology lobby group, university-employed geneticist, consumer organisation, private biotechnology company
Focus group discussions	76	Faith/value groups: African traditional religion, Christian, Muslim, Jewish, Enviro-Altruistic. Consumer groups: Low LSM, Middle LSM, High LSM. Producers: developing farmers, commercial farmers.
Presentation and feedback workshop	8	SAASTA, including Director, PUB team, other members of science communication Unit; Department of Science and Technology

5.5 SUMMARY OF OUTCOMES OF THE PUB STUDY

An assessment of the effectiveness of a study´s methodology can be made by examining the study´s outcomes against its purpose. Detailed findings and recommendations from the PUB study were presented, firstly in a draft report and discussion workshop, and then in a final report to SAASTA. This report is not accessible in the public domain but can be made available on request. Through the researcher's own admittance in the report and in feedback given at the workshop, a number of strengths and limitations of the research were noted. An executive summary, included as Appendix G, succinctly captures the findings and recommendations which emerged from the research. In essence, the findings concerned the following.

The study was considered valuable for offering in-depth insights into the challenges of public engagement about biotechnology and strategic guidance for the PUB programme. It encouraged SAASTA and DST to clarify the ultimate objectives of public engagement with biotechnology and the state's willingness to respond to public input. It also offered a number of motivations for participation as expressed by research participants. The inclusivity of the study's approach helped to build relationships and encourage interest and further involvement in biotechnology dialogue. Recommendations were made to PUB about its role in facilitating such dialogue, which would include taking a neutral and multidisciplinary approach, collaborating with other stakeholders, and establishing a direct channel between government and citizens.

Detailed findings were provided regarding existing knowledge of biotechnology, including experiential and indigenous knowledge. Participants' questions, concerns and interests about biotechnology were detailed, as well as their suggested framing and prioritisation of issues. The findings also included recommendations for communication channels that would allow information, education, interaction and dialogue, as well how participants would judge the trustworthiness of sources of information.

The study is limited in that the responses cannot be considered representative of the broader public. The study was also unable to produce clearly defined audience segments. A

tentative and non-exhaustive segmentation framework was provided, a number of possible segmentation variables were identified and further statistical analysis of the quantitative survey was recommended. The report emphasised that the findings should not be considered as conclusive public opinion but as guidance for effective communication in an ongoing, inclusive process of interaction between the public, stakeholders and government as participants in deliberative public dialogue.

5.6 CHAPTER SUMMARY

This chapter has presented the case of commissioned qualitative audience research conducted for the PUB programme. The context, purpose, research methodology and summary of the outcomes of research have been described based on reporting at the time of the study. This background will be referred to in the following chapter, where the PUB study will be evaluated against the guidelines presented in earlier chapters.

Chapter 6: Evaluation of the Case Study

6.1 INTRODUCTION

Guidelines were developed in Chapters 3 and 4 for designing and conducting audience research for public dialogue about science, and the PUB study was described in Chapter 5 as a case of commissioned qualitative audience research. The task of the current chapter is to critically evaluate the design and conduct of the PUB study by applying the guidelines in the form of an evaluation framework.

Although an evaluation of the PUB study could potentially be a standalone study of significant proportions, this chapter sets boundaries in order to remain within the scope of a Masters dissertation and to fulfil the purpose of this study: that is, to propose how audience research should be designed and conducted for programmes that aim to facilitate public dialogue about science. As described in the research design in Chapter 2, the scope of evaluation has been specified as a theoretical evaluation 'on paper' with a focus on fitness for purpose or, in other words, the appropriateness of the research design for its intended use and context. The development of guidelines has focused on this dimension, while acknowledging other important dimensions of quality in applied research, such as scientific rigour, cost-effectiveness, and ethical and relational aspects (Boaz & Ashby 2003; Furlong & Oancea 2005; see section 2.3.3). While the PUB study can certainly be scrutinised along those other dimensions, it is not the focus of this study to do so.

The focus of this chapter is further contained by specifying how these guidelines are to be applied as an evaluation framework to the PUB study. As set out in the requirements in section 2.4.2, the guidelines are formulated as suggested actions and considerations that can be used both in designing audience research and in evaluating such design. The latter purpose is demonstrated in this chapter. The evaluation process, on the one hand, entails judging the adequacy of the design and implementation of the PUB study for its intended purposes. This is done by assessing the presence or quality of the actions or considerations suggested by each of the guidelines. On the other hand, the evaluation involves reflecting on

what additional lessons can be learned from the case that can further contribute to fulfilling the study's purpose. The process thus combines a judging approach with a learning approach to evaluation, as introduced in 2.3.3. This chapter therefore answers sub-question 4:

> *Applying these guidelines to a case of commissioned audience research for the Public Understanding of Biotechnology programme, (i) to what extent was its design and conduct appropriate to the goal and context of the programme, and (ii) what lessons does it offer?*

The analysis undertaken in the evaluation process creates dialectic interplay between the evaluation framework, developed from the literature, and the empirical experience of the PUB study. For the latter, the discussions will refer to the description of the case provided in Chapter 5 as well as additional sources of evidence including documents (such as the PUB website, research reports, and feedback from SAASTA, the commissioning agent) and participant observation (drawing on the researcher's experience and the project file as a journal of the research process). The discussion focuses on information about the purpose and context of the study and, principally, about the research design and methods. It will selectively refer to the outcomes of the study (the findings, recommendations and client's feedback) only to the extent that these reflect on the purpose, process and principles of the study.

Following this introduction, the remainder of the chapter is structured by the five sets of guidelines – WHY, GENERAL, WHO, WHAT and HOW – which are applied in turn to the PUB study. Each section starts with a reminder of the significance of that element of audience research design and the intention of the guidelines in relation to public dialogue about science. The guidelines are then presented and applied to the PUB study in a format most appropriate for the discussion: usually individually, sometimes grouped, and in a relevant sequence. This is considered acceptable in terms of the requirement that guidelines be applied critically and with flexibility to the particular case. The full set of guidelines can be seen by referring to Table 4-3 at the end of Chapter 4. Reflections and conclusions are drawn about the design of the PUB study and the application of the guidelines in one overall discussion at the end of the chapter.

6.2 WHY: CLARIFYING OBJECTIVES

In developing the WHY guidelines, it was pointed out that clarifying the objectives of communication is an important first step in designing and conducting audience research and planning a communication strategy. The goal, context and intended use of the study's findings will influence other elements of communication and should guide the way in which audience research is designed. The four WHY guidelines were based on different aspects of the question "Why are we doing this?" Given the challenges of communicating about science and the range of rationales for doing so, it is particularly important to clarify upfront the objectives for communication.

In the text below, the PUB study is considered against the guidelines.

6.2.1 Guidelines 1, 2 and 3: Purpose of communication and audience research

The assessment against the first three WHY guidelines is combined in one discussion as these are closely related and were addressed as such in the PUB study.

- Clarify the intended purpose of communication for which audience research is required, considering the range of rationales for public engagement with science.
- Determine the intention of the state or other relevant authority to respond to and incorporate public input in decision-making.
- Define the purpose and role of audience research within the broader communication programme and note any ethical considerations thereof.

a) Process

The issues highlighted in the above three guidelines were given significant attention in the PUB study. This is reflected in the final research report for the study, where most of the first chapter is dedicated to describing the broader context and purpose of the research, with background sections on the PUB programme's purpose and institutional context, the purpose and role of audience research within the programme, and a reflection on the range of reasons for public engagement with biotechnology titled "Why engage the public

anyway?" It also makes the purpose of the study explicit by setting out clearly the research objectives, research questions, the approach to research design and the ethical considerations. Addressing the WHY questions were an integral part of the research process, as explained below.

The early steps in the research process emphasised clarifying the objectives of the research and of the communication programme in close consultation with the client. This consultative approach was intended to establish a mutually agreed foundation, situating the research within the programme's broader strategy and optimising its usability. This was carried out through a planning workshop held with the members of the PUB team and by reviewing the programmes' strategic documents. In addition, the researcher was based in the SAASTA offices for the duration of the study, in order to have frequent interaction with the PUB team. On completion of the project, the client noted as a strength of the study that it took place "close to home", and considered this a positive practice which should be strived for in future commissioned research projects. Indeed, effective communication between the client and researcher at the start of audience research appear crucial to addressing the WHY questions.

b) Objectives of communication

A key consideration which guided the design of the PUB study was the communication objectives and principles of the PUB programme. As stated on the website (SAASTA 2012: el.) and in the previous chapter, the aims of the PUB programme are to:

- Promote broad public awareness and balanced understanding of the potential of biotechnology, including the scientific principles and related ethical, moral and social issues; and
- Create meaningful opportunities for public dialogue and debate on current and potential biotechnology applications within our society to enable informed decision-making.

These aims, along with the programme's guiding principles (SAASTA 2012: el.), set the combined goals of promoting broad awareness, balanced understanding and public dialogue about biotechnology, rather than promoting biotechnology *per se* or prescribing any particular viewpoint. This suggests a need for both information dissemination and

participation, in line with the complementary approach discussed in earlier chapters. However, the researcher found that the programme strategy did not clearly define what the intended impact of this improved awareness and understanding is, what the point of public dialogue would be, or what opportunities exist for informed decision-making, nor by whom and about what decisions can be made. Thus, a gap appeared to exist in the programme's definition of PUB's ultimate objective. At the time the researcher stated this as a limitation of the study, but set out to help to fill this gap through the research.

c) Rationale for public engagement with science

Determining the rationale for public engagement underlying the PUB programme, as suggested by the first guideline stated above, was not an explicit step in the research design but was an underlying consideration throughout the process. The stated intention that PUB should follow a balanced, neutral mandate suggests a democratic participatory model, which largely guided the approach to audience research adopted by the researcher. However, the programme's institutional context imparts a rationale – of promoting public acceptance and attracting learners to science careers – that is more akin to a scientific literacy model. It arose during the study that PUB is constrained in its neutrality by its inseparable relationship with the National Biotechnology Strategy, the Department of Science and Technology and SAASTA, all instruments of a government which holds that responsible biotechnology and people's acceptance thereof is good for South Africa and which aims to promote it actively. This point makes the valuable suggestion to look to the programme's institutional linkages for insight into the rationale for public engagement.

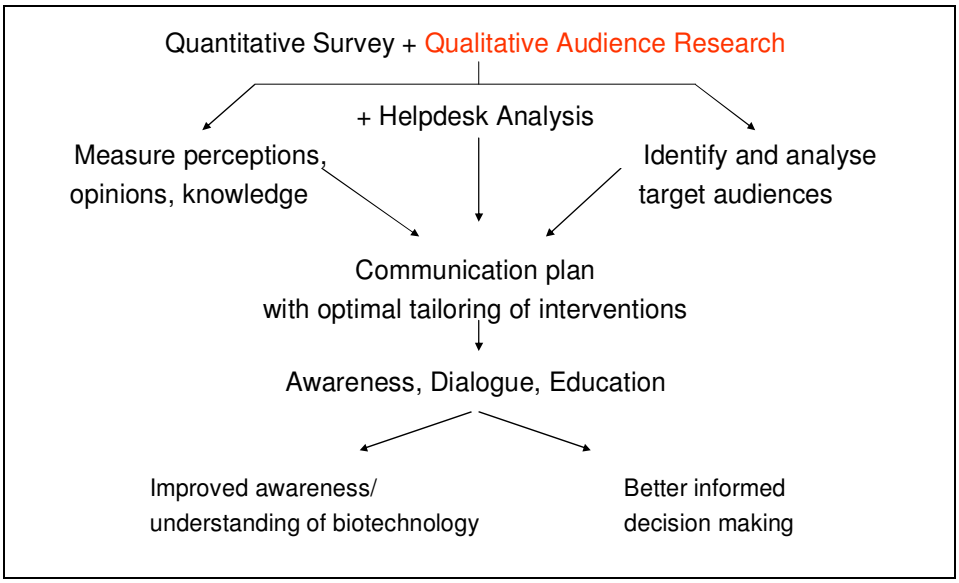
By asking questions about the broader objectives and rationales of the PUB programme, the study was able to highlight important issues for SAASTA and the Department of Science and Technology (DST) to consider in relation to the strategic direction and future design of the PUB programme. This was considered by the client to be one of the study's important contributions and raised significant debate at the final presentation and feedback workshop. Those involved in the programme were urged by the study to question and clarify the reason for PUB's existence, the ultimate objectives of communication, the willingness of DST to engage the public, the possibility of PUB's neutrality and SAASTA's approach to science

communication (Kruger 2007b). However, the lack of clarity around these issues was likely a constraining factor that may have limited the usability of the PUB study.

d) Purpose of audience research

With regards to the guideline to clarify the purpose and role of audience research within the broader communication programme, the role of the planning workshop and review of strategic documents has already been described. Based on these, the researcher produced a diagram in the PUB research report to depict the stated role of audience research within the planning and implementation of the PUB programme, reproduced here as Figure 6-1 to illustrate.

Figure 6-1: PUB's Research-Implementation Plan
(Kruger 2007b: 11)



According to the terms of the commission, the qualitative audience research was to be carried out within a determined timeframe leading to the handover of a report and the subsequent departure of the researcher from the process, leaving the design and implementation of the communication strategy up to the client. These circumstances put pressure on the report to convey all the insights gained from the research, and on the reader to interpret and use them. A more continuous relationship would be most valuable, which allows the researcher to walk with the client further into communication-strategy design and implementation.

The purpose of the research was also captured in an extensive set of research questions developed in consultation with the PUB team (included as Appendix D). Here the PUB study can be criticised for having been overambitious given the time and resources available, the skills and experience of the researcher and the limited ability of any research method to discover and construct knowledge. This pertains particularly to the expectations around audience segmentation, discussed in section 6.4.4. It was noted at the feedback workshop and in the final research report for the PUB study that the depth of the study's findings was limited by the broad scope of research questions.

e) Ethical considerations

Given the politically charged and controversial nature of biotechnology and the potential for commercial interests in the findings (as discussed in section 4.2.3), in clarifying the purpose of audience research it is important for researchers to consider the ethical implications of their work, lest it be used manipulatively as "audience intelligence" (Mody 1990: 121). In the case of the PUB study, the researcher was aware of such complexities from the start. The agreements set out in the proposal (Kruger 2007a: 9) included the following statement: "The consultant proposes to undertake this work based on a personal and professional ethic of commitment to neutrality in the biotechnology debate, as described in the PUB programme's guiding principles. Should there be any interest and/or influence by industry or government in particular results being accentuated or obscured, the consultant will consider withdrawal of her involvement and would like to maintain ownership of data in this case".

Based on the above discussion, the PUB study fared well on these three guidelines and demonstrated the importance of asking these WHY questions at the outset of undertaking audience research. The next guideline suggests that audience research look beyond the sponsoring agent's intended objectives for communication to that of other stakeholders.

6.2.2 Guideline 4: Stakeholder motivations

The fourth WHY guideline to be applied to the PUB study is the following:

Investigate various stakeholders' motivations for communicating about issues and explore how the lay public's motivation to participate can be enhanced.

Before discussing this guideline against the PUB study there is a need to clarify the use of terms. In this guideline, the word stakeholder is used broadly to refer to all potential participants in communication, as in the sense used by Bessette (2004) and as discussed in section 3.5.1. However, the PUB study referred to two sets of communication participants: (1) stakeholders, denoting organisations and networks already actively involved in biotechnology communication; and (2) audience segments in the South African general public. It was conceptualised that some publics might already be associated with one or more stakeholders, such as farmers who might engage with a farmers' association, a seed company and a Christian church. These two sets of participants were the populations from which research participants were selected for interviews and focus group discussions respectively.

The suggestions of this guideline are present in the research questions developed for the PUB study, which included, for actively involved stakeholders, What motivates them to communicate about biotechnology? And for segments of the public, Why would they participate in biotechnology debate? These questions were investigated through various steps in the research design, as detailed below, and suggestions were made for how participants could be attracted to communication about biotechnology.

- At the initial planning workshop, the researcher and the PUB team did a 'brainstorm' about the biotechnology scene, which identified the range of reasons that existing stakeholders and some publics are actively communicating about biotechnology-related issues.

- Stakeholder interviews explored each selected organisation's position on biotechnology, what message about biotechnology they communicate to the public, what drives and motivates their work, and why they think the public should get involved in communication about biotechnology. Thus, motivations for participation were understood in terms of both "invited and invented spaces" (Cornwall & Gaventa 2001), considering what stakeholders and their publics are already communicating about, in addition to mechanisms for communication and participation initiated by the state.

- In focus group discussions, participants' motivations and interests were explored by asking what excites and concerns them about the various biotechnology applications, asking them to rank the applications in order of interest, and by probing their reasoning for this ranking. Motivations were also explored through the question, "If there was something about biotechnology (on television, radio, or in a conversation on the bus, for example) what would make you stop and pay attention to it?" Motivations were also revealed through asking what important biotechnology issues need to be spoken about, and what participants consider their role in such discussions to be.

The outcomes of these steps in the research, combined with what the literature tells about reasons for public dialogue in other parts of the world, were used to provide the PUB programme with a range of reasons why the public might consider it important to engage in biotechnology, as well as how they could be attracted to doing so.

Thus, the PUB study addressed the suggestions of this guideline well. In addition, reflection on this guideline suggests that asking WHY can be an iterative process in audience research, which evokes the concentric Spheres of Audience Research (Figure 3-2). WHY can be asked at the outset of research to understand the broader communication context and purpose of audience research (outer circle) and to influence the overall research design (middle circle). Exploring other stakeholders' motivations can be located at the inner circle of the spheres of audience research. This knowledge may in turn inform the outer circle by refining the broader communication objectives based on broader motivations for participation. In the case of the PUB study, the findings led the client and sponsoring agent to question and clarify the objectives for communication. As this chapter proceeds, the application of this principle to the other elements of audience research will be explored.

To conclude the evaluation of the PUB study in terms of the WHY element of audience research, the final guideline is discussed next.

6.2.3 Guideline 5: Feasibility of public dialogue

The fifth and final WHY guideline to be considered against the PUB study is:

Consider the relative value and feasibility of public dialogue and information dissemination strategies for the particular context, issue and available resources.

This guideline refers to the recommendation made in previous chapters that the relative value and feasibility of public-dialogue and information dissemination approaches must be considered in relation to the issue at hand, local contextual factors, and the availability of resources. With an already weighty set of research questions to answer in limited time, the PUB study did not directly address the suggestion of this guideline, although other findings might have provided some informative insight into how the issue and context lend themselves to either approach. The researcher did not have any information about the resources available to implement the intended communication strategy. In retrospect, such information could lend some pragmatic boundaries to audience research and thereby enhance the usability of the findings. While this guideline presents important issues for PUB to consider in designing their communication strategy, the experience of the PUB study suggests that it may not be feasible to answer such a question comprehensively within the scope of audience research, unless it is defined as the study's emphasis and sufficient time and resources are dedicated to this.

This section has examined how the design and process of the PUB study fulfilled the need to clarify the objectives of communication and the purpose of audience research. In the case of the PUB study, the objectives of communication convey the intention of a multifaceted approach combining information dissemination and public dialogue, and incorporating a balanced range of perspectives. With this goal in mind, the next section will examine the appropriateness of the overall research design of the PUB study by considering it against the *GENERAL* guidelines developed.

6.3 GENERAL: OVERALL RESEARCH DESIGN

The discussions leading to the development of this set of guidelines highlighted the important links between the objective of communication and the design of audience research, as captured by the GOAL-METHOD logic described previously (in sections 2.3.3 and

3.3). According to this reasoning, the answers to the WHY questions should inform the choices made in the overall research design and in posing key questions to investigate the other elements of communication. In the principles of the participatory communication paradigm and democratic science model, audience research should use methods that are able to engage with audiences as contributing citizens in an appreciative and empowering way, openly inviting a range of perspectives, letting their input influence the communication planning process and building a foundation for ongoing dialogical exchanges amongst senders and receivers. The research design also needs to respond to the challenge of communicating technically complex issues within the audience research process in a balanced and inclusive way. All this requires the audience researcher to choose methods that minimise the influence of bias and *a priori* assumptions, as presented in section 3.4.3 and 4.3.2. The following text examines the extent to which the PUB study addressed these issues.

6.3.1 Guideline 1: Methods to minimise bias and *a priori* assumptions

The first GENERAL guideline to be applied to the PUB study is the following:

Employ multiple methods, reflexivity and broad participant selection to optimise inclusivity and minimise the influence of *a priori* assumptions, bias and power differentials, particularly in acknowledgement of the complexity and uncertainty of scientific issues.

The key points in this guideline are addressed in the discussion that follows.

a) Avoiding *a priori* assumptions, bias and power differentials

The researcher acknowledged from the start of the PUB study the complex, uncertain and value-laden nature of the topic of biotechnology. A clear intention was set to minimise potential bias in the PUB study, such that the report included the following statement as part of the ethical considerations: “The researcher strived to maintain as neutral a position as possible regarding the contested terrain that is biotechnology so as not to bias the research towards any particular view. This was done by soliciting the views of a wide range of stakeholders and including their perspectives in the explanations of biotechnology given

to focus group discussion participants, in addition to using open questions that do not lead to presupposed responses" (Kruger 2007b: 21). The design of the focus group discussion is elaborated in section 6.5.

That some stakeholders (notably those opposed to GMOs) were impressed that PUB included them in this research suggests that the research managed to level the playing field to a degree. This contrasts with the power at play when stakeholders with dissident views are deliberately excluded from communication and the planning thereof in order to promote acceptance and deflect controversy (Scoones, Leach & Cockburn 2006).

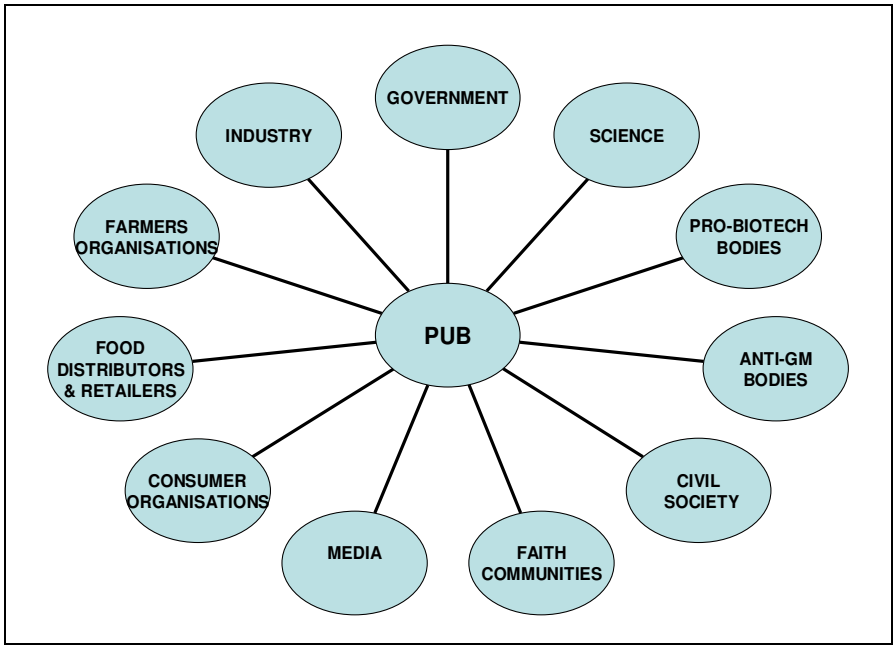
b) Multiple methods

As indicated in section 5.4.1, which explained the PUB study's research design and methodology, the study used a series of steps and methods. The gradual layering of findings from the planning workshop, desktop review (including survey analysis), stakeholder interviews and focus group discussions combined to ensure that the questions put to focus-group participants and the responses elicited from them reflected a broad range of perspectives on biotechnology. The methods are further discussed in later sub-sections in relation to specific elements – that is, in section 6.4 on the WHO element, section 6.5 on the WHAT and section 6.6 on the HOW.

c) Broad participant selection

Within the constraints of qualitative methods and the limited time available, the PUB study involved a broad range of research participants with different perspectives (as indicated in Table 5-2). In the first phase of the study, desk research and liaison with the PUB team generated a 'map' of stakeholders involved in biotechnology. Figure 6-2 (below) was created in this process and reproduced in the report as a diagrammatic representation of this map. PUB is placed at the centre in a facilitative role but the myriad interactions and relationships amongst stakeholders are not indicated. Within the various stakeholder groupings, selected organisations and individuals were identified as potential interview participants. The eleven respondents interviewed represented stakeholders from across this spectrum (see Table 5-2).

Figure 6-2: Map of stakeholders in the biotechnology scene



(Source: Kruger 2007b: 32)

In the second stage of research, the selection of focus-group participants reflected a relatively broad range. This range was predetermined, however, by the initial segmentation framework, which by necessity narrowed down the populations from which participants would be selected (discussed further in section 6.2.3). It was noted by the client at the feedback workshop that the study lacked the participation of younger participants, whose recent exposure to school education and possibly a more positive attitude towards technological change might have brought different views to the findings, although age was not a strong differentiating variable in the quantitative survey. Unfortunately, the high-LSM focus group discussion did not take place due to difficulties with recruitment. The report emphasised, however, that the study should be considered only the beginning of further discussions involving wider populations.

It is interesting to note that the selection of research participants entails a WHO question at the level of overall research design. Again, a layered iterative approach is emerging which suggests that the WHY, WHO, WHAT, HOW questions can be asked at all three spheres of audience research (the broader communication context, the overall research design, and in the research questions) and at various stages of the research process.

d) Reflexivity

As discussed in the methodology chapter (section 2.2) reflexivity is "the self-conscious analytical scrutiny of the self as researcher" (England 1994: 82), in acknowledgement that "…the researcher is a visible and integral part of the research setting" (Okely 1992: 2). A number of mechanisms for employing reflexivity can be noted in the PUB study:

- The researcher made her background and relationship to the subject of research known at proposal stage. In the process of recruiting a research assistant to help with data collection, capturing and analysis, applicants were screened for their research competence and ability to demonstrate self-awareness regarding their views on the subject. The research report provided a brief background on the two researchers involved, stating their qualifications and prior experience with biotechnology issues.
- Several means were used to uncover and mitigate the potential interference of the researchers' own assumptions in the process of data collection and analysis: (i) careful research design (as described throughout this chapter), (ii) continuous debriefing and self-reflection between the researchers to maintain critical distance, and (iii) the use of a structured coding framework for data analysis and cross-checking of interpretations by both researchers.

The preceding discussion demonstrates how various mechanisms were used to minimise bias and maintain inclusivity in the research design.

6.3.2 Guidelines 2, 3 and 4: Open-ended and interactive methods

The next three GENERAL guidelines are combined to look at the extent to which PUB study's methods were able to solicit the participants' perceptions of the issues in their own terms.

- Consider audience research as one step in an ongoing process of communication, not a tool to determine conclusive public opinion, emphasising that ongoing communication processes are required for reaching informed opinions.

- Use open-ended methods that can uncover participants' language use, values and framing of issues in the context of their daily lives.
- Allow time and interactivity in the research process for participants to consider a balanced range of simply stated views, consider both risks and benefits, develop opinions and pose questions and concerns.

That the PUB study should be only one step in ongoing communication, as suggested in the first guideline above, was emphasised at proposal stage of the research process and reiterated in the final research report, as follows: "The participants' input gained from this research should not be considered the end but only the beginning of a continued, more extensive dialogue which would yield richer and more informed opinions. We cannot draw final conclusions about public opinion on biotechnology and make policy decisions based on these until more awareness is created to ensure informed opinions" (Kruger 2007b: 15).

The PUB study's design set out to use open-ended methods as a means to avoid narrowing the discussion. SAASTA's request to use qualitative research also allowed the study to use open-ended methods. Stakeholder interviews used a semi-structured open-ended interview guide, which allowed the researcher to have quite specific issues answered while still allowing participants to express issues in their terms and allowing unanticipated answers to emerge.

Focus group discussions provided ample opportunity for participants to engage in interactive discussions about the issues. The two hours allowed for each focus group discussion provided sufficient time for reflection, along with a relaxed environment to reduce pressure on participants but with enough guidance to keep them focused. Open-ended questions were asked that encouraged participants to discuss their opinions, questions and concerns about the issues. Participatory research tools, further described in section 6.5, stimulated interactive analysis and problem-solving amongst participants which allowed the researcher to observe their reasoning and language usage. The facilitation of the focus group discussion generated dynamic conversation amongst participants as the researchers probed responses and redirected issues around the group.

6.3.3 Guideline 5: Participation of stakeholders

The following GENERAL guideline is addressed last for the most logical sequencing of the discussion.

Promote active participation of stakeholders in communication strategy design and implementation.

When commissioned as an external consultant for a defined period to conduct audience research, the researcher is most likely unable to ensure active participation in the subsequent communication strategy, as suggested by the above guideline. However, as the wording indicates, such participation can be promoted through the design and process of research and in the recommendations made. In the PUB study, efforts were made within the given constraints to promote stakeholder participation in several ways:

- A broad range of stakeholders were involved at interview stage and their views were integrated in the design of the focus group discussion guide, particularly in the framing of descriptions of biotechnology and its applications. This presents a form of participation, namely in the research process itself, which embodies the principle of inclusivity.
- The research explored and reported how stakeholder groups were already communicating within their existing networks, thereby acknowledging other active voices in biotechnology communication.
- At several points in the research report the findings encouraged the PUB programme to use and cooperate with existing communication initiatives. For example, the report made PUB aware of an advocacy organisation's plans to produce an educational comic book, and suggested that PUB could help them with its scientific accuracy.
- Some stakeholder-interview respondents and focus-group participants, encouraged by their experience of the research, expressed a desire for the dialogue to continue beyond the focus groups and to be involved in subsequent public-communication programmes.
- The research report recommended that the PUB programme use action-research approaches that integrate research, design, communication, learning and evaluation in a process in which stakeholders and members of the public participate.

- The report claimed that the study had the added value of being good for relationship-building: "Many participants did not know who PUB or SAASTA was and this research promoted awareness of the PUB programme and of biotechnology as a subject. Stakeholders who were familiar with PUB and had previously mistrusted the programme's claim to neutrality were impressed that this research was hearing the views of all sides equally. Focus-group participants felt that their contribution was important by having been invited to participate in this research and appreciated the chance to express their questions and concerns" (Kruger 2007b: 20).

These points demonstrate an approach to research which is conducive to building a foundation for further dialogue amongst participants. However, since the design and implementation of communication beyond the research stage is outside the researcher's scope of work, care should be taken not to raise false expectations of what is to follow. This highlights the importance of the WHY element of clarifying the objectives of communication and of audience research in close consultation with the client.

This analysis demonstrates how the PUB study's overall research design strived to embrace dialogical principles by emphasising inclusivity, avoiding bias and the narrowing of issues and perspectives, and encouraging stakeholder participation as far as possible. How the research methods achieved this is further elaborated in the subsections to follow in relation to how particular elements were investigated.

6.4 WHO: INVESTIGATING PARTICIPANTS IN PUBLIC DIALOGUE

It may be recalled that the WHO guidelines developed around public dialogue about science emphasise an inclusive, appreciative conceptualisation and investigation of audiences, not as passive recipients of a message but as a dynamic network of diverse, contributing participants and stakeholders who are conceived of as interacting and acting, sending and receiving messages in different ways. This includes considering the roles of lay citizens and civil society groups, the state and institutions of policy-making, and the range of experts, scientists and interest groups of relevance to the issue. Investigating the participants in

dialogue calls for the identification of variables by which to categorise and understand audiences, and where possible, to create audience segments.

The WHO element was of central interest in the research questions posed in the PUB study. As noted earlier, these questions focused on understanding participants in biotechnology communication at two levels: active stakeholders in the biotechnology arena and segments of the South African public. The PUB study is assessed against the five WHO guidelines.

6.4.1 Guidelines 1 and 2: Appreciative investigation of audiences as stakeholders

The following two WHO guidelines are linked by their interest in stakeholders.

- Recognise audiences as active, diverse, contributing stakeholders, where citizens, representative civil society groups, decision-makers, technical experts and the state are all considered participants with varying roles in public dialogue.
- Map the multiple stakeholders in a system of dialogue including the web of interactions, areas of divergence and alliance, existing communication networks and power dynamics amongst them.

a) Possibilities and challenges of an appreciative stance

Rather than appreciating audiences for their potential contributions, surveys that assume a cognitive-deficit position often take audiences to be ignorant and in need of information. While one of the PUB study's research questions was to investigate the present level of knowledge and opinions of biotechnology, the study "did not presuppose that any specific view of biotechnology is better than another" (Kruger 2007b: 15) but sought to uncover "situated expertise" (Irwin & Michael 2003: 102). When presenting the findings of focus group discussions, the report states that the study does not intend to "evaluate responses in terms of 'the correct knowledge'" but to "provide a window into how people make sense of and represent biotechnology".

The design of the focus group discussions and the deliberately respectful and interested manner of the facilitators with the research participants were important tools for conveying

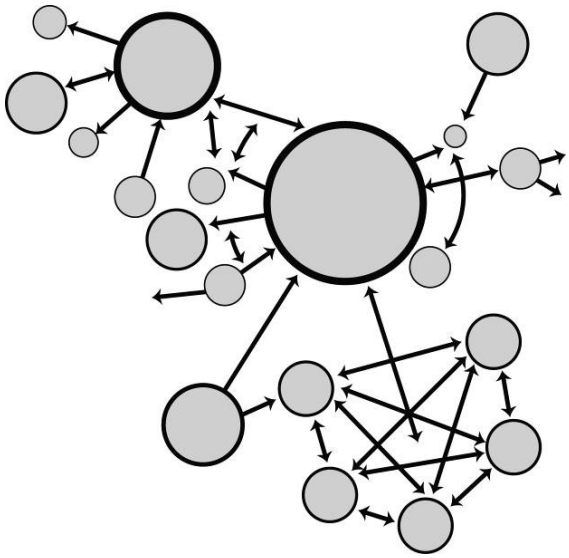
this appreciative stance. To illustrate this principle at work, the researcher recalls the focus group discussion with developing farmers. On arrival at the venue the researcher found the room set up in a classroom arrangement, as if participants anticipated that the researcher was there to teach them about biotechnology. By rearranging the chairs in a circle, and seating herself on the floor as an overt gesture of humility and respect, the researcher listened with interest as she posed open questions to the participants to hear what they had to teach her about what biotechnology means to them in the context of their lives. This stance conjures the significance of the expression: "To understand is to stand under which is to look up to".

Despite the researcher taking this stance, many people who were approached to participate in the research did not consider their own contribution valuable or the topic of relevance and interest to them. This recalls the challenge of uninterested publics discussed in section 4.2.5. It made recruitment a difficult process in the research, as can also be expected in attracting people to public dialogue about biotechnology. In light of this, one is brought to realise that not all people are active or want to contribute, as the guideline seems to assume. Grunig's Situational Theory (1989) provides a useful framework for distinguishing active seekers and passive processors of information, and shows that communication can and should be targeted and framed to highlight its relevance to people's interests. Section 6.4.4 below examines how the PUB study made used of this theory to guide segmentation.

b) Mapping the multiple stakeholders

The inclusion of stakeholders in the PUB study intended to acknowledge and understand the networks and communication amongst those who *are* actively contributing participants in biotechnology communication, thus indicating an alignment with these guidelines. This recalls **Figure 3-3**, which illustrates this complex communication landscape and is repeated here.

A multi-directional network of stakeholders



An extract from the report (Kruger 2007b: 88) conveys how the role of stakeholders was perceived in the study and in the recommendations made, which express the concept of a system of deliberative dialogue:

> The interviews with stakeholders provide a picture of the broader context in which PUB is situated. There is an active and diverse network of organisations who are actively involved in biotechnology in various ways, with communication linkages amongst them, and between them and the public. Such stakeholders make up the existing pool of informed and decided participants in existing biotechnology communication, and are sources and channels of messages sent to and received from the public. PUB can look to their experiences and strategies in order to build its own strategy into this wider existing context and take cognisance of the diverse arguments and competing messages that already circulate amongst the public. PUB could play the role of providing a platform for these diverse views to be aired, stimulating and mediating the debate to assist the uninformed public to make sense of it all, and assisting stakeholders and the public to base their views on an understanding of the basic scientific principles. Stakeholders are also potential secondary or gateway audiences through which PUB can access other intended primary audiences, and through which the stakeholders' respective publics can communicate to PUB.

As seen in this extract, the report recommends a facilitative and informative role for PUB to play in a system of public dialogue about biotechnology. To this end, the PUB team as well as a representative of the Department of Science and Technology (DST) were included as participants in the study and were perceived as participants in communication. The study posed the same stakeholder interview questions to DST as to other stakeholders, investigating the channels of communication to government and mechanisms for public participation. The research process drew on the PUB team's knowledge of other audiences, and heard how PUB is perceived by other stakeholders. Again conjuring the concentric spheres of audience research, the WHO question can thus be asked with reference to the sponsoring and implementing agent within the outer sphere of the broader communication context.

6.4.2 Guideline 3: Trusted sources of multidisciplinary expertise

The next WHO guideline to be addressed is the following:

> Identify who are considered trusted sources of information amongst technical experts from a range of relevant disciplines, including social scientists and activists, and explore their preparedness for public dialogue about science.

Several issues are contained in this guideline: trusted sources of information, multidisciplinary expertise, and the preparedness of technical experts for public dialogue. These are addressed in turn below.

a) Trusted sources of information

One of the research questions which the PUB study set out to answer was: Who is considered a trustworthy, authoritative source to convey information about biotechnology? The PUB study firstly looked to the results of the previously conducted quantitative survey for indications of which information sources were regarded as trustworthy by different demographic groups. Level of education and LSM categories were found to be the strongest differentiating variables, and religious organisations stood out as trusted sources amongst

particular racial and religious groups. These findings were useful for suggesting possible segmentation variables and for comparison with the findings of the qualitative PUB study.

The issue of trusted sources was addressed through an open question in focus group discussions, which asked participants not only to name specific sources but to discuss their reasoning. This provides useful guidance for planning, as this extract from the report shows: "Most participants said that they would prefer to hear messages coming from 'ordinary people' who are neutral, transparent, display integrity and concern for people's well-being, and who are able to communicate their knowledge about the facts and broader issues in a non-intimidating way". Some participants suggested the idea of information being presented by a range of experts with different perspectives, which brings us to the next point.

b) Multidisciplinary expertise

It is perhaps outside of the scope of audience research, as it was in the PUB study, to identify specific individuals as experts to contribute to public dialogue. However, part of the intention of this guideline is (a) to suggest that the framing of biotechnology be opened up beyond a single technical perspective to include other facets of the issue, and (b) based on this to consider the inclusion of other expert disciplines which can contribute broader perspectives to a public dialogue.

In the PUB study, this intention was noted in the stated aims of the PUB programme and expressed as a guiding principle in the research report: "Biotechnology is understood to be more than a purely scientific topic but one involving a wide range of political, economic, social, scientific and ethical considerations. A multidisciplinary and contextualised approach was therefore followed so as to understand the matter in its complexity" (Kruger 2007b: 15).

In practice, the PUB study is seen to reflect this approach in a number of ways. Firstly, the range of stakeholders included at interview stage allowed the multidimensional framing of biotechnology issues in focus group discussions. In other words, explanations of biotechnology provided to participants were phrased to incorporate and balance a range of angles. Secondly, based on the findings, the research report suggests framing biotechnology discussions in a way that places the scientific issues in human context and highlights the

relevance to people's lives. Thirdly, the report recommends that PUB "expand beyond occidental and 'hard science' to also discuss social, environmental, ethical aspects and incorporate indigenous knowledge systems" (Kruger 2007b: 93).

c) Preparedness of technical experts for public dialogue

This aspect was not investigated in the PUB study. It may also have been beyond the scope of such broad, formative research. It might be more feasible to investigate this in preparation for a specific intended communication event, with a defined issue and context, which already has particular technical experts in mind.

The suggestions of this guideline, as this discussion shows, have been met by the PUB study in varying degrees. The final guidelines concerning participant variables and segmentation are addressed in turn below.

6.4.3 Guideline 4: Participant variables

The fourth WHO guideline addressed is:

> Investigate the range of variables that influence participants' potential role in public dialogue about science, such as their interests, values, concerns, technical aptitude and situated expertise in relation to the issue.

The intended focus of this guideline lies in understanding and distinguishing audiences in terms of variables such as their perceptions of and contributions to the issue, potentially as the basis for segmentation.

In the first phase of the PUB study, the results of the quantitative survey provided an indication of relevant variables. In reading the report on this survey (Rule & Langa 2005) and analysing the data tables, the researcher asked: "What variables are responsible for variations in biotechnology responses?" These 'differences that make a difference' contributed to the development of the initial segmentation framework (described in the next section). The interviews and focus group discussions explored in detail participants'

knowledge, questions and concerns with an appreciation of how they make sense of biotechnology in the context of their daily lives and sets of values.

The qualitative open-ended methods revealed nuanced forms of knowledge and situated expertise about biotechnology, in contrast to the quantitative survey which concluded that 8 of 10 South Africans do not know what biotechnology is. The research report concluded: "…It has been seen that there is more to knowledge and awareness of biotechnology than simply whether people have it or not, and more to it than simply those categories of knowledge created by Western science and spread through formal education. While some participants may not have known the term biotechnology, they demonstrated familiarity with aspects thereof, derived from oral knowledge of traditional plant and animal breeding practices, from reports in the media, and from experiential knowledge, as in the case of farmers. In general, knowledge of biotechnology is very limited and its relevance and applications in society are not well known. There remain in participants' minds far more questions than answers" (Kruger 2007b: 88). These finer distinctions of knowledge were presented in the research report with Figure 6-3, noting that audiences in these different categories would have varying information needs and contributions to offer in discussions about biotechnology.

Figure 6-3: Distinctions in knowledge and situated expertise about biotechnology

Don't know anything about biotechnology	Don't know word biotechnology but familiar with some aspects	Have basic knowledge and awareness of biotechnology	Have more developed knowledge of certain applications	Familiar with the players and surrounding debates for certain applications

The study also showed that while few people have sophisticated technical knowledge about biotechnology, they have strong ethical arguments to contribute. The questions and concerns expressed in the study were distilled into a common set of questions that were presented in the report and suggested as a framework or 'agenda' that could guide discussions and deliberations about biotechnology in South Africa:

I don't know about this biotechnology.
What is this about? What does it mean for our lives? How might it help or harm me?
What are our choices?
Or… I know about it and I'm concerned:
Is it good? Is it safe? Is it right?
For me? For other people? For the environment? For the future?
But so what if I'm concerned – what can I do? Who's listening? How does my opinion count?
Whose interests count? Who's accountable for this? Where do we draw the line?

This form of outcome presents not an assessment of gaps in knowledge that need to be filled (cognitive-deficit style), but rather a set of relevant questions for continued dialogue about biotechnology, suitable to an interactive model of science communication. The final WHO guideline is addressed now, assessing the issue of segmentation in the PUB study.

6.4.4 Guideline 5: Segmentation

The final WHO guideline is as follows:

> Systematically use these communication variables to propose audience segments or stakeholder groups in relation to the purpose and topic, with awareness of the possibilities and limitations of various methodological approaches, and a commitment to continued revision and inclusivity.

As shown in the discussion surrounding the development of the guidelines, audience segmentation is not a simple matter. Both quantitative and, even more so, qualitative methods are limited in what they can discover and produce in terms of segments. It might be said that 'everyone' should participate in inclusive dialogue and we should not predetermine and target particular groups, yet the practical question remains of how to make the process accessible to all. The PUB study exemplifies the complexity of segmentation methodologies, which was a problematic aspect of the research design.

a) Expectations and constraints for segmentation

The identification of priority audience segments amongst the public was required of the PUB study. However, the study did not quite produce what was expected by the client in terms of clear audience segments, as the discussion below elaborates. In retrospect, it was probably

unrealistic to expect this outcome of a qualitative study, which the researcher, limited in experience and knowledge at the time of the brief, did not point out. It was, however, stated that the study did not intend to produce a complete representative picture of the total South African public and should be considered only the beginning of an ongoing process. It was also highlighted early that more complex statistical analysis of the quantitative survey could have helped to produce more accurate segments. On the understanding that segmentation variables should be based on the intended objective of communication, the researcher also pointed to the unclear ultimate objectives of PUB's strategy (as described in section 6.2.1) as a further limitation to segmentation. This highlights how important it is to set realistic goals for audience research, as suggested by the WHY guidelines. Notwithstanding these constraints, the researcher developed and implemented a method for segmentation, which consisted of two phases, explained below.

b) Approach to segmentation

The overall approach to segmentation in the PUB study proceeded as follows. The first phase of research led to an initial segmentation framework of suggested audience segments, which were used to define the populations from which focus-group participants were selected in the second phase (detailed in Table 5-2). This approach typifies a scenario in which Slater (1996) warns of sampling bias in qualitative methods for segmentation. On the same principle, SAASTA questioned whether the initial segmentation framework and resulting participant selection could have biased the findings towards prioritisation of certain issues. While this is certainly possible, it may have been mitigated somewhat through the triangulation of multiple methods (Slater 1996: 270), provided these were logically and rigorously analysed. The methods used to arrive at the initial segmentation framework are explained below.

The initial segmentation framework was created through a combined analysis of the following methods:

- A previously conducted quantitative survey (described in section 5.3.1) based on a representative sample of 7000 adult South Africans was the foundation of the qualitative PUB study. Preliminary analysis of the findings by Rule and Langa (2005) and the

researcher's direct reading of the data tables revealed the demographic variables which influence respondents' biotechnology-related responses.

- The stakeholder interviews gave an indication of existing and neglected audiences and pointed out the challenges to attracting people's attention to biotechnology communication.
- Insights were gained from communication literature. In terms of Grunig's Situational Theory (1989), the literature and interviews indicate that biotechnology is an issue many people do not perceive as relevant. It competes for problem recognition with other, more salient issues, its technical complexity make it abstruse as a topic and the lack of greater opportunity for public action or policy influence poses constraints.

Based on the above, the researcher reasoned that biotechnology communication should be targeted and framed in a manner that maximises issue involvement and problem recognition and minimises constraint recognition. By triangulating the findings from these sources, an initial segmentation framework defined ten priority audience segments. The focus group discussions were then conducted and analysed to understand and, if necessary, refine the initial segments.

c) Results

In the final analysis the audience segments initially identified were considered appropriate but not exhaustive. The qualitative methods were not deemed sufficient to devise a complete segmentation framework for the broad population and complex subject at hand. To explain this limitation, the researcher argues in the research report that the focus-group participants can not be considered representative of broader population groups. She cautions against simplistic categories that overlook differences within groups and similarities across groups. As a next step, the report recommends that the findings of the qualitative PUB study be supplemented with further statistical analysis of the quantitative survey to produce more comprehensive audience segments. It also suggests a platform for dialogue which does not presuppose exact audiences but remains open enough to invite expressions by diverse publics in their chosen form.

While the study did not produce neat audience segments or pragmatic guidance for reaching them, the analysis of the focus groups did reveal categories of responses which suggest possible segmentation variables. These included different communication preferences, levels of sophistication of knowledge, different sources of knowledge (e.g. indigenous, experiential, general, occidental scientific), present and potential levels and forms of involvement, and forms of problem recognition (e.g. concerns for self, other people, the environment, or ethics).

In terms of the guideline, it can be said that the PUB study was able to propose tentative audience segments in relation to the topic, although these were not very pragmatic or comprehensive. While the report acknowledged the limitations of the study's methods in terms of segmentation and recommended that these remain open to revision, these limitations were realised at a late stage in the process. Had this been raised at the beginning of the study, the objectives and expectations for the study could have been adjusted early on and the research design focused optimally on realistic goals. The suggestion that PUB recognise existing communication initiatives and access participants through active stakeholders may compensate to some extent for the incomplete audience segments.

These discussions have examined how the PUB study went about conceptualising and investigating the potential participants in communication about biotechnology in terms of stakeholders and audience segments. The next section assesses the case study against the WHAT guidelines.

6.5 WHAT: FRAMING THE ISSUES

The broad objective of the WHAT guidelines is to inform the appropriate framing of issues for ongoing deliberative discussion, rather than merely a message for dissemination. Given the multidimensional and technically complex nature of science issues, the framing should acknowledge the range of relevant perspectives, questions and concerns at play and convey issues in understandable terms that make sense to the participants in the context of their lives. The guidelines also alert audience researchers to considering how they frame the issues within the research process itself so as not to bias or limit the framing.

How did the PUB study fare in this regard, and what lessons does it offer?

6.5.1 Guideline 1, 2 and 3: Investigating the range of issues

The following three guidelines broadly address the range of WHAT issues to investigate as well as how to investigate them. The PUB study is described and assessed below against these guidelines, integrating these aspects in one discussion.

- Explore the range of perspectives and framing of the issues, including participants' opinions, questions and concerns, to inform the inclusive framing-for-deliberation in ongoing discussions.
- Facilitate and observe interactive discussions in order to understand how issues are spoken of, what language is used and what values come into play, in order to convey technical issues in easy, socially relevant, lay terms and accessible language and style.
- Avoid bias or limiting the scope of issues by designing questions to start broad and open and gradually focus inwards, framing questions and probing responses in a balanced, open way.

The PUB study investigated the framing of biotechnology issues at two levels: (1) amongst a selection of active stakeholders, and (2) amongst focus-group participants. At the first level, the interviews explored (amongst other issues) stakeholders' positions on biotechnology, what messages they are communicating to the public and what they consider to be the specific areas of biotechnology that most affect people's lives. As mentioned in the WHO section above, the PUB study took the approach of encouraging recognition of the range of existing messages circulating amongst the public about biotechnology. Research findings describing these views inform how the PUB programme could play a facilitative role in stimulating deliberative dialogue, helping participants to make sense of the various perspectives and promoting an understanding of the basic scientific principles at play (Kruger 2007b: 88). This approach therefore resonates with the guideline to frame issues for deliberation based on a range of perspectives.

At the level of the focus group discussions, issues related to framing were reflected in the following research questions, posed about the audience segments:

- What is their present level of knowledge and opinions of biotechnology?
- What are their questions and concerns regarding biotechnology?
- What are priority issues within biotechnology?
- How do they themselves frame the issues for discussion?
- What role do context, value systems and other influences play in their interaction with biotechnology matters?

The third guideline above highlights the need to frame the issues within the audience research in a way that explains complex concepts in a balanced way that does not bias the discussion and manages to gauge participants´ own perceptions and language usage. A description of the questioning strategy used in focus group discussions in the PUB study helps to reflect on this challenge and demonstrate the implementation of specific techniques to address the guidelines. The full discussion guide is provided in Appendix F-1.

It is worth noting that from the first moment of communicating with research participants about the topic of interest, the facilitators in the PUB study avoided as far as possible explaining what biotechnology was so that the resulting discussion would tap into what participants already knew. The discussion guide followed a “funnel approach”, as suggested by Tufte and Mefalopolous (2009: 23), moving gradually from broad to narrow questions.

The discussion began with an open question: “What comes to mind when you hear the word biotechnology?” Follow-up probing questions then unpacked responses further and stimulated discussion within the group. Similarly, when the discussion moved to exploring specific areas of biotechnology applications, participants were first asked whether and what they knew about each area of application. Only after hearing participants’ views did the facilitator give an explanation of the concepts, which inevitably required the construction of a message. To avoid bias, the explanations were compiled by including the range of perspectives and framing of issues that were raised during the interview stage. In exploring participants’ questions and concerns about biotechnology, as the guidelines suggest, questions were used that balance positive and negative framing so as not to lead or bias

their responses: What have you heard about this? What excites you about this? What are your questions about this? What concerns do you have about this?

To investigate priority issues, as required by the research questions, a participatory ranking exercise[7] was used in which participants were asked to work together to arrange a set of 6 cards, representing the six biotechnology applications, in order from the application they were most interested to least interested in learning more about. The cards (which can be seen in Appendix F-2) contained the name of each application in English and an image to illustrate it for those who did not read English. By way of criticism, the selection of images may have narrowed or biased the responses, such as the smoky factory chimneys on the industry card which elicit negative associations with pollution, or the images on the health card which emphasise a Western biomedical view of health. Nevertheless, the exercise stimulated active discussion, during which participants' interactions were observed and probing questions were asked to discover more about their reasoning, agreements and disagreements. This not only generated more insight into the reasons behind people's interests in the issues, as the guidelines suggest, but produced an aggregated list of priority issues for ongoing communication. The ranked lists from each group were assigned numbers, aggregated and presented in the report as Table 6-1 which had the advantage of conveying the results of qualitative techniques in quantitative terms which are familiar to natural scientists, who were the main audience of the research report. Accompanying the table was an explanation of the more in-depth insights that arose during the discussion.

[7] Participatory research techniques, of which this ranking exercise is one example, provide a vital means of seeking local knowledge and bringing previously marginalized voices into planning decisions. They involve interactive and visual methods that let participants articulate and analyse their own knowledge, guided by the facilitation of the researcher (Chambers, 1997).

Table 6-1: Results of exercise for ranking biotechnology applications in order of interest

6 = most interesting, 1 = least interesting (from Kruger 2007b: 70)

Biotechnology applications (in average order of interest for all groups)	Total	Low-LSM consumers	Medium-LSM consumers	Developing farmers	Commercial farmers	Christian	Muslim	Jewish	African Traditional Healers	Enviro-Altruistic
HEALTH	**40.7**	2	4.7	5	5	5	4	4	6	5
AGRICULTURE	**39.2**	5	2.7	3	4	6	5.5	5	5	3
FOOD & DRINK	**36.5**	1	5	6	5	1	5.5	5	2	6
ENVIRONMENT	**34.7**	6	3.7	4	4	3	3	4	3	4
DNA & FORENSICS	**21**	3	2	1	2	4	2	1	4	2
INDUSTRY	**17**	4	3	2	1	2	1	2	1	1

These interactive discussions also gave the researcher the opportunity to observe participants' framing of issues, processing of information and language usage, as the guidelines suggest. This allowed for numerous direct quotations of participants' responses to be included in the report. In hindsight, video recordings of the discussions would be ideal to capture their full richness and to show them to those responsible for communication planning, as was done in a case reported by Irwin and Michael (2003: 102; section 4.2.6).

This discussion shows that the methods used in the PUB study resonate with the suggestions of the guidelines and demonstrate some qualitative techniques for avoiding bias and eliciting participants' perspectives in as 'pure' a form as possible.

6.5.2 Guideline 4: Social context

The final guideline in this section looks at how the issues are to be understood in context of participants' lives.

Investigate the social context, practical experience and existing belief and value systems through which technical issues are understood and assessed.

The findings of the literature review, survey analysis and stakeholder interviews in the first phase of the PUB study brought to light that people's attention to biotechnology issues was largely mediated by their practical experience (such as in the case of farmers), their belief and value systems (underlying moral arguments about biotechnology) and the perceived relevance of issues to people's lives (seen in concerns about food and health). These issues were key factors in determining the initial segmentation framework and selection of focus group participants.

The open-endedness of the semi-structured interviews and focus group discussions allowed participants to express how they perceive and assess biotechnology on their own terms, rather than having to situate themselves on the researcher's predetermined 'map' of meaning (Brendlinger, Dervin & Foreman-Wernet 1999; see section 3.4.3). Through this approach, the research helped to understand the ethical arguments and concerns about biotechnology based on various belief systems and aspects of participants' social contexts and was able to highlight the value of experiential and practical knowledge. Based on the breadth of research responses, an analysis was provided of some of the contextual influences on participants' engagement with the subject of biotechnology. This addressed the research question, "What role do context, value systems and other influences play in their interaction with biotechnology matters?"

In applying the set of WHAT guidelines to the case, this section has assessed the PUB study in terms of its investigation of the framing of priority issues in biotechnology communication. The final set of guidelines is discussed next to assess how the PUB study's design explored the selection of channels for communicating about biotechnology.

6.6 HOW: IDENTIFYING CHANNELS AND SPACES FOR PUBLIC DIALOGUE

The set of HOW guidelines aims to investigate communication preferences and identify channels and spaces for public dialogue, including means for disseminating information and eliciting feedback and contributions amongst a range of stakeholders. Emphasis is placed on inclusivity by considering the accessibility of channels for public dialogue to diverse participants, including those who are often excluded from such forums and those who may not show interest in the topic. The guidelines suggest taking into broad account existing and potential resources, networks and mechanisms for communication, including a range of media and structured processes for multi-directional deliberative dialogue.

The PUB study is assessed in terms of these guidelines, beginning with a combined discussion of the following two:

6.6.1 Guidelines 1 and 2: Multi-directional communication channels

The first two HOW guidelines addressed are the following:

- Assess communication preferences and possible channels in terms of both dialogue and information dissemination – how to provide balanced, open information, elicit a wide range of views, enable interactivity and facilitate existing initiatives.
- Use open-ended enquiry to map the range of existing and potential communication resources, networks and mechanisms through which people both receive and send information, then consider their appropriateness for the particular topic, context and nature of audiences.

The PUB study's investigation of communication channels was driven by the research objective of identifying "preferred channels for multi-directional communication about biotechnology and trusted sources of information". The emphasis on multi-directional communication, which was guided by the PUB programme's stated objectives, demonstrates an alignment of the study's intentions with the first HOW guideline stated here. The last part

of this phrase, regarding trusted sources of information, has already been addressed under the WHO guidelines, indicating an overlap between elements.

The PUB study used different methods to investigate communication preferences and channels, namely desktop review, stakeholder interviews and focus group discussions, thus allowing triangulation of data from these sources. This aligns with recommendations in the literature, such as in Mody (1991: 124) and Tufte and Mefalopulos (2009: 14).

a) Desktop review

At this early step in the research process of the PUB study, initial indications about communication preferences were gleaned from the previously conducted quantitative survey conducted by the HSRC for PUB. In Rule and Langa's (2005) statistical analysis of the survey data, preferences for television, radio and the internet were distinguished amongst different demographic groups in terms of race, level of education and geotype[8]. The limitation of those findings, however, is that the survey questionnaire provided a predetermined range of responses, which included channels that are principally for information dissemination to the exclusion of more interactive channels. In response, the qualitative techniques of the PUB study sought to compensate by investigating communication channels more broadly, as explained below.

b) Stakeholder interviews

Stakeholder-interview respondents were asked about communication amongst their constituencies and networks. This sought to answer the research questions: Through what methods or channels do they convey messages and how do they receive feedback? What recommendations and lessons can be learned for communicating with the public about biotechnology?

This questioning strategy allowed insight into existing communication networks, channels used, and the potential opportunities and gaps that are apparent, thereby resonating with the guideline to map existing resources and networks. These questions elicited a number of

[8] Geotype refers to whether people live in urban, peri-urban or rural areas. This category of demographic variables was used in the quantitative survey conducted by the HSRC for PUB (Rule & Langa 2005).

insights that allowed PUB to consider their role within the broader landscape of existing biotechnology communication and take lessons from other stakeholders' experiences.

c) Focus group discussion

The interest in existing and multidirectional channels of communication is seen to be carried through to the research questions explored through the focus group discussions with regard to audience segments: How do they know what they know about biotechnology? What are appropriate channels for multi-directional communication – sources of information as well as feedback mechanisms? Who is considered a trustworthy source to convey this information? The last question, as mentioned, overlaps with the WHO element, where this has already been addressed.

The investigation of communication channels in the focus group discussions meets the suggestion of the guideline, in the same sense of a funnel approach, to begin broadly and then narrow in. The tone of this part of the discussion was set with an invitation to participants to help understand how best the public can be engaged in biotechnology. Then, after first brainstorming all the ways in which they communicate so as to stimulate their awareness of the breadth of options, participants were asked to suggest which means would be the best to use for communicating about biotechnology specifically.

This strategy produced a rich depth of responses that include interpersonal, group and mass-media channels. The findings presented in the report recommended how audiences could be reached, describing participants' own reasoning for the approaches suggested. This included participants' recommendations for clearer communication channels for reaching decision-makers and policy-makers in government. This issue of the state's role connects this HOW guideline to the WHY and WHO guidelines, once again showing an interrelationship between the elements.

When considering the findings of the PUB study in relation to the HOW element, it is questionable how useful the data is for informing the selection of communication channels, and unclear how it should be interpreted and used. Since the initial segmentation framework is tentative and focus-group participants are not representative of those

segments, their suggestions of communication channels may only apply to the particular group and not more widely. The triangulation of focus-group responses with the desktop review and interviews helps to address this limitation, but still the findings might not be useful on their own for this HOW aspect of communication planning. As stated before, qualitative research is valuable for gaining deeper understanding and insight, but not for describing or predicting general patterns. This is where mixed methods can be useful. The use of LSM categories in the audience segmentation framework does, however, help to address this limitation. PUB can draw on the wealth of regularly updated secondary information available about LSM categories, including media usage, income, education and geotype (see Boehme, Mulaudzi & Haupt 2007).

6.6.2 Guideline 3: Enhancing accessibility and diversity

The PUB study is now considered against the third HOW guideline:

> In pursuit of inclusivity and diversity in public dialogue about science, seek to identify communication channels that allow the accessibility and visibility of all languages, cultural contexts and levels of literacy, especially those groups often marginalised and those who may at first not express interest in the topic.

The suggestions conveyed by this guideline were fulfilled in the design of the PUB study through a number of means, as detailed below:

- Interviews analysed the efforts of other stakeholder groups to reach hard-to-reach audiences. While some stakeholders demonstrated their suitability as channels for reaching and representing other publics, the study also highlighted that there are biases and gaps in their selection of audiences: the stakeholders interviewed were reaching farmers, faith communities and high-LSM consumers with environmentalist/altruistic concerns, but few stakeholders appear to have succeeded in reaching the general public, especially not low-income, low-education and rural-dwelling audiences.
- The focus group participants represented a diversity of religion, income, geotype and cultural background as much as possible within the nine groups conducted. The

deliberate selection of high-, medium- and low-LSM groups for focus group discussions allowed a cross-section of income groups in the research. As criticised on presentation of the research, younger audiences were underrepresented.

- Where made possible by the researchers' language skills and logistical factors, focus groups were conducted in participants' mother tongue, including English, Afrikaans and isiZulu. The focus-group guide was designed and piloted in English, with efforts made to phrase questions in simple, accessible terms. Time should have been allowed for translating and back-translating the guide into other languages, but this was not done. Translation was done by each facilitator before and during discussions and extra effort was made to rephrase responses to check accurate understanding.
- The report of findings provided suggestions for tailoring communication to low-income, rural and illiterate audiences who are not as easily reached and often missed by urban-biased mass media.

These points indicate that the PUB study's design and selection of participants allowed the inclusion of diverse groups, accounted for language and cultural diversity in the research process, and gathered information which helps to access diverse groups through communication.

6.6.3 Guideline 4: Structured processes for deliberative dialogue

The final HOW guideline follows, which concerns investigating the feasibility of using structured deliberative processes in the particular context.

Consider the suitability for the given situation of utilizing structured processes for public engagement that enable deliberation, dialogue and the emergence of collective intelligence.

The fulfilment of this guideline is not present in the PUB study in any way. The study did not specifically investigate this issue, besides the general enquiry into communication preferences discussed above. This is not to say that the PUB study failed in this respect, nor that every case of audience research should address this issue. In the case of the PUB study, it was not part of the research objectives. Testing the feasibility of using specific, structured

processes for deliberative dialogue for a particular context and issue might be a task undertaken in a subsequent phase of audience research, or for a programme with a more narrowly defined purpose and topic.

Having concluded the assessment of the PUB study in relation to all the individual sets of guidelines, overall analysis and conclusions are drawn in the following section.

6.7 OVERALL ANALYSIS: JUDGEMENTS, LESSONS AND REFLECTIONS

The preceding sections have presented an assessment of the PUB study within an evaluation framework that was developed from the literature in previous chapters. This section steps back from the individual sets of guidelines to consider overall how the PUB study performs against the evaluation framework, whether its design was 'fit for purpose', what lessons it offers for audience research, and what realisations emerge about the application and suitability of the guidelines.

6.7.1 Overall evaluation of the PUB study

The intention set out in the beginning of this chapter was to evaluate the PUB study by combining "judging" and "learning" approaches. In the sections addressing each set of guidelines, the analysis assessed the presence and quality of the suggested actions and considerations of the guidelines in the design of the PUB study. It also considered what lessons the PUB study offers for audience research. This assessment demonstrated both strengths and limitations in the way the PUB study was designed and conducted. Rather than repeat those findings here, this overall assessment reflects more generally on how the study fares against the framework and what its contributions are to addressing the research problem. The discussion to follow therefore attempts to answer the sub-question: (i) to what extent was the design and conduct of the PUB study appropriate to the goal and context of the programme, and (ii) what lessons does it offer?

The PUB study began by positioning its design and purpose within the broad communication context and intentions of the PUB programme, thus addressing the WHY questions. It

engaged the team involved in its implementation, looked to its institutional context and interrogated the objectives and underlying rationale of the programme. Based on the stated aims and guiding principles of the programme, an approach and research design were adopted which aimed to provide a foundation for public dialogue about biotechnology, through both its process (how it was conducted) and product (the information it generated).

In terms of process, the assessment of the PUB study against the various sets of guidelines demonstrates how the overall research design and methodological techniques employed strived to embrace dialogical principles. In investigating the WHY, WHO, WHAT and HOW elements of communication, the methods were designed to emphasise inclusivity and diversity, to avoid biasing and narrowing the range of possible responses, to acknowledge and learn from existing communication, and to appreciate the diversity of perspectives and situated expertise. In this way, the PUB study illustrates how deliberate inclusivity at audience research stage honours the principles of dialogue, helps to build relationships and foster trust, and potentially lays foundations for legitimate public dialogue.

In terms of the 'product' or outcomes of the research and whether these provide useful information for designing a communication strategy, the PUB study's contributions are mixed. On the one hand, the qualitative, open-ended methods allowed for unanticipated and nuanced findings to emerge, which offer in-depth understanding into how people make sense of biotechnology in the context of their own lives and how communication efforts can be framed to engage with people on these terms. The methods and findings of the study are therefore particularly valuable in terms of the WHAT element of communication as well as the WHY element, in terms of understanding stakeholder's motivations for communication. On the other hand, the methods did not produce readily usable audience segments (WHO) nor clear indications of communication channels through which to reach them (HOW). This reflects the limited capabilities of qualitative research for answering certain kinds of questions, as the research participants cannot be considered representative of the population groups to which they belong and the findings are therefore not statistically generalisable. Nevertheless, these challenges in the PUB study are extenuated by the clearly stated intention that the findings were to be considered only the beginning of a continued

process of public dialogue. A lesson to be learned here is that researchers must be realistic about what it is feasible to answer given the methods, time, resources and skills available.

Other important outcomes of the PUB study were the insights provided and the debate stimulated about the programme's strategic direction. These were elicited by the attention given to the WHY questions. It would be interesting for a follow-up inquiry to know whether these debates continued and how they were resolved. A key issue which the study highlighted is the tension in the PUB programme between the stated aim of balanced and neutral dialogue and the implicit rationale of a cognitive-deficit model. This contradiction not only constrains the effectiveness of the PUB programme but affects the extent to which the design of the PUB study can be said to have been appropriate to the purpose and context of the programme, since that purpose was not entirely clear. While the audience research was designed to guide a dialogical communication strategy, the usability of its findings would be limited if the institutional context was not committed to implementing and supporting such an approach. This apparent case of 'lost in translation' suggests that a harmonious link between GOAL and METHOD centres on effective communication between the client or commissioning agent and the researcher.

As described in this chapter, the PUB study employed a practice of closely involving the client, from holding a participatory planning workshop, to reviewing the programme's strategic documents, to eliciting feedback at key stages of the research. Notwithstanding the value of this approach, the PUB study faced the challenge of having to bridge disciplinary paradigms between the researcher and the client. The researcher was operating from a social science background with a democratic model of science in mind, while the client was positioned in a scientific literacy paradigm against a background of natural sciences. This may have constituted a 'noise' in the communication between client and researcher in clarifying the objectives of communication. A key lesson which emerges here is that the challenges of communicating about science play out not only amongst participants in a communication strategy or even between audience researcher and research participants, but between audience researcher and client. The relational dimension of applied research is thus a vital component in enabling the usability of research findings for its intended purpose and context.

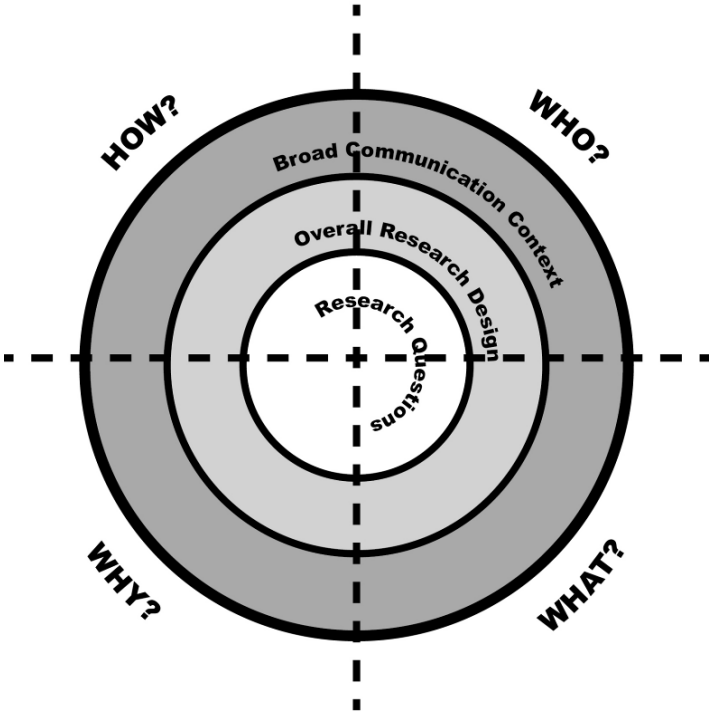
6.7.2 Reflection on the formulation and application of the guidelines

In applying the guidelines as an evaluation framework to the PUB study and thereby grounding them in the practical experience of this particular case, a number of lessons emerge about their formulation, suitability and applicability. These lessons are addressed below and should be noted for their future application:

- The guidelines contain a broad range of issues which point to useful guiding principles and suggested areas for attention in the strategising, planning and implementation of a communication strategy. It may not be realistic, however, to address them in totality within any one particular case of audience research. Researchers using the framework therefore need to make informed decisions about what is applicable to the purpose and scope of a given case of audience research.
- The application of the evaluation framework demonstrates an interrelationship between the various elements of audience research design. For example, the selection of research participants applies to the GENERAL as well as the WHO guidelines. Trusted sources of information relate to both the WHO and the HOW elements. The WHY and WHAT guidelines converge around the question of framing issues to enhance motivations to participate in communication, and so on. This realisation implies, following Feek (2009: 25), that: "It is the totality of the six [elements] that matters and therefore the totality of the [guidelines] that need to be assessed… It is essential not to isolate specific [guidelines] from any of the [others] in any of the planning, operation or evaluation phases".
- While the guidelines were focused, as intended, on the dimension of fitness for purpose, the discussion indicates that, to fully assess the quality of applied research, one cannot consider any dimension in isolation. The extent to which the design of audience research is appropriate to its intended goal and context will be partly contingent on the simultaneous satisfaction of these other dimensions, such as the study's scientific or methodological robustness, its economic feasibility, and the relational aspects of practice. In addition, the findings need to be communicated effectively to their intended audience in order to be available for use.

- It also emerged in the analysis that the elements of audience research design overlap or converge with the three spheres of audience research introduced in section 3.3.4 and depicted in Figure 3-2. Thus, each of the WHY, WHO, WHAT and HOW questions can be asked in an iterative manner in relation to the broader communication context, the overall research design, and the specific research questions. This convergence can be illustrated as a conceptual map, as shown in a Figure 6-4 below.

Figure 6-4: Conceptual map of spheres and elements of audience research design



6.7.3 Epistemological reflection

A final reflection concerns the epistemological relationship between the approach of the PUB study and the formulation of the guidelines. The assessment of the PUB study shows some degree of correspondence between the way in which the PUB study was designed and that which is recommended by the guidelines. Because a systematic process was followed for reviewing the literature and developing the guidelines, it can confidently be said that any alignment of the PUB study with the guidelines is a valid indication of a suitably designed study. However, as acknowledged in the epistemological position in section 2.2, it is an

inevitable consequence of this study's research design that the guidelines would partly reflect the analytical lens of the researcher and her experience in the PUB study. However, any such influence has been mitigated by triangulation with the analytical concepts found in the literature.

6.8 CHAPTER SUMMARY

This chapter has demonstrated the application of the guidelines as an evaluation framework to the PUB study, an empirical case of commissioned audience research. The framework, developed from the literature, provided a structure for systematically evaluating the adequacy of that study's design for its intended purpose and context and noting the contributions that this case study offers to other similar cases. In this process a number of realisations emerged about the formulation and application of the framework, which should be noted by researchers who intend to apply the guidelines, either for design or evaluation purposes.

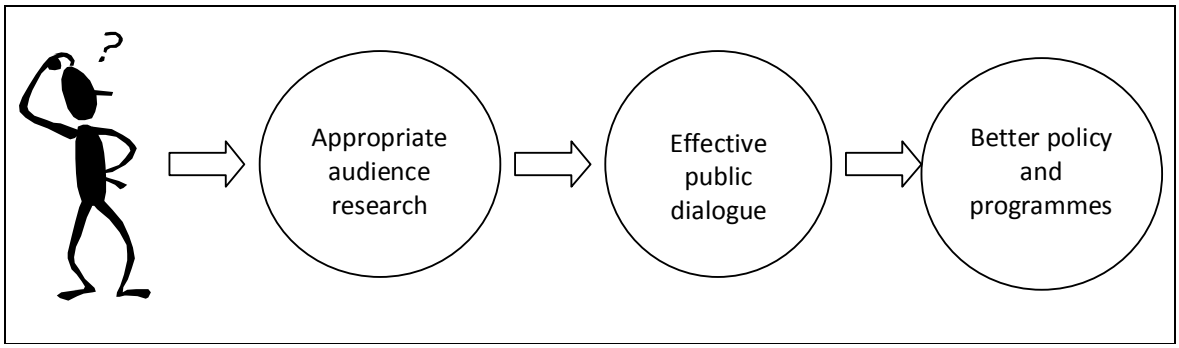
The process of this investigation has gradually answered the four research sub-questions, therein developing guidelines from relevant areas of the literature and then evaluating the case study against the guidelines. The final chapter, to follow, will draw together the dialectic of lessons from literature and the PUB study to answer the main research question of how audience research should be designed and conducted when the intended communication objective is public dialogue about science.

Chapter 7: Conclusion

7.1 INTRODUCTION

At the beginning of this dissertation, **Figure 1-1** (repeated below) was presented to illustrate the rationale and goal of this research. This concluding chapter recalls the problem the research set out to address and examines how the research question and sub-questions (represented by the person in the diagram and restated in section 7.2) have been resolved.

The importance of appropriate audience research for better policy and programmes



As depicted, the study began on the bases that (a) effective public dialogue can make for better policy and programme decisions and, in turn, that (b) appropriately designed formative audience research can enhance the effectiveness of public dialogue. What is meant by "better" policy and programmes has been described in this dissertation as: more accountable to priority needs and public values, more relevant to existing contexts and resources, and more effective in producing widely felt benefits that address social, economic and environmental injustices. "Effective" public dialogue was found to mean sustained engagement processes that have clear objectives, are widely representative, use accessible, inclusive and cost-effective methods, provide accurate balanced information, elicit useful contributions and are transparent, suitably timed, and linked to official decision-making. To get all this right – especially when policies or programmes concern challenging science and technology issues – requires careful planning, in which audience research can play an important role. Given the potentially valuable contribution of audience research to effective communication and ultimately towards development outcomes, this study set out to engage

critically with the methodology and process of audience research in relation to the purpose of such research.

The main question posed in this research was therefore to ask, with reference to the Public Understanding of Biotechnology programme, what good-quality, appropriate audience research should look like in the context of public dialogue and the challenges involved in communicating about scientific issues. The research methodology was designed to address the research question and four individual sub-questions through a process of analysing the literature and developing a set of guidelines for designing audience research that is fit for the purpose of public dialogue about science. This strategy enabled the creation of a structured framework based on the literature, followed by a critical evaluation of a real-life case of commissioned audience research (the PUB study) against this framework.

The next section presents the salient findings and conclusions for each sub-question and finally the main research question. Thereafter the limitations of the research are noted, followed by a summary of the study's main contributions. Recommendations are made for further research and a final closing statement is offered.

7.2 FINDINGS AND CONCLUSIONS

This study does not produce findings in the sense of empirical work, although numerous findings from the literature review are presented in Chapters 1, 3 and 4. The salient findings and conclusions for each sub-question are stated in the sections that follow, leading to the overall findings and conclusions for the main research question. Table 7-1 below illustrates how the focus of each sub-question leads to the main research question.

Table 7-1: Research questions and sub-questions

Sub-question 1	**Sub-question 2**	**Sub-question 3**	**Sub-question 4**
Adapting audience research for public dialogue	Communication challenges in public dialogue about science	Guidelines to evaluate audience research for public dialogue about science	Evaluation of the PUB study
Main research question			
How should audience research be designed and conducted for programmes that aim to promote public dialogue about science, with specific reference to the PUB programme?			

7.2.1 Sub-Question 1: Adapting audience research for public dialogue

The first step in the process of developing a framework of guidelines was taken in Chapter 3, which addressed sub-question 1:

> *How should audience research be designed and conducted when the objective of a communication programme is to promote public dialogue?*

To answer this question, a structured literature review brought together participatory development communication theories and methods on the one hand with knowledge on audience research on the other. The result was the creation of a broad set of guidelines for how to design and conduct audience research for public dialogue, structured in terms of five elements: WHY, GENERAL (overall research design), WHO, WHAT and HOW. This followed the components of the phrase, "Who says what to whom through what channel (how) and to what effect (why)?" From the process of this analysis, several important points stand out.

Firstly, acknowledging the longstanding tensions between the diffusion and participation paradigms in development communication, this dissertation confirmed the value of a complementary approach to these models, holding that the methods of both participation and information dissemination are needed for informed deliberative dialogue and constructive engagement between citizens and decision-makers. However, the principles and goals of the participatory paradigm – greater engagement in social and political

processes, sustainable change and collective action – are given precedence over the top-down, persuasion-oriented biases of diffusion or monological models.

Secondly, it was established that the intended purpose of communication should drive the design of audience research, hence beginning with the WHY guidelines to clarify objectives. Audience research, it was argued, should be undertaken with the responsibility of being the first act in an ongoing process of communication and should therefore set a foundation for the purpose and principles of the broader intended programme. The analysis of literature confirmed that since public dialogue posits a different purpose for communication (WHY), it implies different notions of audiences (WHO), channels (HOW), and topics (WHAT), and requires a different approach to audience research.

Thirdly, by reviewing existing approaches to audience research in development communication, it was found that audience research methods which espouse or serve to inform a transmission model of communication are inadequate for purposes of public dialogue. Thus, the study supported the need for a "double-dialogical" approach to audience research, where the research methods and the information they elicit reflect the dialogical principles and purposes of the communication they intend to inform (see Figure 3-1).

In conclusion, when the objective of communication is public dialogue, the design of audience research should be adapted to a double-dialogical approach, focusing on listening more than telling, building relationships rather than interrogating targets, and optimising inclusivity and diversity in the identification of participants, the framing of issues, and selection of channels and spaces for meaningful deliberative dialogue. How these principles can be operationalised in audience research is specified in an initial set of guidelines developed for public dialogue in general (as presented in Table 3-2).

7.2.2 Sub-Question 2: Challenges of public dialogue about science

The fourth chapter of this dissertation was dedicated to understanding the challenges of public dialogue about science as a specific context in which to apply and further adapt the guidelines developed in Chapter 3. In so doing it addressed sub-question 2:

What are the particular communication challenges inherent in public dialogue about science to which attention should be paid when designing audience research?

A review of selected literature in the wide and evolving field of science communication found reference to numerous difficulties in public dialogue about science and distilled these into the following key challenges, which need to be recognised and engaged with:

- The specialised and technical nature of scientific knowledge
- The complexity and multidimensionality of issues
- The obstacles to neutrality given commercial interests and influences in science
- The need to hold science accountable to social priorities
- The challenge of publics' lack of interest and low estimation of the value of their contributions to public dialogue about science
- The unpreparedness and resistance of technical experts and decision-makers towards dialogue

These challenges were found to have cross-cutting implications for communication and for the elements of audience research, as cross-tabulated in Table 4-1. The guidelines developed in the previous chapter for public dialogue in general were then amended so as to take account of the demands of these challenges, which require a sharpening of awareness of the appropriateness of audience research design for its intended purpose.

The analysis of the challenges found that while public dialogue about science is necessary and worthwhile, it can also be difficult, complex, unpredictable and marked by misunderstanding and polarisation amongst differing values, interests and worldviews. By integrating recognition of these challenges into the guidelines, the study demonstrates how audience research can help to establish democratic and inclusive terms of engagement at the very first stages of communication**.** If audience research can provide guidance on bringing diverse forms of knowledge into productive conversation, then the first steps will have been taken in creating a social contract for science and technology (Wilsdon, Wynne & Stilgoe 2005: 29), where social intelligence is injected into the process of setting research

priorities, making decisions, generating knowledge and harnessing scientific progress in service of a sustainable future.

7.2.3 Sub-Question 3: Guidelines for design and evaluation

Next, sub-question 3 asked:

> *Based on the findings of sub-questions (1) and (2), what guidelines can be used to evaluate the appropriateness of the design and conduct of audience research for public dialogue about science?*

The guidelines called for by this sub-question were developed and refined by answering the previous two sub-questions, resulting in a framework that draws together insights from audience research, participatory development communication and science communication in a way not previously done. These guidelines constitute a principal outcome of this study. For the sake of economy, the full set of guidelines is not repeated here but can be referred to in Table 4-3. To demonstrate how this sub-question has been answered, Table 7-1 summarises the key areas of attention addressed by the guidelines.

Table 7-2: Summary of guidelines

WHY: Clarifying objectives	Clarify the objectives of communication, from the point of view of the commissioning agent as well as other stakeholders' interests. Consider the underlying rationale for public engagement, and assess the state's intention to listen. Explore the feasibility and value of dialogue and dissemination approaches for the particular issue, context and availability of resources. Clarify the purpose, role and ethics of audience research within the broader communication strategy.
GENERAL: Overall research design	Promote active participation of stakeholders in planning, communication and implementation. Overall research design and participant selection should recognise complexity, minimise bias and enhance inclusivity. Use open-ended, interactive methods for participants to consider the range of issues and express their opinions, questions and concerns in the context of their lives. Consider audience research the beginning of ongoing dialogue.

WHO: Conceptualising and investigating dialogue participants	Investigate audiences as active, diverse, contributing stakeholders in a system of dialogue, including citizens, civil society groups, decision-makers, multidisciplinary technical experts and the state. Note the relationships, existing communications, interactions and power dynamics amongst them. For each, investigate variables that influence their situated expertise, technical aptitude, potential role in and contribution to dialogue. Propose audience segments as methods allow.
WHAT: Framing the issues from multiple perspectives	Explore the range of ways in which issues are framed and assessed in terms of participants' social context, experiences and values. Frame questions and probe responses in a balanced, open way to avoid biasing and narrowing scope of issues. Observe interactive discussions to guide framing in easy, socially relevant and accessible language and style.
HOW: Investigating channels and spaces for public dialogue	Assess existing and potential channels, resources and networks for dialogue and information dissemination, ensuring accessibility and visibility for all forms of knowledge and literacy, especially those often excluded. From the range of possibilities, consider appropriate channels for the given issue, context and audiences. Consider suitability of structured processes for deliberative dialogue.

The guidelines aimed to meet the requirements set out in section 2.4.2, which are restated here in italics.

> *Within the scope of this study, the guidelines should focus on 'fitness for purpose' – the appropriateness of the design and conduct of audience research for the goal and context of communication i.e. public dialogue about science.*

This requirement has been met. The GOAL-METHOD logic emphasised that the intended purpose of communication should be clarified first (hence starting with WHY element) and should drive the audience research design and methodology. The challenges of science communication were analysed as part of understanding the goal and context.

> *The guidelines should draw on knowledge and experience from relevant literature in the audience research, development communication, and science communication fields.*

This requirement was accomplished as the guidelines flowed directly from the analysis of literature in chapters 3 and 4. Still, the guidelines remain open to further improvement and enrichment based on other insights from literature and practice.

The guidelines should follow a learning approach, with guidelines to be applied critically and with flexibility to the particular context, not a prescriptive blueprint approach.

Indeed, the guidelines do not prescribe step-by-step instructions for designing audience research for public dialogue about science, but point to important principles and areas for attention. Their application to the PUB case study serves to demonstrate the flexibility and critical awareness with which they should be applied.

The guidelines should be applicable to the PUB case study as well as more widely in the practitioner and scholarly community.

Chapter 6 demonstrated the applicability of the guidelines to the PUB study. The guidelines are captured in a framework that can serve practitioners, but is also open to further theoretical studies. The development of the guidelines integrated references to other contexts described in the literature, which enhances the wider applicability of the guidelines. However, the practicality of their application in other contexts requires further study.

The guidelines should be formulated as suggested actions and considerations that can be used both to design audience research and to evaluate such design.

As formulated, the guidelines can be used to guide practitioners designing audience research for the said purpose. Chapter 6 illustrated how the set of guidelines can serve as an evaluation framework by considering the presence and quality of these suggested actions and considerations in the PUB study. The results of that process are addressed in the final sub-question.

7.2.4 Sub-question 4: Evaluation of the PUB study

The final component of the study was carried out in Chapter 6 and formulated in sub-question 4 as follows:

> *Applying these guidelines to a case of commissioned audience research for the Public Understanding of Biotechnology programme, (i) to what extent was its design and conduct appropriate to the goal of public dialogue about biotechnology, and (ii) what lessons does it offer?*

These questions were answered in Chapter 6 where the guidelines were applied to the PUB study in order to judge the appropriateness of its design and extract lessons for similar cases of audience research. The PUB study offered the opportunity to demonstrate the use of the guidelines for evaluation purposes and to ground this study in the experience of an actual case of commissioned audience research for an existing programme in all its real-life complexity. The framework of guidelines succeeds in revealing the strengths and weaknesses of an audience research project.

The assessment of the case study found that significant attention was given to the WHY questions in the PUB study, where the researcher explicitly sought to position the approach to audience research within the programme's broader strategy, purpose and institutional context. An unclear ultimate objective and mixed rationales for communication in the PUB programme were shown to constrain the focus and effectiveness of both the communication programme and the audience research project, thus confirming the primary importance of the WHY guidelines and the soundness of the GOAL-METHOD logic. Taking as a guide the PUB programme's aim to promote dialogue and balanced understanding of the range of issues at stake in biotechnology, the PUB study was designed with a view towards serving a dialogical purpose and principles, while considering potential communication methods in terms of both information dissemination *and* participation, listening *and* telling. This approach is evident in the research questions set out for the PUB study, in the process in which it was designed and conducted, and in the outcomes it produced. The principles of inclusivity and diversity have been applied across all the elements of audience research,

from participant selection to the mapping of stakeholders or audiences, and the investigation of framing, channels and motivations to participate. Thus, it can be concluded that the PUB study's design was appropriate to dialogical communication.

The evaluation of the case study found a number of lessons for audience research for public dialogue about science. The PUB study's open-ended research methods and the techniques used in the focus group discussions demonstrate a number of strategies for minimising bias, avoiding narrowing down the issues, inviting unanticipated responses and listening to how participants make sense of biotechnology in terms of their values and experiences. In this way the PUB study produces recommendations for how ongoing communication about biotechnology can be targeted and framed in a way that is meaningful, significant and addresses the priority questions, concerns and interests of participants. The evaluation of the PUB study shows that while the use of a qualitative methodology can generate in-depth, contextualised insights, these cannot be statistically generalised to a wider population. The PUB study's findings are therefore useful as a beginning for guiding the strategic direction of an ongoing process of communication, but are less able to provide readily implementable guidance on certain aspects such as clear audience segments.

It follows from the above that the usability of research findings are inseparably linked to the methodological robustness of a study's design. The evaluation also reflected on the importance of the relational dimension of research, where the communication between the commissioning agent and the researcher lies at the core of the applied research process. This is the level at which the programme's broader context and purpose must be understood, where the audience research defines its role and key questions, and ultimately where the findings of the research are to be communicated and handed over to be used. The way in which the PUB study closely involved the commissioning agent in the research process demonstrates a positive attempt at strengthening this communication, yet it still faced the challenge of bridging a gap in disciplinary and methodological cultures. The challenges of communicating about science therefore come full circle to face the audience researcher, who is confronted with working in interdisciplinary contexts.

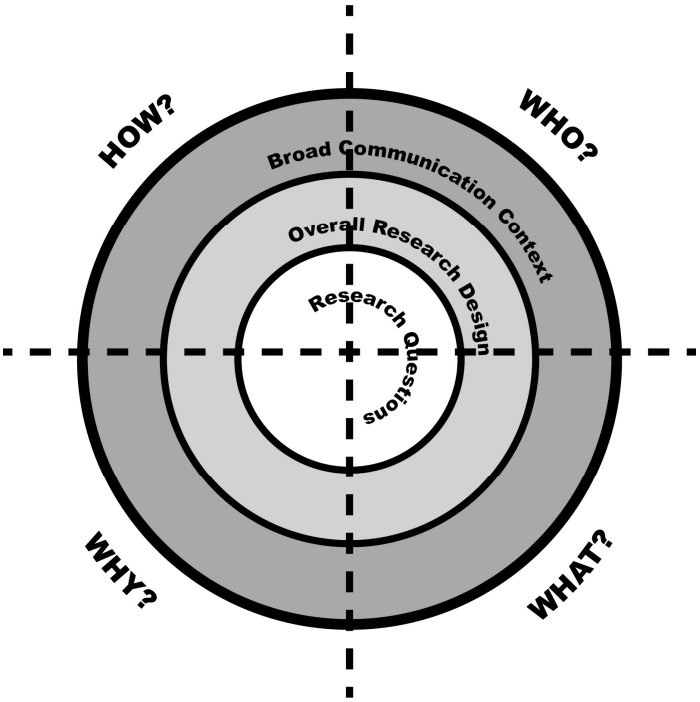
7.2.5 Main question: Designing audience research for public dialogue about science

The results of the four sub-questions let us answer the overarching research question:

> *How should audience research be designed and conducted for programmes that aim to promote public dialogue about science? (The initial reference to the PUB programme in the research question was merely to direct the study.)*

The use of the words "how should" in this question was perhaps inappropriate as they suggest a normative, prescriptive approach. This study does not claim to have the final answer on the matter, nor does it believe one exists. Instead it proposes an approach that is open to adaptive application, primarily captured in a framework of guidelines. In addition, the study offers a conceptual map for navigating the terrain of audience research for public dialogue about science, captured in **Figure 6-4**, which has been developed through the course of this dissertation and is repeated below.

Conceptual map of spheres and elements of audience research design



The overlapping spheres and quadrants of the conceptual map, along with the accompanying explanations below, capture some of the broader considerations in the approach to audience research proposed by this study.

- Audience researchers are advised to position their overall approach to research design in relation to the broader context and objective of communication, and within that to design appropriate research questions and data-collection strategies which generate the information required for the purpose of the research. As information is gathered it can inform subsequent phases of the research design (as happened in the PUB study) and provide necessary guidance to the broader communication programme. There is thus a flow inward and outward through the spheres. One can imagine the researcher stepping into these circles from the outside, moving through the spheres as the research progresses, then moving outward, delivering the outcomes to be used and stepping out.

- Researchers attempting dialogical audience research should determine the relative degree of participation implied by the objectives of the programme and the possibilities enabled by the given context. In reference to the spheres in the figure, participation embedded within the broader programme could mean active participation of stakeholders in the design and implementation of communication strategy. Where that is not possible, the overall research design (the centre sphere) can be based on participatory principles, in the ways suggested by the guidelines. At the level of the innermost circle, key questions can be asked in a way that informs the planning of public dialogue. The degree of participation in the PUB study corresponds to the inner two spheres, but is promoted in the outer sphere through its recommendations.

- Audience researchers should consider the interrelationships amongst the spheres and the elements of audience research, as was revealed in the evaluation of the PUB study. Firstly, the elements and (by implication) the guidelines should not be taken in isolation, hence the dotted lines in the figure. Secondly, the WHY, WHO and HOW questions can be asked at different spheres and stages of research. Thus, to get an initial understanding of the broader communication context, the audience researcher can ask about the objective and underlying rationale of communication (WHY), the commissioning agent

and institutional context (WHO), the agent's perspective and framing of the issues (WHAT) and existing and envisioned means of communication (HOW). At the central sphere of overall research design, WHY can denote the purpose of audience research, the WHO question applies to sampling or selection of research participants, WHAT refers to how the issues are framed during the research, and HOW refers to the research methods. At the innermost sphere, the research questions should investigate these elements in order to inform the communication strategy design. In other words: what are stakeholders' motivations and interests in communication (WHY), who are the various stakeholders and participants in the system of dialogue and what role and contribution do they offer (WHO), how can the issues be collaboratively framed for deliberation (WHAT) and what are appropriate channels for both listening and telling.

- The solid lines between the broader communication context and the audience research remind audience researchers of the importance of delineating what can realistically be investigated given the time, research skills and resources available, as well as what is allowed by the research methods. This was an important lesson from the PUB study. Thus, not all the issues raised by the guidelines and all the implications of the challenges of science communication need to be addressed directly by one audience research study. Some issues might require a response at a broader level.

In conclusion, the analysis of literature, the framework of guidelines and the conceptual map developed in this study present an approach to designing and conducting audience research which follows participatory principles in both its purpose and its design, ensuring a coherent GOAL-METHOD relationship. Thus, audience research becomes about building relationships, establishing trust and initiating an inclusive conversation amongst diverse stakeholders rather than interrogating targets and developing audience intelligence that serves the need of persuasion-oriented communication. It places people at the centre of the conversation, not as passive receivers of information but as active citizens and participants in communication and action, whose views and contributions must be appreciated and understood so that the gaps between participants can be bridged and constructive dialogue can take place. Audience research could inform how to transmit messages and wisdom between, across and amongst participants. If audience research is about enhancing the

relevance and appropriateness of communication to the audience's needs, it serves a crucial role for enhancing the inclusivity of public dialogue.

Where, according to Rogers (1999: 182), little is understood about "how audiences make sense of information about complex scientific issues", this study has proposed how audience research can enquire more deeply into people's relationships to and assessments of science issues. By contrast with the shortcomings of surveys often used as a source of public opinion on science, this alternative approach can recognise a diversity of publics' and lay people's knowledge, employ interactive research instruments, address ethical, political and metaphysical concerns and overcome technocentrism (Davison, Brans & Schibeci 1997).

In essence, the circular, iterative notion of communication and audience research presented in this study represents an entirely different 'geometry' of communication than the linear, one-way model implied by the sentence: *Who says what to whom through what channels and to what effect?*

7.3 DISCUSSION OF LIMITATIONS

The anticipated limitations and challenges of the study's research methodology were pointed out in section 2.5. Having completed the investigation at this stage, the limitations are briefly recalled in order to evaluate their impact on the findings and conclusions.

7.3.1 Scope of evaluation

The evaluation of the case study was done by assessing it against the guidelines developed, and not through empirical investigation, which would have been beyond the scope and complexity required of this level of study. The evaluation process as applied in the dissertation has nevertheless been valuable for reflecting on the case study in relation to the literature and for demonstrating the application of the framework of guidelines.

It can be added that the scope of evaluation and of the guidelines is limited to a particular dimension of interest, namely the fitness for purpose of the research design. The guidelines

do not address the methodological robustness, cost-effectiveness or relational and ethical dimensions for evaluating applied research, which means that the PUB study has not been evaluated on these terms. The focus of this study on fitness for purpose has been noted throughout the dissertation. This does not limit the validity of the findings in any way, it only circumscribes their scope.

7.3.2 Limitations for wider application

The guidelines, having been developed through a systematic analysis of the literature, are expected to be applicable and adaptable to other cases where audience research is required to inform the design of public dialogue about science. To some extent the development of the guidelines may reflect the specific purposes and circumstances of the PUB study, such as its emphasis on qualitative methods, the South African setting and the institutional context of the PUB programme. It is foreseen that the framework of guidelines might benefit from critical debate and improvement by other scholars and applied researchers based on other areas of literature as well as practical experience in different contexts.

7.3.3 Personal involvement

The researcher's direct involvement in the PUB study has been recognised as an inseparable and valuable source of knowledge in this study. The research design for this study allowed this personal experience to be reflected upon within a structured framework. Still, it is inevitable that the same lens and ideals of the researcher of the PUB study were also operating in this study in the selection of literature, the development of the guidelines and the evaluation of the case study. Rather than considering this a limitation to the study, it is seen as a consequence of the research design and a realised opportunity for learning that has emerged from bringing applied and academic research into conversation in this way. Possible influence by the researcher's involvement in the PUB study is countered by the strong literature basis for the framework of guidelines.

These stated limitations are to be noted in assessing the findings and conclusions of this study but, as argued above, they do not detract from the validity of the study's contributions, which are summarised in the following section.

7.4 SUMMARY OF THE STUDY'S CONTRIBUTIONS

The following key contributions have been made possible by this study at the interdisciplinary intersection of audience research methods, development communication and science communication.

- The study addressed the call for greater relevance of audience research in new communication contexts and domains, particularly in civil society and the public sphere (Livingstone 1998) as well as in relation to public engagement with science. In these contexts, the study demonstrated an alternative approach to audience research which is based on a participatory model of communication, can help to build a foundation for public dialogue and takes into consideration the particular challenges of communicating about science.

- The study contributes to the search for effective means of public engagement by providing practical guidance for the first steps of such a process, a methodological praxis for audience research that can be useful in the scholarly and practitioner communities. This is offered in the form of the set of guidelines, which can be used and adapted for designing and evaluating audience research in various contexts, and can also serve as a comparative framework. The guidelines can be applied to public dialogue generally, or particularly to science issues.

- By assessing the commissioned PUB study within a scholarly framework, the study has brought into view the relationship between applied and academic research. Applied research, like the PUB study, highlights the value of making research relevant and socially accountable by contributing to better, more informed planning, programming and policy decisions, rather than only creating knowledge for the sake of knowledge. Academic research, on the other hand, demonstrates the importance of situating one's research methods and approach within a broader body of knowledge and scholarship and exposing one's work to peer review. While academic researchers are challenged to seek increasing relevance, so applied researchers are challenged to maintain rigour in their methods.

7.5 SUGGESTIONS FOR FUTURE RESEARCH

The following suggestions of worthwhile areas of further research emerge from this study:

- This study has engaged with literature across a number of disciplines and, as set out in Chapter 1, has ventured only as deeply into each area as served the purposes of the study. It is acknowledged that the breadth of this cross-disciplinary undertaking limits the depth of insights possible within the scope of the study. It would therefore be useful for the guidelines to be subjected to further critical analysis by scholars who specialise in any of the component disciplines. How might the guidelines be enriched and improved by in-depth, expert knowledge from the point of view of audience studies, participatory democracy, science communication, and studies of science and citizenship?

- For the purposes of this study, the framework of guidelines focused on one particular dimension for assessing applied research: fitness for purpose. Further research could add other dimensions to the framework so that audience researchers can also be guided in terms of scientific rigour, cost-effectiveness, and ethical and relational aspects of practice, which are equally important dimensions.

- As already made clear elsewhere, the guidelines are offered as a contribution to critical debate and adaptable application by researchers within the needs of a particular context. Others are invited to apply the guidelines in different contexts to test their practical applicability for both design and evaluation purposes. It is imagined that through iterative testing and refinement by experienced communication scholars and practitioners, the guidelines can be strengthened and offered to a wider community of users in a more substantive, user-friendly form.

7.6 CLOSING

This dissertation has been impelled by a quest for relevance: relevance of research, of communication and of science to the pressing issues of our time. In an unequal world facing gross social injustice, poverty, widening inequality and environmental crises, the institutions of leadership in our society cannot afford *not* to pay attention to addressing these issues. They are complex problems that require creative, systemic and multifaceted solutions. The knowledge, resources and capacity to address these issues exists, if they can be harnessed, translated and guided by social priorities and human values. How to enable this kind of dialogue in practice remains a challenge, but one we must not give up on. Because communication across boundaries is difficult, it may simply be abandoned or done in the most predictable and tidy way possible, which will not generate the kind of solutions we need to solve our problems. If the chain of results in Figure 1-1 holds true (that appropriate audience research can inform effective dialogue for better programmes and policy) then communication practitioners and audience researchers have a crucial role to play in strengthening democratic processes that can direct the powers of science and technology towards a more sustainable future. Idealistic as this vision may sound, it resonates with Priest's (2005: 266) observation, with which this dissertation began and now ends:

> *It seems that as societies grow more complex – culturally and politically pluralistic, based on increasingly complex science and technology, aware of complex global interdependencies – communication and communication research become correspondingly more important.*

* * *

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Appendices

Appendix A: Permission from SAASTA to use PUB study for dissertation

SOUTH AFRICAN AGENCY FOR SCIENCE AND TECHNOLOGY ADVANCEMENT

SAASTA

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Research Administrator
University of Pretoria
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0002

To Whom It May Concern:

PERMISSION TO USE DATA FOR PUBLICATION AND ACADEMIC DISSERTATION

Ms Jenni Kruger was commissioned by SAASTA to conduct a qualitative target audience research to guide the design of a public communication programme around biotechnology based on the guiding principles of the PUB (Public Understanding of Biotechnology) programme. This commission has been successfully completed and she has submitted the final report.

SAASTA grants Ms Kruger permission to use the data collected in the process of completing the research project for publication and academic dissertation purposes on condition that the confidentiality of the research participants and key informants are protected. This, in particular, would mean not publishing names or contact details of research participants or key informants. At her own risk as principle investigator and first author, Ms Kruger may use the corporate identity of research participants provided that they have given their permission and this permission is documented.

This is particularly imperative since, as the funding and commissioning agent, SAASTA is directly associated with the research project and is responsible to ensure that the integrity of the information is maintained.

SAASTA also requests that upon publication of the research, the following accreditation be awarded. "This research project was made possible through the Public Understanding of Biotechnology programme, funded by the Department of Science and Technology (DST) and implemented by the South African Agency for Science and Technology Advancement (SAASTA)"

In addition, the Science Communications Unit thanks Ms Kruger for work well done and wishes her all of the best in her endeavours to further her studies.

Yours sincerely,

Lorenzo Raynard
Manager: Science Communication

Raynard 12/12/07

Appendix B: Ethical considerations in PUB study

Excerpt from Final Report (Kruger 2007b: 21)

This research was conducted with utmost commitment to ethical integrity and respect towards the client and the research participants. This was ensured through the following measures:

- The researcher's acceptance of the contract was conditional on there being no interest and/or influence by industry or government in particular results being accentuated or obscured.
- The researcher used methodological techniques to maintain as neutral a position as possible regarding the contested terrain of biotechnology so as not to bias the findings towards any particular view.
- The researchers (principal investigator and research assistant) were transparent with all participants about the purpose of the research, the source of its funding and commissioning, the demands on the participants and the expected consequences of the study. It was explained that there are no conceivable risks of participating (or choosing not to) for participants nor their communities, and that the benefits would not accrue to them directly but possibly to the public through the resulting communication campaign.
- Stakeholders' informed consent to participate in the research was not obtained in writing but by virtue of their agreement to be interviewed. Stakeholders were given the choice of anonymity and their permission was requested to use their and their organisations' names in reporting. (This permission was however not documented in any form, and as requested by SAASTA, their corporate identities shall therefore not be used).
- Written informed consent was obtained from all focus group discussion participants, which entailed ensuring that participants agree willingly to participate based on a clear understanding of what the research involves. An informed Consent form was created based on the guidelines of the University of Pretoria.
- The informed consent process detailed that the responses obtained would only be accessible to the research consultant, the research assistant (for the period of the research contract), the PUB team and an academic supervisor. This includes interview notes, transcripts and electronic files of the recordings of discussions.
- Focus group discussion participants were each given a R100 gift voucher from a retail store (with no interest whatsoever in the research) as a token to thank them for their time, effort and costs incurred to attend the discussion and for their contribution to this research. This is considered a gift and not an 'incentive' as such as they were *not* informed of the voucher beforehand. Individuals who assisted in recruiting participants were also given a R100 gift voucher for their efforts and in addition compensated for costs like telephone calls.
- While the responses in this research were not of a sensitive nature, the identity of focus group participants has been protected. The contact details of those individuals who expressed a wish to continue their involvement in the PUB programme were made available directly to PUB.
- In analysis of data and reporting, a commitment is made to usability of the findings, accuracy, honesty, acknowledgement of limitations and human welfare.

Appendix C: Selection of structured processes for facilitating public dialogue

Table C-1: Selection of structured processes for facilitating public dialogue
(drawn from Bojer, Knuth & Magner 2006; Pruitt & Thomas 2007; RCUK 2002; and www.peopleandparticipation.net).

Name of Process	Description
Open Space Technology	A participant-driven meeting framework that allows unlimited numbers of participants to set the agenda and form discussions about issues they are willing to take responsibility for. Useful for generating creative thinking, building collaborative working relationships and developing a sense of ownership.
World Café	A creative method set in the informal hospitable ambience of a café, with several rounds of conversations taking place at small group tables around inspiring questions. Participants move around between tables enabling cross-pollination of ideas, deepening insights and the emergence of the group's collective intelligence. (Brown & Isaacs 2002; www.theworldcafe.com)
Consensus Conferences and Citizens' Juries	A consensus conference is made up of a representative panel of 10-20 citizens who question expert witnesses on a particular topic of concern at a public conference, then weigh up the evidence in order to arrive at a statement of intent. The panel informs itself on the topic beforehand, chooses the experts and sets the questions for the hearing, which the public and press attend. Often used for assessing scientific and technological developments. (see UK National Consensus Conference on radioactive waste management in 1999). The Citizens' Jury follows the same structure except that it happens outside of general public view (Bojer *et al.* 2006).
21st Century Town Meetings	Events involving a large number of citizens (between 500 and 5,000) in deliberating planning, policy formulation and resource allocation decisions on local, regional or national issues. They combine the benefits of small scale face-to-face discussions with those of large group decision-making, using modern technology, including networked laptops and voting pads, to feed opinions and questions back and forth between the small groups and larger network. (www.americaspeaks.org)
Lekgotla	Originating in Sotho and Tswana village assemblies, Lekgotla is a consultative process whereby a leader poses a question or topic then passes a talking stick around a circle and listens to everyone's voices before assessing and summarising all the inputs and proposing a way forward.
Deliberative Polling	Developed by social researchers to overcome the uninformed nature of opinion polls, a deliberative poll quantitatively measures public opinion amongst a sampled group before and then after providing information and adequate time to reflect on the questions at hand.
Design Charettes	Used especially in urban planning, charettes are workshops that brings together people from different disciplines and backgrounds, including residents, planners and municipal officials, to explore design options for a particular area or site.
Theatre of the Oppressed	A group of dialogical theatrical forms in which audiences become active "spect-actors" who explore, analyse and transform their realities through interaction with a facilitator and the performers on stage. Developed in Brazil by Agosto Boal who was influenced by Paolo Freire (1994), with the intention of stimulating dialogue and overcoming conditions of oppression. (http://www.theatreoftheoppressed.org)
Participatory Budgeting	A number of mechanisms that delegate varying degrees of influence over local budgets, investment priorities and economic spending to citizens. Helps to enhance the efficiency and legitimacy of budget decisions as well as accountability to citizens' expressed priorities. (See Porto Alegre Municipality, Brazil for longest running PB process; Cornwall & Gaventa 2001)
Participatory Appraisal	A family of approaches enabling people to analyse their own realities, build community knowledge and encourage grassroots action. Uses several creative methods to map and visualise local understanding of issues. Synonymous with Participatory Rapid Appraisal (PRA) and Participatory Learning and Action (PLA).

Appendix D: Research questions of the PUB study

Excerpt from Final Report (Kruger 2007b: 14)

Specifically, this research aimed **to identify and analyse target audiences as participants in biotechnology communication, seeking to understand their perceptions, information needs and preferred communication channels**. This main question was broken down into the following research questions which were defined at a planning workshop by the PUB team and the research consultant:

1. **Stakeholders**
   - 1.1. Who are some of the relevant stakeholders in the biotechnology scene?
   - 1.2. What are they communicating to the public?
   - 1.3. Through what methods/channels do they convey messages and how do they receive feedback?
   - 1.4. To whom are they communicating?
   - 1.5. What motivates them to communicate about biotechnology?
   - 1.6. What recommendations and lessons can be learned for communicating with the public about biotechnology?

2. **Public segmentation**
   - 2.1. Who is the South African public relevant to biotechnology?
   - 2.2. How can this diverse public be segmented?
   - 2.3. Which segments should be prioritised as participants in biotechnology communication, and why?

For these segments:

3. **Knowledge and Perceptions**
   - 3.1. What is their present level of knowledge and opinions of biotechnology?
   - 3.2. What are their questions (information needs) and concerns regarding biotechnology?
   - 3.3. What are priority issues within biotechnology?

4. **Communication methods**
   - 4.1. How do they know what they currently know about biotechnology?
   - 4.2. What are appropriate channels for multi-directional communication? *(sources of info as well as feedback mechanisms)*
   - 4.3. Who is considered a trustworthy, authoritative source to convey this information?
   - 4.4. How do they themselves frame the issues for discussion – how to talk about it, what to talk about?
   - 4.5. Why would they participate in biotechnology debate?

5. **Context**
   What role do context and value systems play in their interaction with biotechnology matters? Other influences?

Appendix E: Stakeholder interview guide for the PUB study

Excerpt from PUB Report (Kruger 2007b: 102)

1. How would you describe your organisation with regards to its position on biotechnology?

2. Would you be willing for your organisation's name to be referred to in reports, or would you prefer to remain confidential? If confidential, could we refer to your organisation as you described it above?

3. What is the message that (your organisation) is communicating to the public? What views does (your organisation) hold? What evidence do you base your views on?

4. Who are you communicating with? Who are your audiences?

5. What channels/media do you use for communicating with your audiences?

6. In your communication with people, is there any attempt to give your audiences a basic understanding of the science of biotechnology?

7. What is it that drives and motivates you in your work for (your organisation)?

8. What barriers do you perceive to accomplishing your aims?

9. What do you think about the idea of a public dialogue in South Africa? Can it be done? Challenges?

10. Who is affected by biotechnology?

11. Who amongst the public already has a specific interest in biotech issues?

12. Can we break down biotechnology into specific areas which directly affect peoples' lives?

13. Why should the public understand biotechnology? What's the point of getting involved?

14. Do you have any recommendations to PUB for how they should go about communicating about biotechnology?

Thank you for your participation in this study.

Appendix F-1: Focus group discussion guide for the PUB study

Excerpt from Final Report (Kruger 2007b: 105-107)
Note: Words in italics indicate instructions to researcher

A. Introduction

Welcome and thanks
Thank participants for being there, introduce self and go around the circle for everyone to introduce themselves.

Introduction of research and focus group process
My name is Bongiwe/Jenni. We are working as independent research consultants for the Public Understanding of Biotechnology programme, or PUB, run by the South African Agency for Science and Technology Advancement and funded by the Department of Science and Technology. PUB is a public communication programme which aims to improve balanced understanding of biotechnology, its applications, benefits and risks, and stimulate dialogue about this amongst the public.

This research is to find out how best PUB should go about communicating with the public about biotechnology, and it will guide the design of a public communication campaign. We have invited you to participate in this discussion here today so that we can hear about your views. It doesn't matter if you don't know anything about biotechnology – most people don't. I will guide the discussion with certain questions, and there are no right or wrong answers. I value what everyone has to say. To give everyone a chance, and to cover all the questions, I might need to move the discussion along, so please don't be offended if I stop you. It will take no more than 2 hours, and we will take a short break to get some refreshments.

You can choose not to answer any questions if you like, and you are welcome to leave the discussion at any time without any harm or loss caused to you. If you choose to leave, I'd be interested to know why. You will not benefit directly from this research, but your input will contribute towards a campaign which if successful will improve people's knowledge and informed decision making about biotechnology. I have brought a small gift for everyone here today to thank you for your time and contributions.

With your permission, I will record our discussion on this digital recorder, which will help me to focus on listening now and later be able to remember everything you said. The recording will be written out later, without using any names, so your responses will be kept confidential. The recording will be safely stored.

To protect the rights of research participants, it is customary to ask participants to clearly give their written permission to participate in research like this, once they are fully informed about what it is all about. I ask you to please consider the information I've given you, ask any questions you might still have, and if you choose, sign this form to say that you agree to participate and understand what the research is about. Are there any questions about the research?

Questions
Answer any questions directly related to the nature and purpose of the research.

Informed Consent
Hand out consent letters and informed consent forms. Read aloud if necessary. Ask other participants to sign as witnesses. Ensure that forms are fully completed.

B. Open-ended exploration

What comes to mind when you hear the word "biotechnology"?

Allow lots of brainstorming then openly explore and probe responses e.g. Tell me more about this. What makes you say that? Where did you learn that? Is that a positive or negative thing? What excites you about this? What are the questions that come up for you? What are your concerns?

C. Biotechnology applications

If I break down the word biotechnology I see the words BIO, which means life, and TECHNOLOGY, which is about tools. So then we can say that biotechnology is about using living things and processes to make and improve products for human needs.

Biotechnology is very broad. We can break it down into different areas and uses, like ...

Place in centre of group, cards containing the following words/pictures and read out:

Food & Drink	***Agriculture & Farming***	***DNA & Crime Forensics***
Health	***Environment***	***Industry***

Let's look a little closer at each one.

Name some applications within each category– not explaining in detail, just giving a short lead without implying any value judgement.

The applications:
- **Food** (traditional – making yoghurt/cheese/beer/wine/bread, food made from GM crops)
- **DNA & Forensics** (science that helps to solve crimes, DNA fingerprinting – tracing bodily material to crime suspects, paternity tests, forensic entomology (insects) – *high education only*)
- **Agriculture & farming** (traditional selective breeding, genetic modification of crops)
- **Health** (medicines, vaccines, fertility treatment, predicting inherited/genetic conditions, therapeutic cloning – stem cells to repair organs, reproductive cloning – whole organisms?)
- **Environmental** (treating waste, cleaning oil spills, endangered species)
- **Industrial** (mining, washing powder with enzymes, biofuels)

For each category, elicit responses, exploring:

- What have you heard about this?
- What excites you about this?
- What are your questions about this?
- What concerns do you have about this?

Now that you know more about the various applications of biotechnology, can we arrange the cards in order from those you are most interested in learning more about, to those you are least interested in learning about.
Facilitate discussions that arise from this process, probing reasoning. Write down order.

D. Communication

People involved in biotechnology include scientists, government, universities, companies, religious groups, and activist groups who promote or disagree with some aspects of biotechnology. The public is another very important stakeholder because biotechnology has an impact on people's lives, and so it is important that the public can understand the benefits and risks and make informed decisions.

We need to know what would be the best way to engage the public in communication about biotechnology.

So first, please tell me: What are **all the ways** that you communicate? How do know what you know about things happening around you?

(Probe for various media and interpersonal/group communication channels. For value/faith groups: ask about communication channels within their faith communities)

Now considering all these communication channels you have told me about, what would be the best ways to communicate with you **about biotechnology**?

If there was something about biotechnology (on TV, radio, paper, in social group discussion, exhibition, AS SUGGESTED ABOVE) what would make you **stop and pay attention** to it?

Who would you **trust** to tell you the truth about biotechnology and these various applications?

After all that we have spoken about, maybe we can summarise by you telling me: what are **the real issues** for you that need to be spoken about when it comes to biotechnology?

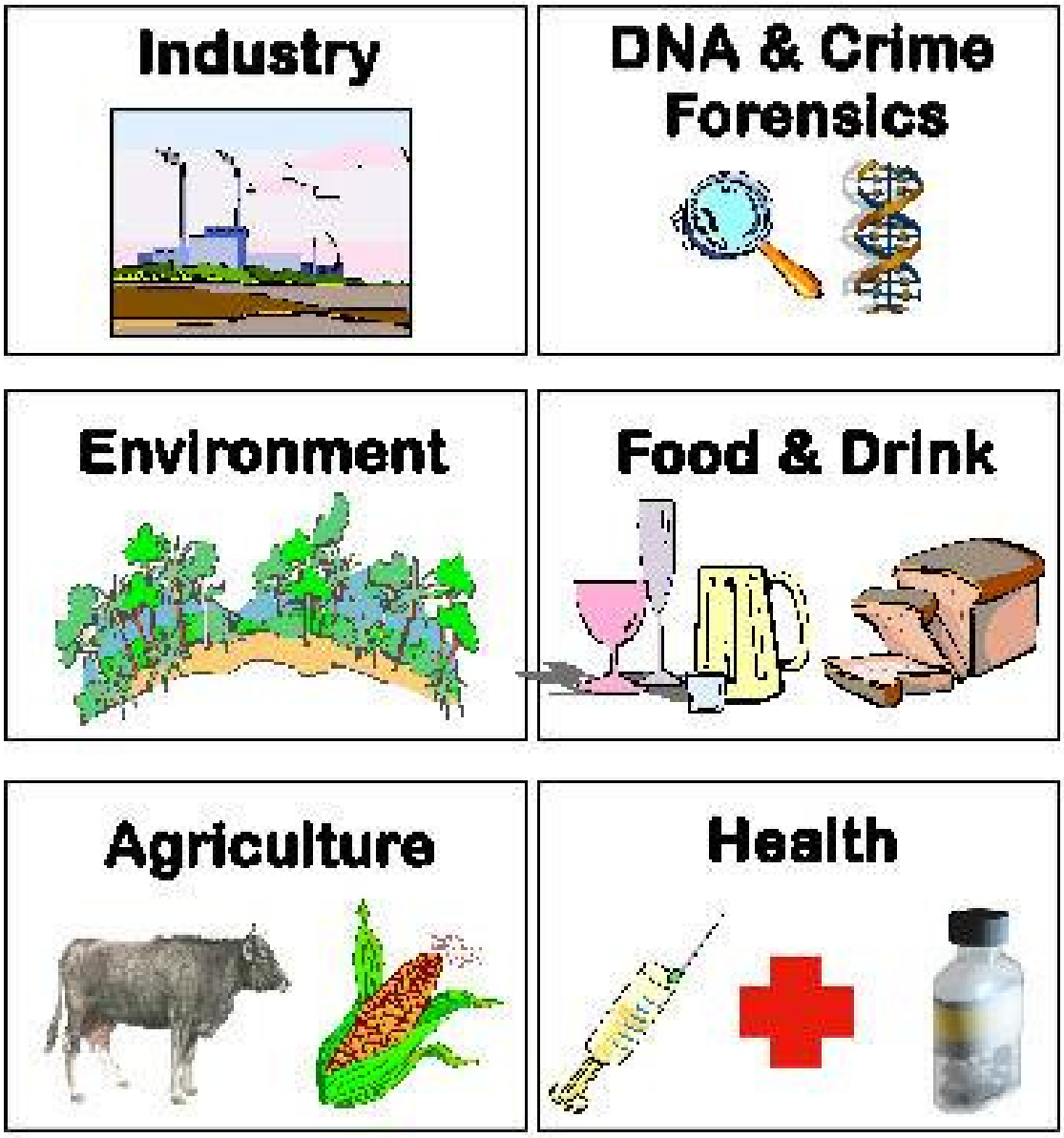
How do you see your **own role** in a discussion of these issues?

We have come to the end of the discussion. Is there **anything** that anyone would like to add?

Thank you very much for your contributions and your time.

Give a gift of gratitude [grocery shop vouchers] to participants.

Appendix F-2: Cards used for participatory ranking in focus group discussions



Appendix G: Executive summary of the Final Report of the PUB study

Excerpt from Final Report (Kruger 2007b: 6-8)

The South African government is committed to biotechnology as a key driver of scientific, economic and human progress, yet a large-scale survey conducted in 2004 shows that 8 of 10 South Africans had never heard of biotechnology. Public understanding and acceptance is considered essential for the responsible development of this technology which is expected to have an increasing impact on our lives. The *Public Understanding of Biotechnology (PUB)* programme was initiated with a neutral mandate by the Department of Science & Technology to promote balanced understanding of biotechnology – the scientific as well as related ethical and social issues - and stimulate debate about its applications, benefits and risks in society to enable informed decision-making.

The intended audience of the PUB programme includes learners, educators and the general public. Since the South African public is so diverse, PUB commissioned this qualitative audience research in order to better target its public communication strategy for priority audience segments, with an understanding of their questions and concerns about biotechnology, appropriate communication channels, their views on what the priority issues are and how they ought to be addressed. The results are intended to complement the findings of a large quantitative survey conducted in 2004 by PUB and the HSRC.

The first phase of this study drew on desk research - including a review of PUB's strategy, relevant communication literature and the results of the 2004 quantitative survey – as well as semi-structured interviews with a wide variety of stakeholders actively involved in biotechnology. From this an initial framework of specific segments of the intended audience was devised. In the next phase, focus group discussions were facilitated with purposefully selected groups of people from each of these segments. They include consumers of various levels of wealth (low, medium and high Living Standard Measure), farmers (both developing and commercial) and five faith or value-based groups (Muslim, Christian, Jewish, African Traditional and Environmentalist-Altruistic).

The study generates in-depth insights and strategic guidance for PUB's challenge of engaging the public in communication about this complex issue. The inclusive approach used in the study had the additional strength of building relationships, establishing rapport, sparking interest in biotechnology and encouraging further involvement. The participants' responses cannot be considered representative of the broader public, due to the small sample involved, the selective initial segmentation and the limitations of qualitative research.

The study highlights the need for PUB, together with government, to clarify the ultimate objectives of public communication about biotechnology. Suggestions for these broader objectives include supporting democracy and rights to information and enabling better policy decision-making that is

informed by public priorities and values, thereby making the technology accountable to citizens and South Africa's priority needs. While some research participants considered such goals worthwhile, others considered how they might use their increased knowledge to make choices to improve their own lives. Still others would be satisfied just with the goal of improving their knowledge. There is no point to a dialogue, some said, if nobody is listening and if there are no choices to make, such as whether to eat genetically modified food. The concern about GM food was widespread, especially since maize is a staple food and health a priority issue in South Africa.

Existing knowledge of biotechnology and its applications was generally very limited amongst participants. There were varying shades of knowledge apparent however, indicating that knowledge created by Western science and conveyed through formal education is not the only type. Many participants, though perhaps not familiar with the term biotechnology, were familiar with various aspects of traditional biotechnology, and those involved in its use - such as farmers - had considerable practical knowledge developed through experience. This suggests opportunities to develop a greater understanding of indigenous biotechnology knowledge and casts questions on the conclusion from the quantitative survey that "8 out of 10 people did not know what biotechnology is".

Participants' information needs and concerns about biotechnology centre on common questions such as "What is this biotechnology and what does it mean for our lives? How might it help or harm me? Is it good, safe and right – for me, other people, for the environment, for the future? What are our choices? If I'm concerned, what can I do? Who's listening and how does my opinion count? Who's accountable? Where do we draw the line?" These questions could be considered as the suggested contents of communication materials and the agenda for a public dialogue.

As the topic of biotechnology is technically complex, not considered immediately relevant, and competes for salience with other priorities, it is important to frame biotechnology communication in ways that show its practical relevance to people's lives and concerns. Scientific details are less important than situating the issues in human context. The greatest interest was expressed in biotechnology applications that deal with health, agriculture, food and the environment, considered as interrelated aspects that impact on our lives.

A strong case emerged for the use of interpersonal and group communication channels in existing networks. These provide opportunities for interaction and feedback in a familiar environment and are accessible to audiences who use such channels more than formal media. These can be complemented with mass media, such as radio, television, print media and internet, with preferences varying per audience. Journalists and other stakeholders are recommended as a gateway channel through which to access other audiences and to provide balanced information.

Asked who they would trust to tell them the truth about biotechnology, many participants said they would trust 'ordinary people' who are neutral, transparent, display integrity and concern for people's well-being, and are able to communicate their knowledge about the facts and broader issues in a non-intimidating way. Formal biotechnology training was not an important prerequisite. Many said they would not trust anybody with vested interests to convey information about biotechnology, including industry-sponsored research. Some suggested a forum where the audience members can make up their own mind after considering the views of a panel of experts with different perspectives.

The findings support the initial selection of intended audiences: developing farmers, commercial farmers, consumers of different living standard groups, and various faith and value groups. This selection however is not exhaustive, and should be extended to include younger audiences, to include tertiary education institutions in PUB's previous focus on learners and educators, and to partner and train with media groups and journalists. Further statistical analysis of the quantitative survey could further define the relevant audience segments.

In addition, it is recommended that PUB situate its role within the network of existing biotechnology stakeholders who already communicate diverse messages to their audiences. By taking the role of facilitator, PUB could provide a platform for dialogue amongst the stakeholders and public, assist understanding of basic scientific facts behind various arguments, and channel the public's and stakeholders' concerns to government.

This study should be considered as only the beginning of a longer, more participative process of multi-directional learning between the public, existing biotechnology stakeholders, and government as participants in deliberative dialogue. Research, design, communication and evaluation can be integrated into an action learning approach, with lessons to be learned from other countries in the use of such methods. Provided there is higher level commitment to public engagement, PUB has the potential to play a unique role in facilitating this process. To do this, PUB will need to establish rapport as a neutral body with the aim of promoting not biotechnology but balanced understanding thereof. It will be necessary to expand in its perspective and skills beyond occidental 'hard science' to enable consideration of social, environmental, ethical and political aspects which are at play in this truly multidisciplinary issue.