

**DRAFT GUIDANCE FOR COMMUNICATING ON GENE TECHNOLOGY [TITLE TBC]**  
**[Year Date to be Added]**

This document was developed by the Gene Technology Ethics and Community Consultative Committee (GTECCC).<sup>1</sup>

The Gene Technology Ethics and Community Consultative Committee (GTECCC) is one of the two statutory committees established under the *Gene Technology Act 2000* (Cwth). As outlined in the Act, the Committee’s function is to provide advice to the Gene Technology Regulator and to the Gene Technology Ministers’ Meeting. Consistent with these functions, the GTECCC has developed this document with a working title “Guidance for communicating on gene technology [insert year date]” (Guidance).

## **1. CONTEXT**

Gene technologies can have far-reaching and complex effects on all living things – including people – and the environment. It is, therefore, important that we communicate about gene technologies with clarity and integrity. This Guidance is intended to help people communicate about gene technology effectively, including but not limited to researchers, Institutional Biosafety Committees (IBCs), organisations and individuals regulated by the Act, companies, and media and communications professionals. In this way GTECCC hopes to contribute to the public’s engagement with gene technology, and their ongoing confidence in the regulatory scheme.

## **2. AIMS OF THE GUIDANCE**

The over-arching aim of the Guidance is to improve gene technology communication outcomes and to foster and support responsible communication about gene technology and the regulatory scheme. More specifically, the:

- **guiding questions** aim to provide ‘prompts’ for those working with gene technology to consider when preparing for, and engaging in, communication about gene technology;
- **story-telling case studies** aim to illustrate how multiple questions can be relevant in different communications scenarios; and the
- **background paper** aims to facilitate scholarly reflection on questions about communication by drawing reader’s attention to the relevant scholarly literature, including references that informed the development of the guiding questions.

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<sup>1</sup> The Gene Technology Ethics and Community Consultative Committee (GTECCC) is a statutory advisory committee established under section 106 of the *Gene Technology Act 2000* (Cwth) to advise the Gene Technology Regulator and the Gene Technology Ministerial Council. The opinions expressed in this discussion paper represent the views of the GTECCC and do not necessarily reflect those held by the Office of the Gene Technology Regulator (OGTR) that provides the Secretariat to the Committee.

### 3. GUIDANCE FOR COMMUNICATING

#### 3.1 GUIDING QUESTIONS

The following questions aim to facilitate reflection on, and action towards, best practice when preparing to communicate about gene technologies. They are based on a review of principles and global best practices for communicating about technical developments that can have far-reaching or complex effects on people, all living things and the environment.

1. What is your purpose or goal (i.e., why do you want to communicate) and on what time scale do you hope to achieve that goal?
2. In an era plagued by ‘mis/disinformation’ and so-called ‘fake news,’ what are likely to be the most effective and ethical strategies for communicating about gene technologies?
3. With whom do you wish to engage—that is, who is your audience or target?
4. How can you ensure that your communication is transparent and that you are open about assumptions and uncertainties, benefits and risks?
5. Are you communicating based on your specific expertise, and what evidence will you use to ensure that your claims are accurate and can be externally fact checked?
6. How can you move away from our usual (ineffectual) approaches centred on information transfer to approaches that promote engagement, discussion, deliberation, and/or bidirectional exchange to meet people ‘where they are’?
7. What forms of media are the best for communicating your message and why?
8. What values, meanings, attitudes, beliefs, or other underlying considerations should be articulated when crafting your communication plan and the language used within it?
9. Given the rapid pace of developments in gene technology research, how can your communication strategy be designed to remain relevant and valid for as long as possible?

#### 3.2 THE STORY-TELLING CASE STUDIES

A series of story-telling case studies, labelled A – F, have been developed as examples of situations where consideration of multiple guiding questions is likely to be relevant. One of these, Case Study A, has been elaborated as a worked example containing hypothetical responses to the guiding questions (page 6).

Further development of the themes and literature that underpin the application of the guiding questions is provided in the background paper and further reading (page 12).

##### **Case Study A**

On Queensland’s Darling Downs, temperatures are increasing. The all-important “finishing rains” are decreasing. Sally Gore thinks that gene tech needs to be deployed quickly to develop new crop varieties or her farm will cease to be viable in these changing conditions. Gene tech is also needed to ensure Australia’s future food security, she thinks. She also believes that crop innovation is stymied by the fear that consumers won’t buy GM products.

As a farmer, Sally is frequently asked her opinion of GM crops.

How can she communicate her views about the need for GM crops to consumers in a way that is also ethical?

### **Case Study B**

Priya Sharma is a PhD student in an Australian university-based molecular biology lab that has a focus on crop science. Her research is focused on using CRISPR/Cas 9 to gene edit a major cereal crop to make it more resilient, and she is very excited about the potential for using such a precise and efficient technology for these purposes. She is hopeful that she will be able to use site-directed nuclease (SDN) 1 rather than more 'problematic' techniques.

Priya has been invited to do a presentation at a 'science in pub' event for the general public and to address current debates about regulation of gene technology.

What should she say about whether gene editing is 'different' than conventional breeding or older GMO-related techniques? Should she present a 'balanced view' or strictly her own scientific opinion?

### **Case Study C**

John White is the media, communications, and public engagement officer for a major Australian academic research centre focused on creating new solutions for agriculture in light of climate change. The scientific investigators within his centre are at very early stages of their research with gene technologies on various plants, with actual solutions likely to translate to the field and farmer likely to be 15-20 years away at a minimum. He is asked to write a press release on a recent lab finding about a genetic mechanism in wheat that could permit it to be more saline resistant than traditional varieties, which the scientists describe as making it 'more sustainable.' This research is in very early stages, and it is not clear precisely how the mechanism will affect the overall plant itself, particularly in the medium- to long-term.

How should John present the benefits of this finding for a general public audience in terms of real-world impacts?

John is also preparing a media training session for the centre's scientists including ECRs: what should he address regarding communicating to various publics about these types of findings?

### **Case Study D**

Dr Huw Jarvis is a large animal vet who is often asked for advice by the farmers with whom he works, many of whom are boutique producers who pride themselves on their natural products and sell them at a premium price. The farmers are concerned about the status of any of their animals who are vaccinated with GMO vaccines, such as for salmonella in birds and cows, and circovirus in pigs, among a number of other examples. Dr Jarvis is aware of a 2010 report by the World Organization for Animal Health (OIE), the Food and Agriculture Organization (FAO), and the World Health Organization (WHO) which suggested that animals vaccinated with GMO vaccines should not be considered GM animals. Further, the report clarified the difference between GM food and the use of GMO vaccines based on a difference in intentions. More specifically, with GMO foods the intention is to introduce a new trait into a food which will be present in the food eaten by the consumer. With GMO vaccines, however, the intention is to introduce a protective immune response into food animals by means of an immunogen that is often no longer itself present at the time the animal is slaughtered, but sometimes is. What should Dr Jarvis tell these farmers about whether they should inform their customers when GMO vaccines have been used? Should these animals be considered to have been genetically modified? Should Dr Jarvis argue that they could still be claimed to be organic?

### **Case Study E**

Biohackers in the US claim to be genetically engineering themselves with injections of home-brewed materials. It's a publicity stunt. The claims are baseless. Nonetheless, members of the Australian DIYBio community get calls from journalists for their opinion. The Australian DIYBio community comes from all walks of life. It is united by the desire to do hands-on biology outside of academia. It operates equipped PC-1 certified community labs, where members can do things like develop genetic tests for monitoring rare species. Members don't typically have training in media or ethics. They don't want people thinking that they are genetically engineering themselves or acting irresponsibly. Should the DIYBio community talk with the media? If so, what are the key issues that they should make the public aware of?

### **Case Study F**

The Welcome Life Hospital in Melbourne is embarking on a first-in-human clinical trial of gene therapy for a serious, heritable skin disorder. The gene therapy was developed by Welcome Life researchers.

John Agnassi is a nurse who will be caring for the patients in the trial. John has heard the researchers talk about the research being “ground-breaking” and “revolutionary”. He knows that the Welcome Life leadership expect the clinical trial to enhance the hospital’s global reputation as a research powerhouse. CEO Jane Mwamba has made it clear she wants the trial to be a “success” and for nothing to go wrong.

John worries about the risk of unintended exposure to gene therapy or to the viral vector that is being used to introduce it into the body. He has shared his concerns with other staff, and they have requested a meeting with Hospital leadership.

Use the Guiding Questions to help Mwamba and her colleagues prepare for the meeting. How should they communicate with staff?

**Case Study A (see page 2) – Hypothetical responses to the guiding questions**

No	Guiding Question	Hypothetical Response
1	What is your purpose or goal (i.e., why do you want to communicate) and on what time scale do you hope to achieve that goal?	<p>Sally wishes to communicate to:</p> <ul style="list-style-type: none"> <li>• Share her farming (and broader food production/security) challenges and explain how science/R&amp;D has helped to address many challenges over many decades/over the history of agriculture.</li> <li>• Encourage greater science/R&amp;D investment in new crop varieties that are adapted to changing climate and other challenges, and to also ensure that Australia’s regulations are based on science and keep pace with new tools and technologies.</li> <li>• Explain why gene technology science is a means to achieve this (e.g. faster times from laboratory to paddock, compared with other plant science options).</li> <li>• Allay fears and build confidence about gene technology for food production.</li> <li>• Explain how farmers in Australia and overseas are growing gene technology derived crop varieties and the outcomes these have delivered.</li> </ul> <p>Sally sees this as a long-term communication challenge, although she would like to see more funding investment/new projects in the next two-three years.</p>
2	In an era plagued by ‘mis/disinformation’ and so-called ‘fake news,’ what are likely to be the most effective and ethical strategies for communicating about gene technologies?	<ul style="list-style-type: none"> <li>• Sally wishes to provide factual, science-based information that is relevant to her target audiences.</li> <li>• Sally knows that she does not have all the facts/information at her fingertips, and as she is not a scientist, she can only share her own experiences (which may have included growing GM crops on her farm).</li> <li>• Sally acknowledges that in order to deliver effective and ethical communication, she will need to call on the assistance of a range of experts to assist her in delivering fact-based information.</li> </ul>

3	With whom do you wish to engage—that is, who is your audience or target?	<p>Sally has a number of target audiences:</p> <ul style="list-style-type: none"> <li>• Fellow farmers – she would like to see more farmers aware of the gene technology options and advocating for more investment in gene technology plant science.</li> <li>• Developers/research agencies – she would like to see more ‘developers’, developing gene technology plant varieties for the Australian market, and in doing so, having confidence in Australia’s regulatory system and path-to-market, as well as Aussie farmers adopting new varieties. These organisations include seed companies, plant breeding organisations, universities and science/research organisations.</li> <li>• Funders – she would like to see funding agencies (such as the Rural Research and Development Corporations and Departments of Agriculture) investing in gene technology science.</li> <li>• Policy makers – she would like to see policy makers showing confidence in gene technology science and regulation (and avoiding non-science political debates).</li> <li>• Agriculture advocacy/membership bodies – she would like to see her farming representative bodies (such as state farming associations and national commodity organisations) more engaged on this issue to advocate for greater investment in, and effective regulation of, gene technologies.</li> <li>• Media – the media is both a communication vehicle and a target audience. Sally would like to see key media outlets (rural, regional and metropolitan) looking to share science-based information, not creating headlines from non-science-based claims.</li> <li>• Community – she would like to see the community ‘comfortable’ rather than fearful of crop varieties developed from gene technology – and ‘comfortable’ with eating food derived from these crops.</li> </ul>
4	How can you ensure that your communication is transparent and that you are open about assumptions and	<ul style="list-style-type: none"> <li>• Sally can tell her own ‘on farm’ story – which is a true/factual story.</li> <li>• She is going to look to source science-based data to provide references, case studies etc.</li> <li>• She is going to be honest about farmer experiences – for example, she knows that when GM cotton was first introduced it took some time for farmers to work with seed companies, agronomists and the broader industry to get the best out of the new varieties. This is often the case with any new crop variety, and she will explain this story and how farmers worked together with the industry to best ‘deploy’ this new</li> </ul>

	<p>uncertainties, benefits and risks?</p>	<p>technology on their farms, not dissimilar to how people took a while to adopt/get used to and utilise mobile telephones (and how many use them for different reasons/utilise different features).</p> <ul style="list-style-type: none"> <li>• Sally is going to refer questions she does not have the answers to/experience about to the relevant expert/expert organisation and/or source science data and fact sheets where she can.</li> </ul>
<p>5</p>	<p>Are you communicating based on your specific expertise, and what evidence will you use to ensure that your claims are accurate and can be externally fact checked?</p>	<p>Accepting that she does not have all the knowledge at her fingertips, Sally has identified a number of individuals/entities who she sees can assist in providing communication support – e.g. by sharing information within their areas of expertise/their experience. These ‘helpers’ include:</p> <ul style="list-style-type: none"> <li>• A scientist from a national research organisation who can talk about different types of plant science and how gene technology science compares with other plant breeding tools.</li> <li>• A neighbour/cotton farmer from the Darling Downs - who has grown GM cotton since 2010 and can explain how this works ‘on farm’ in their farming business.</li> <li>• A grower advisor from the cotton peak industry body – who can explain how the cotton industry has managed and overseen GM cotton in Australia since it was developed and introduced, including how it is sold and marketed.</li> <li>• A representative from the relevant regulator, the Office of the Gene Technology Regular (OGTR), who can explain how this plant science is regulated in Australia.</li> <li>• A farmer from Cootamundra, who Sally met at a NSWFA meeting - who has grown GM canola for five years.</li> <li>• An agronomist from a leading farming systems group – who reviews a lot of farm data in the Wimmera region and can talk about why farmers opt or don’t opt to grow GM canola and the on-farm results observed over the past decade.</li> <li>• A grain trader who sells Australian grain including GM canola into overseas and domestic markets to discuss customer perception, how customer perceptions/demands are met, and how to improve the acceptance of GM products by the end consumer.</li> </ul>



		<p>Sally can also reach out to a national commodity/farming organisation to seek its support in the provision of information, including research reports and fact sheets. This may also provide her with a link to a broader network of farmers who can share their stories and experiences.</p> <p>Sally can draw on these examples when she is asked to provide commentary. She can also talk about the changing farming environment she faces in the Darling Downs and why she believes more investment in gene technology science can deliver varieties with ‘in-built’ solutions – e.g. wheat varieties that can grow with less water.</p>
6	<p>How can you move away from our usual (ineffectual) approaches centred on information transfer to approaches that promote engagement, discussion, deliberation, and/or bidirectional exchange to meet people ‘where they are’?</p>	<p>Sally is hoping that by engaging with all the entities listed (At Question 5) she can utilise a wide range of approaches. While this is not a complete list, she has thought of the following ideas:</p> <ul style="list-style-type: none"> <li>• Major Field days – for farmers and the media.</li> <li>• Farm days – e.g. Regional Updates (hosted by R&amp;D Corporations), Farming Systems Field Days (e.g. walk through crops etc).</li> <li>• Discussions/community/group meetings – to engage interested people. This could be physical events and/or online events and/or media broadcast events and include a variety of spokespeople.</li> <li>• Agriculture Shows – e.g. the Royal Melbourne Show – to engage city-based audiences.</li> <li>• Popular television shows – rural shows (e.g. Landline), cooking shows.</li> <li>• Utilising social media – to engage with a broader community to provide an authentic story about her farm, the changing operating environment and how new crops and plant technologies will allow her farm to adapt and continue into the future.</li> </ul> <p>Sally has read about Australia’s First Consensus Conference on Gene Technology. She would like to do something like this, but as a single voice/farmer in the Darling Downs she doesn’t have the capacity to organise this. She will raise this with a range of entities.</p>

7	What forms of media are the best for communicating your message and why?	<p>Sally intends to target:</p> <ul style="list-style-type: none"> <li>• Print media – rural (e.g. Weekly Times), regional (e.g. local newspapers - many of which now have Facebook pages/digital footprints), metro (e.g. Sydney Morning Herald) and special interest (e.g. Women’s magazines, RM Williams magazine)</li> <li>• Radio – rural (e.g. Country Hour), regional (e.g. local talk back) and metro.</li> <li>• Television – regional broadcasts, rural shows such as Landline (watched by many city-based people).</li> <li>• Social media – Sally believes that X (formerly Twitter), Facebook and TikTok would help to encourage a broad conversation, however, she does not have the capacity to manage all this and manage her farm etc, so she is going to ask the entities she has identified if they can assist with this. She also thinks she might enrol in a social media course to better understand how these tools work and possibly try and do some media/presentation training. She does have a Facebook and TikTok account and is going to try to use these to share more of her on farm stories/on farm challenges. She might even be able to make some short videos featuring some of her near neighbours who share her views and experiences.</li> </ul>
8	What values, meanings, attitudes, beliefs, or other underlying considerations should be articulated when crafting your communication plan and the language used within it?	<ul style="list-style-type: none"> <li>• Sally aims to engage in honest communication and always listen to what people are saying (listen and respond, rather than dismiss).</li> <li>• Sally is aware that she has expert agriculture/food production knowledge that many do not have, so she may have to provide a lot of background about this, about how farmers operate. Sally will also avoid using acronyms and scientific jargon – i.e. she will try and explain this to non-agriculturally informed audiences in general terms where she can (for example, even the word ‘agronomy’ may be unfamiliar to non-farming audiences), in a manner that she would use when talking to and explaining something to primary school children. She appreciates that different audiences will have different understanding and belief and she will try and change her communication to suit the audience where she can.</li> </ul>
9	Given the rapid pace of developments in gene technology research, how can your communication	<p>Sally is going to do her best to stay up-to-date with new plant science tools and technologies. She will try and read as much as she can from science-based sources, however, she is going to have to rely on other experts – such as scientists in the field/particular disciplines – to help to ensure her information remains up-to-date and accurate. She also believes that farmers are only ‘one part’ of this story, so others in the supply chain (as</p>

	strategy be designed to remain relevant and valid for as long as possible?	identified at Question 5) also need to play a role/take some responsibility. Sally will also be looking to these entities to identify new communication tools, technologies and techniques.
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### 3.3 THE BACKGROUND PAPER INCLUDING FURTHER READING

This background paper articulates **themes in the science communication literature**. The development of these themes was in response to literature research that explored the following question: **What guiding principles govern global best practices for communicating about technical developments that will have far-reaching or complex effects on people or the environment?**

**1. The “why?” behind communication is often unclear (or problematic) making it difficult to determine best practice. But the literature does give alternative communication purposes to consider.**

- a. The literature frequently reported that one of the biggest issues with science communication is that the purpose of communication is often not stated and appears unclear even to those who are promoting communication or engaging in it. Institutional communicators in particular *assume* that communication is purposeful and beneficial without evidence that this is the case.
- b. We do not know how diverse these assumed benefits or purposes are, or whether the assumptions made by different sectors are in conflict (but suspect that they are). Unarticulated assumptions make it impossible to evaluate effectiveness of different approaches or determine best practice.
- c. When the purpose of communication is stated, it is often vague, and the connection between the communication activity and the desired outcome unclear. For example, “to raise public awareness” (with the purpose of doing so remaining unarticulated), “to promote” science or investment in a scientific field, “to educate the public,” or “to avoid public controversy.” We note that some of these objectives fall foul of, or are outside of, OGTR’s mandate (see the recent review of the Gene Technology Act for more details).
- d. However, the literature also gives alternatives to consider when reflecting on the potential purposes of OGTR communications about technological developments. For example, facilitating resolution of public controversy; enabling mutual learning; building democratic capacity through deliberation; increasing representation of diverse voices in decision making; broadening input on debates associated with policy and values; and fostering responsible innovation and better policy.
- e. The literature emphasises the need to be clear about the goal(s) and purpose(s) of communication as best practices will differ significantly depending on this factor (Kappel & Holmen 2019).

**2. Many science communication efforts are guided by the faulty ‘deficit model’. In contrast, robust approaches acknowledge the need to promote mutual bidirectional knowledge sharing and communication.**

- a. The ‘deficit model’ underlies many approaches to science communication. According to this model, the public is assumed or diagnosed as ignorant of, and lacking interest in, science. The key goal is to fill the public with clear and accurate information, and to foster more ‘science literacy’ (Nisbet & Scheufele 2009; Simis et al. 2016).
- b. The evidence shows that this approach is ineffectual either for fostering engagement with, or interest in science, let alone support for it.

- c. The most robust and up-to-date approaches to science communication rely on acknowledging and incorporating the knowledge, perspectives, experiences, and values that publics bring to their interactions with science and technology, and fostering conditions for and training that promotes mutual engagement and bidirectional communication (see e.g. Reincke et al. 2020).

**3. Approaches to ‘communication’ are often narrowly focused on the written word delivered via a website. But other types of media may work better.**

- a. Communication is often taken to mean the written word delivered digitally through a website or social media. There is often insufficient reflection on who is the target of communication, and ways in which diverse publics may require different approaches.
- b. Given the need to consider differing values, perspectives, experiences, and – importantly – goals, in connection to any science communication initiative, there are clearly problems with a one-size-fits-all approach (Nisbet & Scheufele 2009).
- c. Using digitally delivered text may be relatively easy or inexpensive but fail to generate the desired public engagement or participation.
- d. Other types of media may be more appropriate, such as forums, art or film, or citizen participatory events, to name just a few alternatives.

**4. Communicating ‘post-normal’ science is difficult. It requires a deeper awareness of differing values and meaning than communication of standard science.**

- a. Communication is particularly tricky in fields that are rapidly evolving, technical, and with uncertain impacts, such as gene technology. These attributes are shared by several scientific fields such as neuroscience, and computer and information science in relation to artificial intelligence. This domain is described as ‘post-normal’ science (see Brossard et al. 2019, which borrows the term from Ravetz 1999). Purely technical expertise is not enough to address the risks and benefits associated with post-normal science as there are also social, ethical, and legal dimensions.
- b. This need to engage multiple disciplines and publics should be reflected in communication about this type of science. Communication efforts should consider how, why, and when information can be shared with publics, including the critical question of how to engage publics about technologies that are in flux and have uncertain impacts (either negative or positive).
- c. Political, social, cultural, economic, and ethical concerns impact and are impacted by science communication: just as science is never ‘value free,’ so too is science communication infused with values and with decisions that depend on values.
- d. Science communication requires deeper awareness of how meaning is shaped at multiple levels not only by factors internal to the process but also those outside of it that are part of publics’ interpretations (see Smith & Garramon Merkle 2021).

**5. Rapidly developing technologies create a new dilemma for science communication. Communication of these technologies requires careful curation and timing.**

- a. Rapidly developing technologies such as gene technologies create significant pressures to communicate at speed, and when outcomes are still in flux. (Medvecky & Leach 2019).
- b. Those engaging in science communication must consider the impact of announcements, critical responses, and publications, and not simply engage or communicate because of external pressures. But it is also critical that publics can influence technology development, and do not only receive communication when technologies are well-developed and their use assumed or predetermined.

**6. Science communication is a hybrid field, and thus so are its norms. Identifying goals and target publics will help clarify the norms of a communication initiative.**

- a. Science communication draws on a mix of various fields, each of which have their own guiding ethical norms and principles (Medvecky & Leach 2019). These include the norms of science itself, journalistic ethics, public relations and business codes of ethics, and communication ethics, some of which are in direct tension with each other.
- b. Values such as truthfulness can be interpreted differently in these diverse contexts, particularly depending on to whom an individual or organisation has responsibilities or accountability (e.g., shareholders versus publics).
- c. What counts as ‘ethical communication’ clearly requires that communication be accurate. But some argue it should also consider how to use communication to create more good in the world and to foster greater human worth and dignity (e.g., NCA 1999). Some of these norms are echoed in the OGTR’s own documents such as the National Framework of Ethical Principles in Gene Technology (2012).
- d. Framing – how different individuals or groups understand and communicate reality – also matters to public engagement (Bauer & Bogner 2020). Those seeking to engage in ethical and effective science communication about technology development must consider their assumptions. They must be careful not to use framing that imposes their assumptions on the publics, and to resist perpetuating unhelpful norms.
- e. In a domain as complex as gene technology, there are unlikely to be a simple set of rules or guidelines that can be provided to individuals, institutions, or groups about how, when, and to whom communication should occur. Conflicts will be faced depending on the different roles played by the entity trying to communicate (e.g., OGTR as regulator versus a university wishing to promote its research).
- f. To help provide clarity regarding the norms and principles governing a communication initiative, communication efforts should be curated with the overarching goals of the initiative and diverse target publics at which they are aimed in view (e.g., see AAAS Logic Model for Public Engagement with Science).

**7. One-way communication is not sufficient, particularly for certain complex sciences. Close consideration of models that involve end-users in deliberation and even decision making is also required.**

- a. There are growing trends toward involving end-users and publics in deliberation about technology not only when technologies have been developed but at the earliest stages

of the processes, including in the planning and application of technologies. End-users and publics are involved, for example, through co-design, deliberative engagement, patient representatives (in medical research), *Responsible Research and Innovation* programs, and community-led scientific initiatives (see e.g. DIISRTE 2018, Nowak & Paton 2018).

- b. Outward communication to the publics is necessary for all these types of initiatives. But alone it is not sufficient, particularly in complex scientific domains that are expected to impact society and where values, experiences, and lay knowledge are critical, such as gene technologies.
- c. Close consideration of models that involve end users in some type of bidirectional knowledge exchange is critical for deciding on an approach (see e.g. Scheufele et al 2021).

**8. Science communication is an immature discipline. This makes it difficult to determine best practice.**

- a. As outlined in the themes above, there are many underlying assumptions and gaps associated with science communication, indicating that more research is required in this domain.
- b. Key assumptions are that communication and engagement are in themselves ‘good.’ But the research shows that this is not the case, and that evaluation must be done in relation to the goals of the communication or engagement initiative, and with focus on the targeted publics and their involvement (for a review, see Kappel & Holmen 2019).
- c. Similarly, science communication has tended to rely on one narrative - the march of progress toward discoveries and truth. This narrative leaves out certain publics. It also fails to recognise that science has sometimes caused harm, for instance to Indigenous communities and in developing countries (Leach & Medvecky 2019).
- d. This lack of maturity makes it difficult to determine best practice.

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## Glossary

**Deficit model (also information deficit model) of science communication:** This model attributes a public indifference or hostility to science to their lack of understanding or knowledge. It implies that science communication should focus on experts educating non-experts. The model has repeatedly been shown to be empirically incorrect and theoretically problematic.

**Framing:** Framing refers to how context and language can alter interpretation of information. For example, using the term “development” versus “advance” to describe research.

**Narrative (or storytelling):** An account of the interactions between people and events over time. In communication practice it can be used to improve engagement with, and recall of, embedded information. Narrative is frequently used in science communication, journalism, advertising, and public health messaging. Alternative techniques for information delivery include didactic or fact-based content, such as information sheets.

**Science communication:** Practices for sharing scientific knowledge.

**Post-normal science:** Science that is rapidly evolving, technical, and with highly uncertain impacts, and where purely technical expertise is insufficient to assess risks and benefits that have social, ethical, and legal dimensions.

**Publics:** Groups of people united by common ideas, hobbies, interests, etc. Used to emphasise that “the public” is not uniform, and that individuals are likely to belong to more than one group.

**Public engagement or public participation:** The practice of involving publics in policy formation, agenda setting and decision making.

## Appendix 1

### A: Development of this Guidance

In the Third Review of the Australian National Gene Technology Scheme (October 2018), it was noted that there is a need to communicate appropriately with the public about gene technology including its applications and end products. The Review recommended that the Commonwealth Gene Technology Regulator continue to lead communication activities on topics related to the assessment of risk associated with gene technology. Soon after, GTECCC commenced work on the development of the guidance.

June 2019 – The Committee:

- discussed the need for, and purpose of guidance – i.e., to provide a reference point for OGTR and others who communicate about gene technology
- discussed the values that would underpin guidance.

November 2019 – GTECCC agreed to refer work on ‘guiding principles’ to the next membership of the committee.

October 2021 – Following re-appointment of the Committee and changes in processes due to COVID-19, GTECCC resumed development of guiding principles. The Committee:

- discussed progress on guiding principles
- agreed to establish a phase I working party for the purposes of undertaking research to find key literature (literature review)
- agreed to consider next steps for guiding principles, following the literature review.

October 2021 to June 2022 – On behalf of GTECCC the phase I working party conducted literature research and drafted a report on the literature. This work also articulated the themes identified in the background paper. For further information about the research process please see Part B of Appendix 1 (below).

June 2022 – The working party provided the Committee a preview of work to date on the literature review. The Committee:

- clarified the purpose and intent of guiding principles
- discussed who guiding principles would be aimed at and identified target audiences
- provided feedback on the literature review so far.

November 2022 – GTECCC was presented with a report on the literature by the phase I working party. GTECCC considered the report on the literature and discussed next steps. The Committee:

- clarified the target audience of guiding principles
- considered whether a workshop with stakeholders would be appropriate
- discussed developing case studies to assist with discussion at such a workshop
- agreed to consider next steps and discuss at the next meeting.

May 2023 – GTECCC discussed project timelines for guiding principles and agreed to hold a workshop with communication experts to inform further development. The Committee:

- added to the purpose of guiding principles, with the addition of “Improving gene technology communication outcomes and fostering or supporting responsible communication about gene technology”
- discussed the timeframe for the project, including potential exposure at the IBC Forum in 2024
- provided input into a plan for a workshop with external participants.

October 2023 – GTECCC undertook a workshop with external participants and formed a phase II working party. The Committee:

- engaged with academics and experts in the communications field to inform guiding principles
- discussed workshop outcomes and formed a phase II working group to further develop guiding principles by formulating a set of questions
- GTECCC considered the intent of a second workshop, to test the questions prepared by the working group.

2024 – GTECCC continued development of guidance, in preparation for the IBC Forum. GTECCC phase II working party formulated questions and disseminated these to the Committee for comment.

May 2024 – GTECCC held an informal workshop to consider the question-led approach devised by the Committee.

June to August 2024 – GTECCC undertook out-of-session revisions of the draft guidance document in preparation for exposure of the document for public comment and presentation at the September 2024 IBC Forum.

[September to November 2024 – presentation of the draft guidance document at the IBC Forum on 16 September 2024 coinciding with a period of eight weeks of public release and call for comment.]

## **B: Approach to report on the literature for the Background Paper**

*Conducted on behalf of GTECCC by the Phase I Working Group: Professor Rachel A. Ankeny, Dr Rachel Nowak, and Dr Robert Sward AM (Convenor)*

### **The question the report on the literature sought to address:**

What guiding principles govern global best practices for communicating about technical developments that will have far-reaching or complex effects on people or the environment?

The phase I working group took a broad scoping approach that included literatures and approaches associated with genetic modification (GM) and other types of technologies and developments. The word ‘developments’ was chosen so to take a value-neutral approach, as compared to ‘advances’ or ‘innovations’ which might be read as indicating endorsement or reinforcing positive narratives. The working group used the words ‘far-reaching’ and ‘complex’ to be inclusive. These words described what is important (and most difficult) to consider, regarding the potential implications of gene technologies and how they are communicated, as compared to communication approaches associated with developments where impacts are more delimited and/or predictable.

Literature searches were extensive, but not exhaustive or strictly speaking systematic. There likely were additional worthwhile pieces of literature not identified in this review, particularly in languages other than English. The group used standard scholarly scientific and interdisciplinary databases including Medline, Scopus, PsychINFO, JSTOR, and Project MUSE, and identified grey literature available via the internet in English such as professional societies, research councils and institutes, science communication-related organisations, and GM-opposed organisations. They developed a standardised search strategy using keywords associated with science engagement and communication, and with the specific technologies of interest related to the OGTR's mandate. The latter search strings were borrowed from a previous project which Prof Ankeny recently performed for FSANZ on novel breeding techniques. The working group also used a snowballing technique and added relevant literature included in the bibliographies or references of the resources identified using our searches.

The working group considered searching for literature published over the previous 20 years, but as expectations regarding societal expectations and best communication practices had changed significantly during this period, searches were limited to the previous 10 years. The group screened the literature generated for relevance to the research question, analysed the relevant literature, and constructed a summary of the themes articulated through the analysis, as well as identifying some key references. On completion the working group noted that the total number of references identified was relatively small (less than 50 in total, combining the grey and scholarly literatures) and there were fewer than 20 references that were considered highly relevant to our focal question.

#### Gaps:

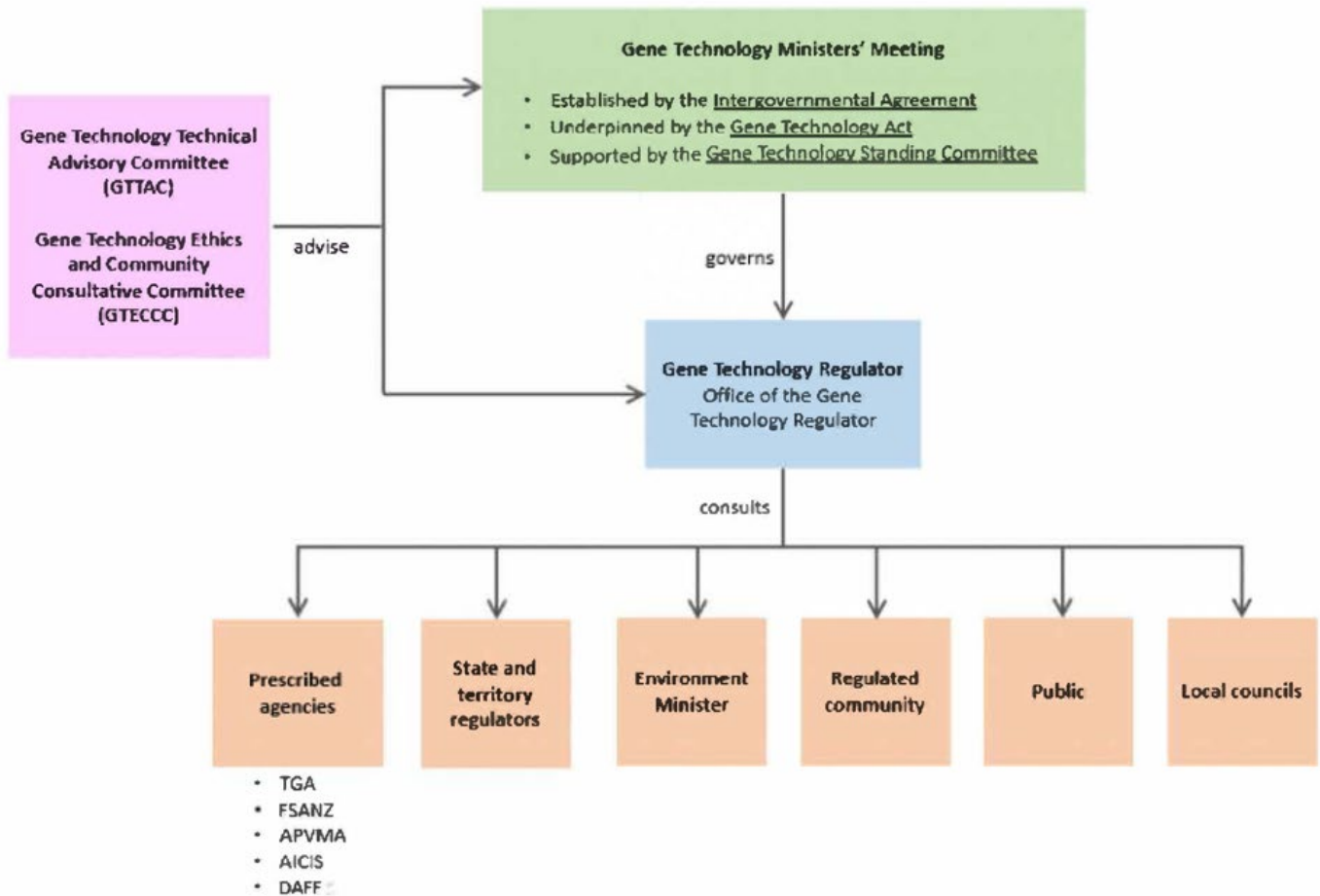
There was a dearth of formalised material and resources available even where it might have been expected to be found (e.g., in the grey literature from peak bodies focused in part on engaging or communicating with the public). The working group suspected that many think that answers to the question that was articulated for the background paper and identified themes are obvious, or perhaps that communication principles in other domains are directly applicable in this one. There is a considerable literature and resources about how to engage with the media, but this was not the primary focus of the literature review.

## Appendix 2

### THE NATIONAL REGULATORY CONTEXT

#### A. The National Gene Technology Scheme

The gene technology regulatory scheme is a national collaborative scheme involving the governments of all Australian jurisdictions and a Gene Technology Ministers' Meeting. Further information is available at: <https://www.genetechnology.gov.au/>



#### B. The Office of the Gene Technology Regulator

Under the *Gene Technology Act 2000* (Cwth), the Gene Technology Regulator (GTR) is responsible for protecting the health and safety of people and the environment by identifying risks posed by, or as a result of gene technology and managing those risks through regulating certain dealings with genetically modified organisms. The Office of the Gene Technology Regulator (OGTR) assists the GTR to administer the gene technology regulatory system and sits within the Commonwealth Department of Health and Aged Care.

### **C. The Gene Technology Ethics and Community Consultative Committee**

The GTECCC provides advice to the Gene Technology Regulator and the Gene Technology Ministers' Meeting.

The *Gene Technology Act 2000* (Cwth) establishes GTECCC. The Regulator and the Ministers' Meeting can request advice from the committee on:

- ethical issues relating to gene technology
- principles, guidelines and codes of practice for genetically modified organisms (GMOs) and genetically modified (GM) products
- community Consultative on the process for applications for licences covering dealings that involve the intentional release of a GMO into the environment (DIRs)
- risk communication matters for DIRs
- matters of general concern about GMOs
- matters identified by the Regulator.