Getting heard: a writing guide for scientists and engineers in government

By Melanie Smallman, Think-Lab, October 2009

Foreword

The world faces a range of significant global challenges including food and water shortages, energy security, climate change, human and animal diseases, and counter-terrorism. Science and engineering can provide solutions to these and more, but none of the answers the world requires will be realised if the skills we need to communicate them have been neglected.

As science and engineering professionals we must continue to work effectively with each other and with other stakeholders both in Government and elsewhere. We all have an instrumental role to play in developing and delivering the policy solutions needed to mitigate these issues. Perhaps most importantly, we must ensure a fully informed public is kept up to speed.

The key to better understanding is better communication, and as well as our collective need to improve verbal communication, it is in our writing that the impact of our messages must be maximised. That is why I am pleased to present this writing guide aimed at Government scientists and engineers, produced by Think-Lab for the Government Science & Engineering (GSE) community. I hope that you find it useful.

Professor John Beddington
Government Chief Scientific Adviser

Introduction

As issues such as the need for new energy sources, the influenza pandemic, international conflict and potential food shortages rise up the public agenda, science and engineering is having a greater impact on our lives. And with that greater role comes increasing pressure on scientists and engineers to communicate their work to policymakers and the public.

Working with publicly funded science and engineering, there is also a duty on us to be accountable and open about what and how evidence is used in policymaking if we want people to be confident about the policies we make.

But we live in an information-rich world, where only the clearest messages get heard. And our expectations are rising – we're all used to reading and hearing information presented by professional communicators, so the stakes are high if you want to get your point across.

That doesn't mean that you can't get heard though. Communicating science or engineering effectively to non-scientists isn't that different to communicating well with your colleagues. And if you can get it right with non-specialist audiences, then you'll learn valuable skills that will help you be even more effective in communicating with experts.

This guide, produced for the Government Science & Engineering (GSE) community, aims to support you in your communication activities. It is by no means a comprehensive summary of current thinking in the academic science communication field, but instead aims to provide a reminder of the lessons that will be most valuable to you in a practical setting, to make sure that your point gets heard every time.

The Science Bit

In communication theory, written communication is sometimes described according to a linear communication model developed for telecommunications called the Shannon-Weaver model. While this strips communications down to its most basic form (communication is rarely one-way, for instance) it can provide a useful model for planning your communications:

You (the sender) have a message that you want to send to your audience (the receiver) through a piece of writing (the medium).

Once the 'message' reaches the receiver (i.e. the article is read) the receiver (hopefully more than one!) comprehends and interprets the message according to whatever's in their head (previous experiences, their values and beliefs, their current situation and environment etc). This is important, because it means that what you write or say isn't necessarily the same as what is understood. Unfortunately, as you have absolutely no control over what goes on in the heads of your readers, there's nothing you can do about this 'decoding'.

Rather than worrying about that then, to communicate well, it's important to focus on the things you can control – what you're saying (the message), how you're saying it (the medium) and to whom (the receiver(s)).

Step 1: Preparation

The key to communicating well is in the preparation

What are you trying to say?
The first thing to think about is your message - what are you trying to say? As a general rule, it's best to focus on no more than 3 key points that you want to make because people rarely take in more than that. Write each one down in a sentence so that you have the 'essence' of the points to refer to later. If you find it difficult, try writing a paragraph for each point and then cutting it down until it's a sentence – you're the expert and if you're not crystal clear about what you're trying to say, what hope has anyone else?

Who are you trying to say it to?
Once you've worked out what you want to say, think about your audience – who are they? People often say 'the general public' or 'lay-people' but what does that really mean? Are you interested in people in rural communities? People who work in local government? MPs? People under the age of 16? Or people over the age of 65? And don't try and catch everyone – poorly targeted material runs the danger of being read by no one (apart from the author perhaps!). Be honest – writing and publishing is expensive and time-consuming, so who do you really want to read about your work?

How can you reach them?
Following that, the logical question is: Have you picked the right medium? Is a leaflet or brochure the best way to target ordinary 'citizens' - how will they get a copy of it if you don't have their names and addresses? Would you be better off trying to get a smaller article in a newspaper or magazine? Or placing something on a well-visited website or respected blog? If you're writing for a publication, is the publication read by your target audience – what do young people read, for instance? Press officers are expert at this, so ask their advice if you're not sure.

How long and by when?
It's also useful to know any practical restraints before you start writing – in particular how long should your piece be? What is your deadline? What type of article should it be (see Style - news and features on page 6)? Are there any house style rules? These are particularly important to clarify and stick to if you are writing for an external publication as the commissioner or editor is less likely to be flexible – if they have space for a 200-word news article and you provide a 1000-word feature, even if the editor has the time and patience to rewrite your material, you are unlikely to be asked to contribute again. And while the deadlines within scientific journals and internal publications might be flexible, newspapers and magazines that are produced on a daily or weekly schedule have much stricter deadlines – there's no point submitting an article at 5.30pm for a 4pm newspaper deadline because the paper will already be in the printers.

Style – news or feature

Different sections of newspapers and magazines have articles written in different styles, generally split into two categories: news or features.

Apart from being much shorter, news articles have two other characteristics – they focus on something newsworthy (see 'News values' on opposite page) and have a particular structure. This news structure is very different to that of a scientific paper - while a scientific paper takes the reader through the background, technique and evidence, eventually reaching the conclusion and main point of the paper right at the end, a news article is the reverse – the first paragraph always gets straight to the point, answering what journalists describe as 'the 5 w's' – who, what, where, when and why? From then onwards subsequent paragraphs give more and more details, but on the clear basis that you should be able to stop reading at the end of any paragraph and still understand the story. This is important, not just because most readers are impatient and don't read beyond the first paragraph. Newspaper sub-editors, whose job it is to fit dozens of articles onto the page often in a short space of time, simply cut the bottom paragraphs of articles that are too long. This would make your article nonsense if you've saved the point for the last paragraph. These rules also apply to press releases (more details below). While quotes from one or more people or organisations are often used, news articles do not usually set out to explain the writer's viewpoint, values or opinions, but instead aim to report the facts and opinions of others.

Features, in contrast, tend to be much more flexible in style and length – they can take the format of interviews, profiles, opinion pieces, in-depth examinations of issues or background reviews of topics in the news for instance. Feature articles often explore different points of view and may be written from a particular standpoint or give the perspective of the writer. They are sometimes described as the journalistic equivalent of essays.

Step 2: Writing

During your preparation you've thought about the two or three points that you'd like to make, who your audience is and which media and formats will be most effective. Now you need to think about how you can best express your points to your audience – what words should you use? What analogies and comparisons will best illustrate your points?

So what?
Once you're clear on the points you want to make, put yourself in your audience's shoes and ask yourself 'so what?' If you were a member of the public, why does it matter if you know about climate change, swine flu, sustainable buildings or whatever it is that you are planning to communicate? How will it impact on people's lives? Your answer to this question is what journalists describe as the 'human interest angle' or 'news values' and, if you are writing for a non-technical audience, should form the main thrust of your writing.

News values

Before stories appear in a newspaper or programme, they have to pass through two 'gatekeepers' - a reporter first has to want to cover it and the editor secondly has to want to include it. The criteria that editors and journalists use in selecting stories are called 'news values'. While these news values aren't written down and stuck to journalists' pin boards, they are measures that they are trained to use and recognise without thinking.

Specific news values will change according to the publication or programme – local papers will look for different stories to national papers for instance, while TV news stories have to be driven by pictures. The general underlying principles are similar though:

Unexpectedness/novelty:
What's unusual about your story – is it the first/last/biggest/smallest? An example often given is that a dog biting a man might not make the news, but a man biting a dog might.

Relevance:
How meaningful will the story be to the readers/viewers? Does it affect their lives? Does it affect their immediate world?

Significance:
Is the event/story big enough? Does it affect many people/places? Does it shed new light on another current news theme?

Celebrity:
Relevance and significance are sometimes overlooked if the story involves a famous person – someone leaving a bag on a train is unlikely to make the news, unless the bag belonged to the Prime Minister for instance.

Timing:
Stories, no matter how big, are of little interest at certain times (and vice versa). For instance a story about a Nobel prize-winner's science is likely to be of great interest during the week in which the prize was announced, but of little interest much later, when the 'news cycle' is likely to have moved onto another focus.

Conflict:
Stories often appear in the news when there is disagreement or a challenge to the status quo – a scientist disagreeing with international policy on fishing quotas, for example. Unfortunately, this fascination with conflict sometimes distorts the picture, with minority views being given equal status as mainstream consensus. Nevertheless, whether it is something to exploit or be cautious of, conflict is an important news value.

While these news values limit the stories covered in newspapers and most other media, they're also the same criteria that press officers use when they're looking for science to publicise. Understanding news values can help you present your stories to attract more attention: How is your research going to affect people? Is your science relevant to something already in the news? Can you link it to a celebrity? We describe this as finding a news 'peg' or 'hook' to hang your story upon.

Language and style

The words you choose to use to express your complex ideas in a way that can be understood by non-experts are important, but choosing them needn't be painful. While you have expert knowledge in science, when you're not talking about science you use the same sort of everyday language as your audience – you already know the right words and expressions to use, you just have to use them to talk about your specialism. It's about communicating in a modern and efficient manner.

Of course that's sometimes not that easy – technical language helps us be precise and gives us all sorts of short-cuts, so it can be challenging to break the habit of talking in this way.

Some things you might like to try:
■ **Using short sentences** – once you've made a draft of your article, go through and see if you can cut any long sentences into two or three shorter ones.

■ **Using everyday and short words** – even if a word is everyday, if there's a shorter one that will do the job, use it.

■ **Using everyday analogies and examples** and relating your science to something that people encounter in day-to-day life.

■ **Using active language** - it is usual for a scientific paper to be written in a passive voice, but you'll notice that articles in newspapers and magazines tend to use more active language. Active language sounds more familiar, friendly and engaging ('we wrote the paper in an active voice' rather than 'the paper was written in a passive voice'). Outside a scientific paper, passive language can sound over-formal and pompous, so try to avoid it.

■ **Using direct quotes from people involved with the research** – provided they are interesting and understandable, quotes can really add life and personal interest to an article.

■ **Showing some personality and/or emotion** – this only works if it's authentic, but showing that you (or the scientist doing the research in question) are human is good.

■ **Using rhetorical devices** – while it might have earned a bad name for itself, rhetoric is designed to capture and hold people's attention, so can be very useful. In speeches in particular, it provides punctuation marks to make the words comprehensible. Examples include repetition (I didn't want to do research for the money; I didn't want to do research for the prestige; I wanted to do research for the excitement); antithesis (That's one small step for a man, one giant leap for mankind); alliteration (with alliteration you can communicate clearly).

■ **Tell a story** – we learn to understand information in the form of stories or narratives, which describe a sequence of events, from a very early age. Could taking readers through things in this sequential manner help you structure your writing and communicate more clearly? For example, rather than presenting an argument why it's important for your department to peer-review its evidence, you could tell the story of how five years ago some policy was made on evidence that later was shown to be questionable. As a result, the department introduced a peer-review programme to ensure that

all evidence is good evidence and since that time fewer mistakes have been made. Which is why today, colleagues always peer-review any work they commission.

■ **Using different styles** – particularly for internal or in-house publications, you are likely to have a lot of freedom in terms of style. Outside work, we all enjoy reading magazines, novels, etc so could any of the styles used in these publications help you capture and keep the reader's attention? Could you present the arguments for the Severn Barrage options being considered in an interview with or profile of one of the engineers? Would case studies provide clearer illustrations of your point, for example? As well as being lively, such an approach could help to add authenticity and a human face to the issue.

Things to avoid:
■ **Using jargon** i.e. words that mean something to experts but nothing to non-technical audiences ('meridional overturning circulation', 'hysteresis', 'preturbation') or an everyday word that has a different meaning to scientists (amplify, translate, tissue, significant).

■ **Civil Service Speak**, for instance: 'accordingly' instead of 'so'; 'commence' instead of 'start' 'in the event of' instead of 'if' 'persons' instead of 'people' 'prior to' instead of 'before' 'terminate' instead of 'end' 'utilise' instead of 'use'.

■ **Explaining science with science** – comparing a molecular system to the engine of a car is useful if you're talking to car mechanics but probably not if you're talking to a local school.

■ Using clichés and overused analogies

■ **Trendy vicar syndrome:** Getting the tone right is important for any audience, but particularly so when writing for younger readers. While it's always important to use words and examples that the audience can relate to, try to avoid using a 'voice' or tone that is too far away from yours naturally – young people can spot a lack of authenticity from a mile, and as well as patronising them it doesn't help your credibility. Unless you really are a teenager, avoid colloquialisms such as 'cool' or 'groovy'.

■ **Patronising your readers:** just because you're writing for non-experts doesn't mean you're writing for idiots. Just as you'd be insulted if someone started explaining Greek history to you in a tone appropriate for 'an interested 14-year-old' so will your audience if you use that tone to talk about science and engineering. Assume that your audience is capable of understanding your subject provided you are capable of explaining it clearly. Things that make readers feel really patronised include expressions such as ''of course everyone knows that the…'', ''…that is too complicated to go into here'' or ''but you don't need to know about that''.

You might want to try out your written work on a non-expert 'guinea-pig', such as a member of your family, who can tell you if there are aspects of the writing that they don't understand. But beware – family members quickly become 'expert guinea-pigs'!

Step 3: Editing and re-writing

Once you've written your article, the job's not done yet! The next task is editing and re-writing – everyone hates it, even the most experienced writers go through several drafts, but it's the difference between a poor and an excellent article. Redrafting gives you the chance to check the length of the article and is an opportunity to think about the precise way that you've expressed yourself, so look out for jargon and long sentences, as we've mentioned above. At this stage, you might also want to look out for:

■ **Unnecessary words** – for example, the following sentence makes as much sense without the words in bold.

'We measure every change **that takes place** by looking at the amount of waste produced.'

Without them, though, the writing is much 'tighter' – and you get more space to say something else.

■ **Consistency of language and 'voice'** – have you slipped into passive language and have you been consistent throughout? This is particularly important if your piece has been drafted or changed by a number of people.

■ **Spelling and grammar** – use the spell check on your computer, but also look out for mistyped words that the spell check doesn't spot ('of' instead of 'for' is a common example). Good sources of help are *The Oxford Dictionary for Writers and Editors*, which will clear up any queries about hyphens, capitals, etc, and *The Economist Style Guide*, which

will answer any grammar questions you might have.

■ **Analogies, similes and phrases that you are particularly pleased with** – if they stand out that much, are you sure they are clever and apt rather than cheesy and clichéd?

■ **Rhythm and cadence** – we're being really picky now, but does your writing flow and feel comfortable to read?

■ **How does it look on the page?** Picky again, but when you see the final layout, you might want to think about rewording any paragraphs that leave one word on a line or a line on the top or bottom of a page (printers call these layout mistakes 'widows' and 'orphans').

Special Cases
Writing press releases

The purpose of a press release is to catch journalists' attention and help them write an article about your topic very easily. The most successful press releases then are ones which do the journalists' job for them, but unless you are only sending the press release to a couple of journalists, it's not usually possible to write press releases specifically for each publication. Instead, press releases usually follow a general news format:

■ Use a pyramid structure for a news article, with the first paragraph answering the 5 w's' (who, what, where, when, why?) and subsequent paragraphs containing information of decreasing importance.

■ Use simple, non-technical language and short sentences.

■ At least one relevant and lively quote.

■ Double space the document.

■ Make sure it's no longer than one page – include any background information in 'Notes for Editors' on subsequent pages.

■ Always put the date of release on the top of the page.

■ Number pages and indicate the end of the main part of the press release (notes to editors come afterwards).

■ Give a contact name and telephone number (and make sure that person is available and able to answer calls).

Writing for the web

For most people, reading information on a screen is much more difficult than reading from a printed document. People also tend to skim even more when reading on screen and so your chance of getting your point across is more limited. While your readers might pay less attention to the precise wording, you need to pay even more attention to make sure that you make your point clearly. It helps if you keep paragraphs and pages short, so that the text appears in small chunks and the reader doesn't have to scroll down too far to find the important information.

Web readers don't necessarily start at the beginning of the page either, so it's helpful if each paragraph makes sense in isolation and focuses on one idea – start a new paragraph for each new idea or point. Using sub-headings can also help guide the reader to the information they're after.

It's also important to keep in mind the global accessibility of the web. Readers could be looking at your page from anywhere in the world – the most popular way of accessing the Defra science web pages, after google.com and .uk, is through Google India for instance. Keeping the language plain, simple and clear will help people accessing the site who don't have English as their first language. Metaphors and puns are best avoided too as they often don't translate well.

Briefing Policymakers

Policymakers, whether civil servants or politicians, are busy people but nevertheless need evidence for the basis of their decisions. Having access to well-explained evidence is vital then. While the principles of good communication outlined above still apply when talking to policymakers, the following lessons will be valuable too:

1. Keep it short
Policymakers, particularly the elected variety, are extremely busy. They will not wade through a 50-page document with two chapters of annexes. Keep your paper short and to the point – aiming for one or two pages maximum (they'll ask for more detail if they want it). Bullet points and boxes can be useful to break up the text and make it even more concise.

2. Make it relevant and timely
Think about the policymakers' objectives and present your evidence in a way that demonstrates how it relates to their policy objectives. In particular, think about how it impacts on people, particularly those people that the policymaker is most concerned about.

It is also important to explain its timeliness – why do policymakers need to think about this evidence now?

3. Graphs and graphics can be useful
A picture can say a thousand words, so images can help you get your message across. If you use graphs or charts, make sure that they're clear, easy to understand, labelled properly and explained in the text too – as a scientist or engineer you might instinctively find graphs easy to

understand, but don't assume that's the case with everyone. They just as easily turn off some people.

4. Provide a well-written summary of the main points and conclusions at the start of your briefing note.

The Communication Checklist

- What is your deadline and word limit?
- What are the points that you are trying to make (no more than three)?
- Who are you aiming this at?
- Why would they be interested?
- Have you chosen the right media to get this message across?
- Have you avoided jargon and technical terms?
- Have you used everyday examples and analogies?
- Are you using active language?
- Are you using short sentences?
- Is the tone right for the audience?
- Is the rhythm and pace right for the audience and message?
- Is the article the right length?
- Have you double-checked spellings?
- Does it look OK on the page (if you're dealing with the final layout)?

About this guide

This writing guide has been produced by Think-Lab for the Government Office for Science, to help scientists and engineers working across Government to improve their communication skills. It is based on a guide that was originally produced for scientists working within Defra.

About the Government Office for Science
The Government Office for Science is led by the Government Chief Scientific Adviser, Professor John Beddington. It exists to ensure Government policy and decision making is underpinned by robust scientific evidence and long-term thinking. Professor Beddington reports to the Prime Minister and Cabinet and works with all Government departments.

About Government Science & Engineering (GSE)
GSE is a cross-Government community of scientists and engineers, which aims to champion the profession and its members. At the time of publication it has over 2000 members. It is open to all civil servants with a background in science or engineering or who work in a related area. For more information contact GSE@bis.gsi.gov.uk.

About Think-Lab
Think-Lab is the UK's first communications practice specifically set up to support the scientific community. With more than 15 years experience, we develop and deliver creative and powerful communication products and campaigns that change the way people understand science.

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