The role of science communication

Your Excellencies, distinguished guests, ladies and gentlemen.

I was thrilled to receive an invitation to address your event today. This is such an important topic, and Indonesia is such a vibrant part of the world, that having a conference of this nature in Jakarta seems exactly right.

I want to thank and congratulate the partners:

- Ministry of Communication and Information Technology as the Focal Point from Indonesia
- Agency for Assessment & Application of Technology (BPPT)
- University of Indonesia (Chemistry Department)
- DoctoRabbit Science Inc., and my good friend Dyah Ratna Permatasari

These are organisations and individuals with the foresight to realise that science communication is a vital link which connects the advances of scientific research with the interests of the people.

The questions this conference poses are important.

Governments invest in science and scientific research, but how best can this investment be realized? How can new ideas be transformed into new industries, and generate employment? How can scientific research in health, agriculture and the environment be translated into new practices to be adopted by citizens?

These questions are not unique to Indonesia or the ASEAN countries but are being considered by governments across the world.

If a society is to take full advantage of the discoveries of scientists, it has to have a basic appreciation of the science and what it means. But the gap between science and citizens is growing. Even well-informed scientists cannot keep up with the rate at which new knowledge is generated; and as my colleague Bernard Schiele from Canada pointed out recently:

> *This explosion of knowledge means we no longer have a shared culture of S&T, and this position is going to worsen in the future.*

If the knowledge gap is growing wider as science expands, then how can a modern democratic society function in a logical and progressive manner? Government is guided by the views and the votes of the citizens. Ultimately citizens make the decisions in the choices the country faces. Citizens need to have a basic understanding of the issues - and the implications of these issues, even if they are difficult to understand - so they can vote in a rational way at the ballot box.

Today I want to address three aspects of science communication:

1. the challenges

2. the benefits
3. a possible structure for a regional science communication network

The Challenges

The first challenge is that scientists and many science organisations put a low priority on using the media as a tool of communication. This is the case in Australia, and probably the case in other countries.

Jenni Metcalfe and I looked at the reasons. What factors encouraged or discouraged scientists from using the media to communicate their work? The paper was subsequently published under the title *Incentives and Impediments to Scientists Communicating through the Media*.

We organized thirteen focus groups across Australia, where scientists from universities, government research organisations, government departments and industry talked about their views and experiences in using the media.

The results were that scientists saw communicating through the media was an optional activity rather than a basic part of their jobs. What is alarming is that they regarded it as neutral or even slightly negative to their promotion prospects – a clear indication of the value management put on communication through the media! - and felt that management did not support media activities with any enthusiasm.

The incentives for scientists to use the media were weak, in contrast with the impediments which stood in their way.

The major impediment was time. It takes time to think about scientific work from a media perspective, to prepare material specially for the media, to take calls from journalists, and handle the subsequent public interest. Another impediment is when the research has commercial value, and the scientists are prevented from discussing it because the results might be taken up by a rival company. A third impediment is that scientists do not always feel confident in talking to the media, and fear that journalists might misrepresent or exaggerate their work. They said they needed media training.

Our conclusion was that scientists were supported and encouraged to engage in some forms of communication – writing papers, speaking at conferences, giving seminars – but not encouraged to communicate with the public.

A second challenge is finding a balance in the communication process. The modern approach is one of dialogue. It is no longer enough for 'the experts' to give information to the community for it to absorb. If the aim is to get people interested in science and to persuade them to change, it is more effective to establish a process which allows people to interact with the science. The public want to be able to ask questions and express ideas and concerns: they are not willing to be sponges to soak up information. This is why modern science centres have interactive displays, rather than static exhibits in glass cases.

But to many scientists, the ideal communication is putting out a brochure. A brochure sets out the facts and gets the science right. A brochure is inanimate and cannot talk back or ask

awkward questions. A brochure can be reviewed quietly in the office. Many scientists prefer this sort of one-way communication, and do not like the unpredictability of conversations with ordinary people.

The problem with this approach is that unless people have a chance to talk back, they are less willing to accept the science. We have seen a growing skepticism about science around the world, with populations skeptical on scientific advice on matters like climate change and vaccinations. In matters of health, they can be more willing to turn to traditional or customary methods for solutions.

A third challenge is countering misinformation, both accidental and deliberate. Today I want to focus on deliberate misinformation. Science works in many contentious areas, and research findings may challenge existing industries and economic interests. Examples are the work on products such as tobacco and DDT, or in the area of climate change. In these cases, results indicate that a product should be banned or practices changed; and in each case powerful business interests are threatened. Industry may fight back to protect the value of their product.

In her book *Merchants of Doubt*, Naomi Oreskes documented how industry fights back. She describes the work of a handful of scientists who conspired to obscure the truth on issues from tobacco smoke to global warming. One was Frederick Seitz, a retired nuclear physicist then employed by the tobacco firm R.J. Reynolds. His principal strategy, said Oreskes, was to defend tobacco products by doubt-mongering, by insisting that the science was unsettled and therefore that it was premature for the US government to act to control tobacco use. No matter what new research and new proof emerged from the science, it was never enough evidence for governments to act.

The same strategy was used over and over again. Find scientists sympathetic to a cause – tobacco, DDT, climate change – and encourage and train them to speak out on the issue. They do not need to have expertise in these areas as long as they have credentials which sound impressive to the public. They do not use refereed journals to make their case (although that is the standard arena to settle scientific disputes) but go to the popular press where they sound plausible and their ideas will come under a much lower level of scrutiny.

Their efforts are supported by industry. They may be offered ‘scholarships’ and their messages are churned out by the sophisticated public relations machines of companies like ExxonMobil. The aim of these campaigns is to cloud the issue, to confuse the public and the politicians and delay action – and protect their business interests.

Countering these sophisticated and well-resourced campaigns is an issue for science communication.

A fourth challenge is that few people understand the scientific method. Most people are impatient, they want simple answers from scientists, and not long detailed papers. They want issues with an answer in black-and-white terms, and not qualified. They say: “Well *you* are the experts. You tell me what the situation is!”

Scientists cannot always provide a simple unqualified answer. On climate change, the best they can say is: "well, all the evidence, all our models support the idea that the world is going to get hotter and also dryer in some parts. It seems likely that this has been caused by the actions of people."

People find qualified answers frustrating, and when scientists appear to disagree on science, this adds confusion to their frustration. They do not appreciate the scientific method, the vigorous internal debates scientists have to test the validity of new ideas and establish the truth.

There are other challenges: getting the support of management for communication activities when resources are tight, and when scientists would rather spend them on research. Securing the support of senior people in Government and research institutions can be difficult, but this is essential if communication gets proper recognition and funding. The presence of their Excellencies Professor Gusti Hatta, Mr Tifatul Sembiring and Dr Emil Salim and their distinguished contributions to these discussions will be a great advantage in advancing the cause of science communication in Indonesia and the region, because it means you have a sympathetic ear at the level where big decisions on resourcing are made.

We can add to this list of challenges:

- the digital divide, which cuts poorer people and rural populations from access to the internet
- cultural and religious differences

The list is not complete, and will change and grow with time. The pace of scientific discovery is increasing, not decreasing, and the knowledge gap is growing wider rather than narrower. Each advance in science will present new challenges in science communication. Some members of the audience will be puzzled that I have not mentioned education, and the vital role it plays in the process. We recognize this, and the PCST Network, of which I am President, recognizes its importance. But we consider it to be a field in its own right, separate from but strongly complementary to science communication.

What are the benefits?

A number of countries have in recent years written national plans for science communication. Colombia, China and Australia are three examples, and the University of Bristol has done comparative work in this area.

In Australia the aim of the review was to give science communication activities a greater sense of direction. This had been identified as an issue in several previous government reports:

> *… existing science awareness activity required better coordination and refocusing of objectives, and … a higher priority needed to be placed on strategic leadership and policy formulation.*

The report was launched in February 2010 and nominated four key reasons why Australia should invest in science communication:

- to increase appreciation of science in Australian culture

- to facilitate informed citizen participation in decision making and science policy development
- to boost confidence in the Australian Government's research investment; and
- to ensure a continuing supply of well-qualified science graduates."[i]

These are all worthy aims and will be high on the list of any country considering a national plan for science communication. It is important that scientific research operates in a sympathetic environment, and that citizens have a broad appreciation of the capacity and benefits of science, and that science continues to attract new students.

But the list misses one essential idea: to ensure that the results of research are taken up and used by industry and the public.

This additional reason underlines the point that ideas and research results can only create impact if the *intended users know of them*. Ideas need to be communicated, to be published in journals or a website or a newsletter or in the media, or discussed with interested parties, or go on display at a science centre. The best ideas will be lost if people never hear them.

Good communication adds value. It is a basic measure of the effectiveness of an organisation: how many of its ideas are adopted? How well is it known? How influential is it in setting new policy directions? Communication allows new approaches to be taken up, new ideas to be considered. It generates discussion and critical input which leads to more workable solutions. It can attract funding and support to an organisation.

Not to communicate is to diminish the value of a research project. People will not appreciate the capacity of the organisation or research because they have not heard about its work.

Clear communication brings long-term benefits to a research project – strong reputation, mutually beneficial relationships, renewed funding. These benefits do not happen by accident. They do not automatically flow to research projects doing quality work. Benefits often rely on other organisations and individuals, the right people, understanding and appreciating what you are doing.

Communication also has an internal component, the people involved in the project. Staff and colleagues will lack a clear sense of the direction and priorities of the research unless they are kept well-informed. Poor communication causes ignorance and confusion.

Much scientific research is used to change the way resources are managed, by examining issues such as the impact of fishing or agricultural practices on the natural environment. The research may conclude that the current way of doing things is causing damage, and will recommend changes. The results will be passed on to the appropriate government agency – a role for the science communicator – and then the agency will need to contact the local farmers, fishermen and councils, another role for the communicator.

One example is the Landcare Program in the Philippines, where farming has caused significant environmental damage on the island of Mindanao. Farmers traditionally plough furrows straight up and down steep slopes to plant their crops, and this causes widespread erosion and landslides. Research showed the advantages of ploughing across the slope, along the contour lines; and planting trees to anchor the soil to the slope.

When a team of international scientists agreed to work in the Philippines in 1996 to improve farming practices, they chose the name 'Landcare' very carefully. It was selected to emphasise that this was a partnership, completely different to the normal 'top-down' approach. It is an equal partnership between farmers, technical facilitators and local government.

The farmers learned from other farmers, people they knew and trusted. They learned from visiting farms where the new practices had been adopted. If farmers were to adopt the new ways, it would mean a change to traditional ways of doing things and a substantial investment, and because of this - like many practical people - they wanted to see the ideas in operation. Landcare is an example of very effective science communication, a way of translating the research of the scientists to benefit the farming community of the Philippines.

Everyone wants to see benefits from money spent on scientific research, taxpayers, politicians, and the public. They are all interested in the value proposition. If the science is invisible, if the scientific community does not take the time to explain what it are doing and the potential benefits of its work, then taxpayers will begin to question why money is spent on science rather than on roads, or education, or better telecommunications.

There are a variety of ways to inform the taxpayers and the public about the value of the science: the media, web sites, posters, interactive computer sites, science centres and museums, and the formal education system. Scientists can be directly involved in a communication role. Their big advantage is they have credibility because they are the experts. The big potential disadvantage is that they may not be skilled at talking to non-specialist audiences, and some training may be required.

In Australia an event called 'Science meets Parliament' brings 200 scientists to Canberra (the national capital) for individual 30 minute meeting with members of the Australian Parliament. The day before these meetings the organisers hold a training session, so scientists can learn how to talk to busy politicians without much knowledge of science. All 200 scientists met in a conference room and 10 volunteers were asked to come to the front. Each of them was given the same task: to explain what their research was about and why it was important, in one minute.

At the end of the minute, each volunteer got feedback on their explanation from a three-person jury: a journalist, a former politician and a lobbyist. How well did they explain their work? Would the Parliamentarian understand it? Did the speakers use too much jargon?

Often the feedback is that their explanations are too technical for a lay audience. Scientists tend to talk on matter which interest them most, the research, rather than what interests non-scientific audiences. Most people are not interested in the details of how the research is done, but want to know if it will affect their lives. What are the implications? Will it improve the environment, or the reliability of crops, or reduce the price of mobile phones?

'Science meets Parliament' is an exercise in science communication. The aim is to ensure continuing funding and support for scientific research, and the method is by demonstrating the value proposition to Parliamentarians.

Possible structures

This symposium has three broad aims:

1. To learn and share science and technology communication practices and success stories using the cyber space media in South East Asia region in proper, useful and safe ways
2. To search for common approach in cultural diversity to develop better results in science and technology communication tools and programs
3. To explore the possibilities of developing a regional network through cyber space media in science and technology communication communities

There is a great deal of interest in each of these at national and international levels. As President of the PCST Network (Public Communication of Science and Technology), my sights are set on the third aim, to develop a regional network.

In talking about possible structures, I want to describe the operations of two organisations: at a national level, Australian Science Communicators (ASC; and internationally, the PCST Network. These models might suggest ideas for organizing your own network.

"Australian Science Communicators" (ASC) is a national organization for people interested in science communication. It was formed in 1994, when each research organization and museum had one or two staff to manage the media, organize events, edit a newsletter, write the annual report and mount displays. These people felt isolated because they had no association where they could meet colleagues to share ideas, ask questions, advertise events or look for jobs.

The first step in forming ASC was to call a meeting of people prominent in science communication. Twenty-four people attended - science journalists, media officers from research organisations or communicators from national bodies representing science and engineering. The meeting was at the National Press Club in Canberra on 3 February 1994, and it discussed the aims and activities and membership of the proposed organization.

The proposal was accepted and a small steering committee was elected to take the idea forward. Six months later we adopted a constitution and elected a committee, and ASC was underway.

ASC has been running now for 17 years. It organizes national conferences and regional meetings, and has an active email discussion list which advertises events and publications, and allows members to promote media releases, to seek advice or express their point of view on contentious matters. We have a constitution, a national President and a web site, and members pay an annual subscription.

ASC also hosts international events. In 1996 it organized the fourth PCST Conference, and in 2007 hosted the international conference for science journalists in Melbourne.

ASC has about 450 members. Most of these people handle communication issues for research bodies or universities or museums, as public relations or media officers. Some are writers and editors or consultants; others work for the government in science policy areas.

Others work in research or teach at universities. It includes scientists interested in communication.

The organization has been highly successful in its main purpose, of creating a community of science communicators. People throughout Australia know each other, can work together, seek advice, and exchange good ideas. It has allowed the running of events and meetings which would not have been possible without the links and the publicity machine ASC provides. Both South Africa and New Zealand have used the same approach to set up their own associations.

The PCST Network is an international group which held its first conference in 1989. What began as an informal network of researchers meeting to discuss issues of common interest, with a strong base in France and Spain, has grown now to have a full international presence. It allows researchers and practitioners from different countries to exchange ideas; and in 5 months this process will continue when the PCST Network holds its twelfth international conference in Florence, Italy.

1989 was an important milestone for science communication, an occasion where science communication ***practitioners*** (science journalists, editors, media officers, communication staff at museums and research organisations) were able to meet at an international level with people who worked on the ***academic and theoretical*** side of science communication.

Since then conferences have been held every two years:

Poitiers, France (1989)
Madrid, Spain (May 1991)
Montreal, Canada (April 1994)
Melbourne, Australia (November 1996)
Berlin, Germany (September 1998)
Geneva, Switzerland (CERN) (February 2001)
Cape Town, South Africa (4-7 December, 2002)
Barcelona, Spain (2004)
Seoul, South Korea (17-19 May 2006)
Malmo-Copenhagen, Sweden-Denmark (June 2008)
New Delhi, India (December 2010)
Florence, Italy (April 2012)

The first conference I attended was in 1994, in Montreal. Since then the PCST Network has broadened and strengthened its operations. The Committee meeting in Montreal accepted a bid from Australia to host the 1996 conference, and this geographical and cultural expansion accelerated a transformation of the Network beyond its French and Spanish origins.

Hosting the conference in 1996 had a galvanizing effect on science communication in Australia. It led to expanded horizons and new ideas; and had a significant impact on the way science communicators thought about their work and their role in the workplace.

In 2005 PCST took a second big stride, with the decision to hold its first event in Asia, a PCST Symposium in Beijing. The next year the full conference was held in Seoul, and the PCST Network had become a truly international body. The Seoul conference drew 460 registrants and attracted 320 abstracts and 264 full papers from 38 different countries.

Over the last decade the Network has became more organized, with a process for nominating and electing members of the Scientific Committee. The Committee has 25 members, drawn from 21 different countries, including Thailand, Germany, the UK, China, South Africa, Italy and Brazil.

PCST has a web site and a discussion list with 1200 subscribers. This is a free service – anyone can join and to post messages about events and publications, or ask questions or seek advice. The Network has established a process for selecting the location of the next conferences and a guide to the bidding process is on the PCST web site. In 2006 the Network introduced a degree of formality into its structure by electing a President, and in 2011 we agreed to take the first steps to raise funds to pay administrative expenses.

Unlike ASC, the PCST Network operates informally and does not have a constitution or a membership fee.

As well as holding a conference every second year, the PCST Network also invites proposals to host a symposium in the years between the conferences. This could be an opportunity for the organisers of this meeting: on behalf of the PCST Committee, I invite you to submit a formal proposal to host a full international PCST Symposium.

And while the theme of any possible symposium is up to you, such an event might be an opportunity to build on the aims of this meeting, and in particular to explore further the possibilities of developing a regional network.

Any proposal would be considered by the Scientific Committee of the PCST. The organisers would be invited to appear before the Committee, to discuss their ideas and answer questions. The next opportunity to present a proposal would be to the meeting of the Committee in mid-April 2012, at the PCST Conference in Florence. If the Committee accepted the proposal, it would appoint a number of members to work with your local organizing group to help plan the Symposium.

I began today by asking a series of questions: how can countries benefit from scientific research? How can new ideas be transformed into new industries, and generate employment? How can research in health, agriculture and the environment be translated into new practices?

In each case the answer involves science communication, and in describing activities at both international and national levels I have identified one mechanism which can help discover a path to answers and solutions.

Science communication has a strong role to manage the gap between science and citizens, and to help citizens deal with the “explosion of knowledge”. It can encourage and inform community discussion on science issues, using mechanisms such as the media, science museums, science festivals, awareness campaigns and publications.

There has been a growing recognition of the importance of science communication. Fifty years ago the term ‘science communication’ was never used. Today, conferences, societies

and journals are devoted to this field. Courses are taught and research is undertaken at universities, and 'science communication' has established a place, if not as a separate discipline, then certainly as a field of study.

Science communication is an essential link in unlocking the value of science to a society. The role of the communicator is to assist in creating a dialogue between scientists and society. It has to be a dialogue, because people have shown many times that they will not respond strongly if they are told, they want to have a say and to ask questions too. Such processes are essential to the successful social appropriation of science.

Thank you.

Toss Gascoigne was elected inaugural President of the PCST Network in 2006. He works at the interface between politics, science and the media. He served as Executive Director for the Federation of Australian Scientific and Technological Societies (FASTS); and the Council for the Humanities, Arts and Social Sciences (CHASS. He has co-authored studies on the attitude of scientists to the media, on the way journalists regard scientists, and on scientists commercialising their research.