

Evidence-based science communication

Enhancing transparency and public trust in Nanotechnology (SAASTA/NRF webinar)

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Today's talk

- Motivations for public science communication and engagement
- A few definitions and models
- The 'science of science communication'
- Communicating nanotechnology in SA: challenges, solutions, gaps

Why go public with science?

- ♥ Science is a public good; responds to societal needs
- ♥ Science has moved from a 'closed' to an 'open' system
- ♥ A new social contract between science & society



Academic scicomm motivations

- People have a right to know & participate (*democratic*)
- Innovation and future workforce (*economic*)
- Benefits science and scientists (*strategic*)
- Scientists are obliged to give back to society (*moral*)
- The 'beauty' of science (*cultural*)



Real-world scicomm motivations

- ❑ Science has ethical, moral, regulatory, economic implications
- ❑ Science is entangled with society and politics
- ❑ Science is not immune against public opposition; needs public support
- ❑ Science communication (and societal dialogue) can help people cope with a changing world



Arguments in favour of public engagement about nanotechnology

- ❑ Normative: value of dialogue to incorporate public values; democratic ideals
- ❑ Instrumental: public input increases the legitimacy of decisions and enhances trust.
- ❑ Substantive: Dialogue creates better decisions and outcomes.

(Pidgeon and Rogers-Hayden, 2007: 192)

My #scicomm definition

1. Making science visible, relevant, meaningful, accessible, and memorable ...
2. ... to diverse public audiences ...
3. ... through providing information, but also ...
4. ... engaging, listening, and co-creating knowledge

It's not only about the 'results at the end'
it is about the 'process and values'
and related topical issues.

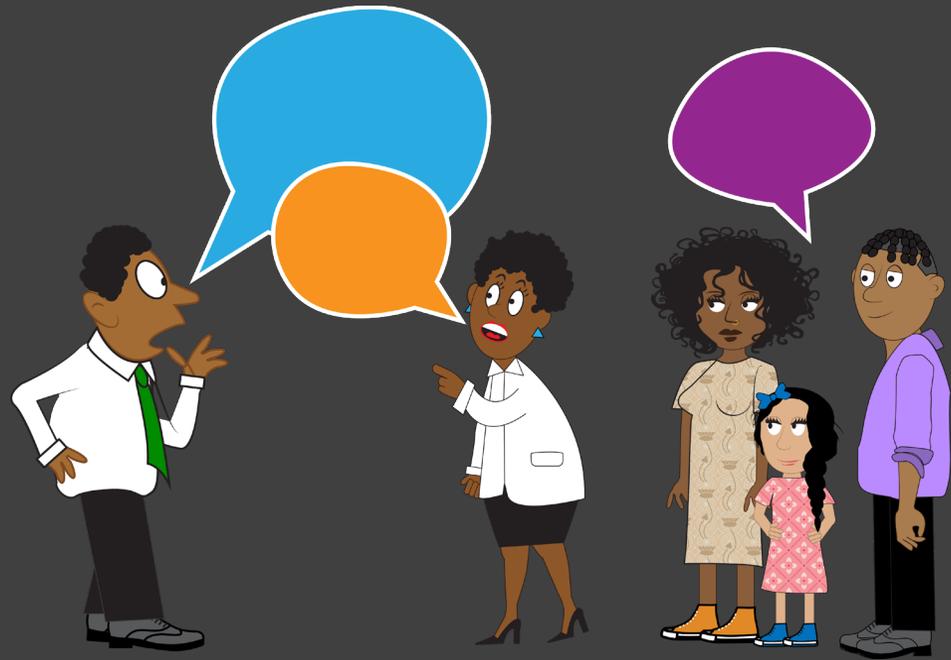


Defining science communication

“Science communication may be defined as the use of appropriate skills, media, activities, and dialogue to produce one or more of the following personal responses to science (the vowel analogy):

- Awareness, including familiarity with new aspects of Science;
- Enjoyment or other affective responses, e.g. appreciating Science as entertainment or art;
- Interest, as evidenced by voluntary involvement with Science or its communication;
- Opinions, the forming, reforming, or confirming of Science-related attitudes;
- Understanding of Science, its content, processes, and social factors.”

Defining 'public engagement' ...



*Public engagement with science refers to activities, events, or interactions characterised by mutual learning – using a **dialogue approach**,*

(not one-way transmission from “experts” to publics)

– among people of varied backgrounds.

DST Science Engagement Framework (2015)

Public engagement

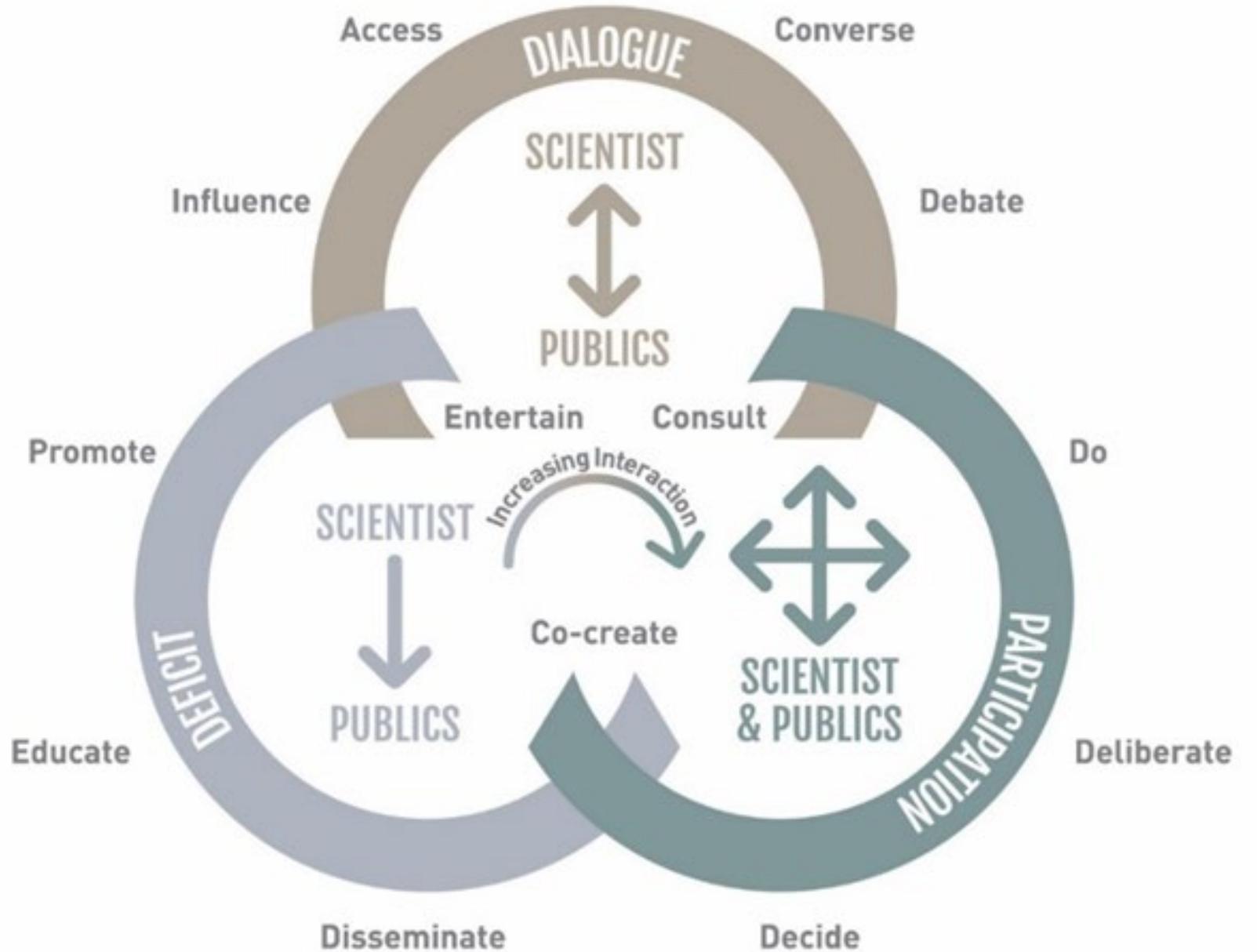
with science describes intentional, meaningful interactions that provide opportunities for mutual learning between scientists and members of the public.

(AAAS, 2019)



The 'rosette' engagement model

(Dr Jenni Metcalfe)



Public
understanding
of science

Public
engagement
with science

Public
participation
in science



Involvement

Dialogue

Information

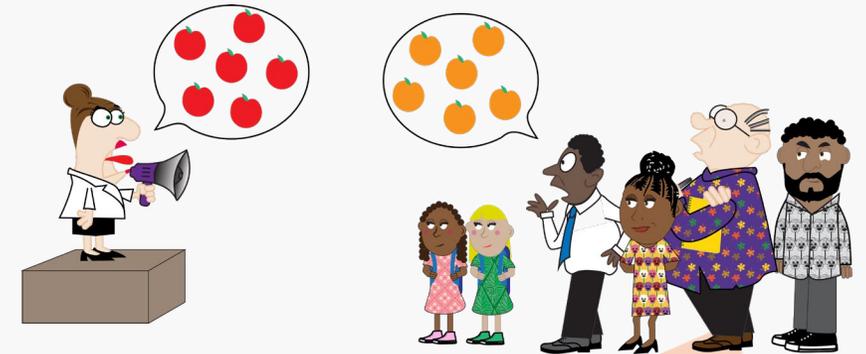
Scicomm 'models' ...

Emerging and evolving ...



Reasons for public engagement

- Making science relevant to community and individual concerns
- Listening and learning – reciprocal process; exchanges
- Conversations about the process of science (not about explaining science)
- Mutual benefit; mutual respect
- Building trust & sustainable partnerships
- Openness, honesty, transparency
- Including diverse views, values, voices and ways of knowing



Positioning, profiling,
& sharing knowledge,
but also ...
Listening, meaningful
dialogue & public input

Science

Society





**The science of
science
communication**



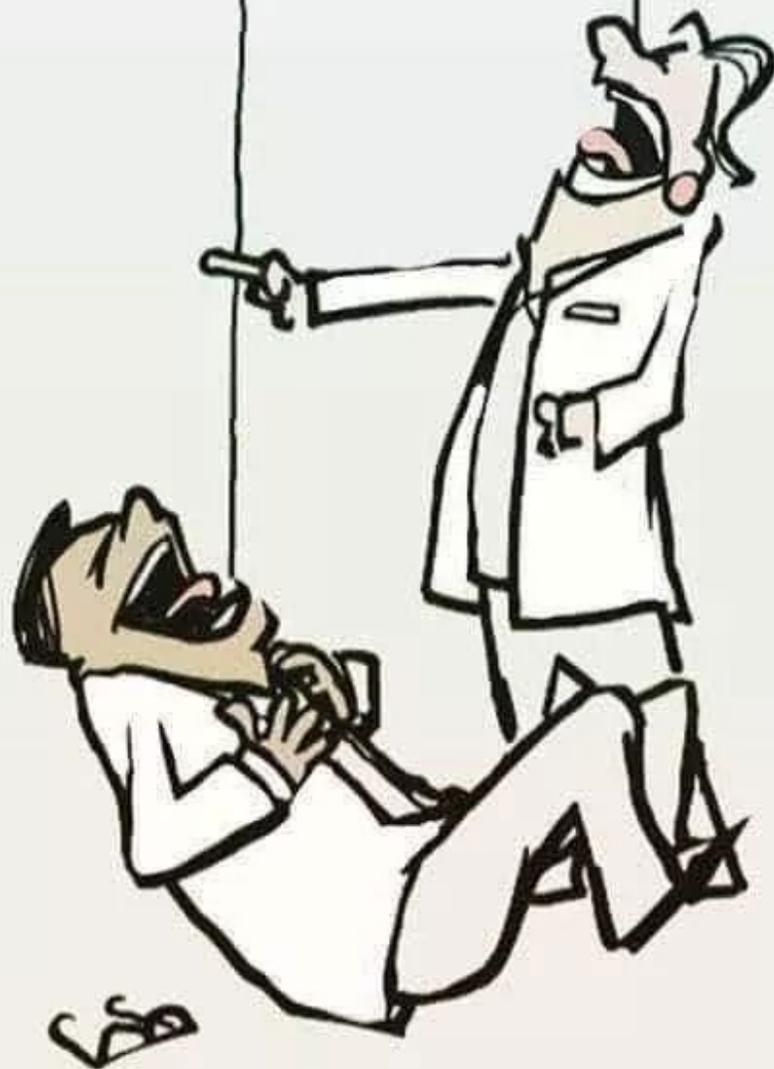
**Why facts
alone are not
enough!**

COVID-19 SCIENCE

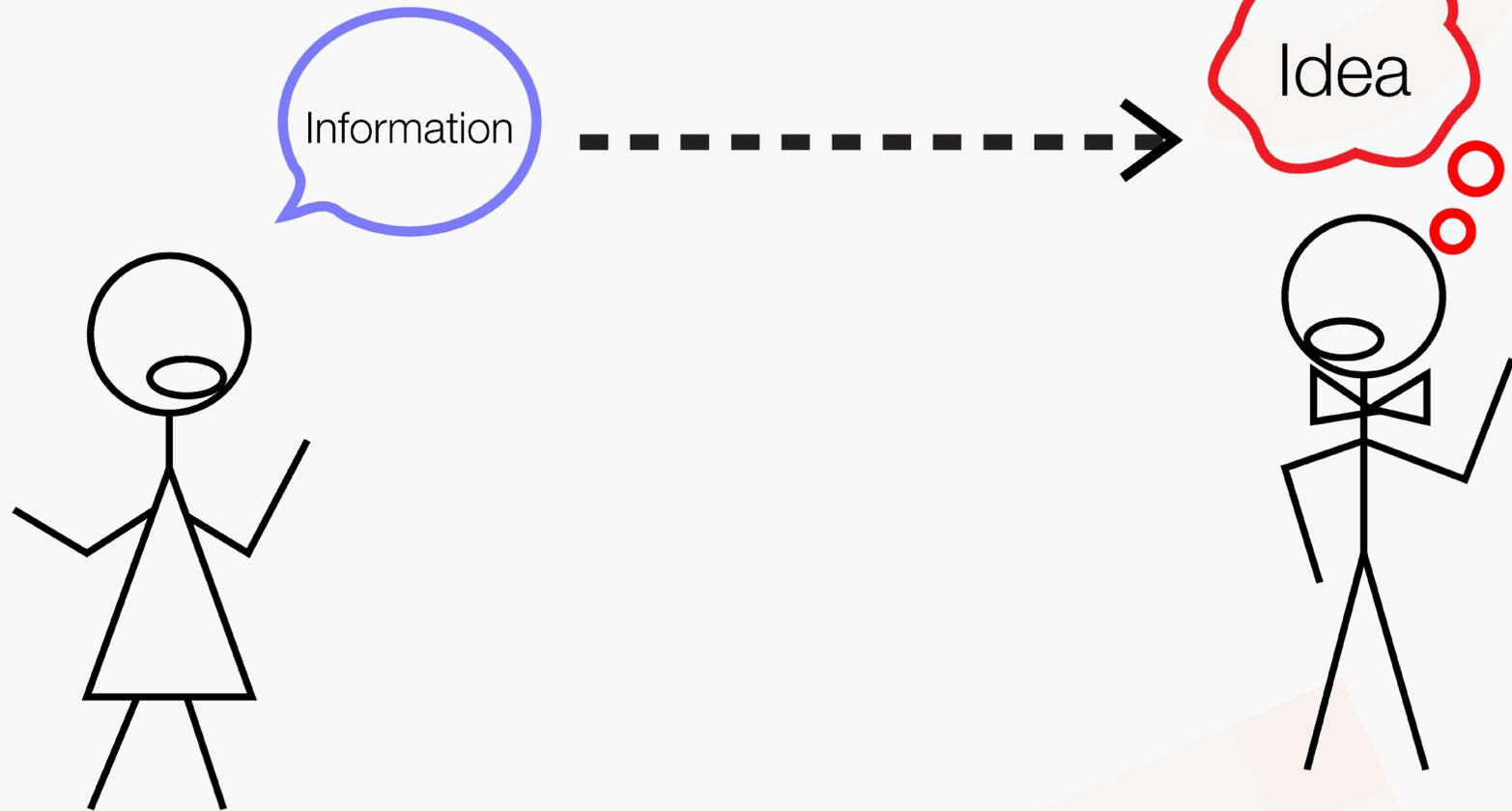
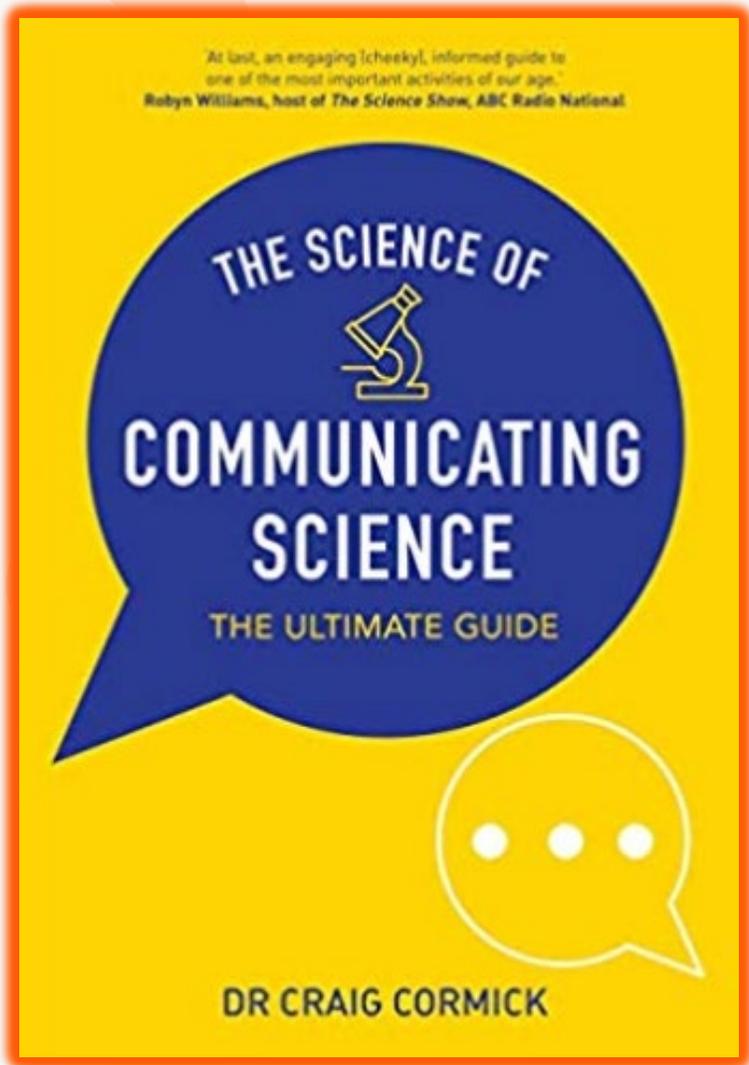
AS LONG AS
WE JUST PROVIDE
THE FACTS TO THE
AMERICAN PEOPLE



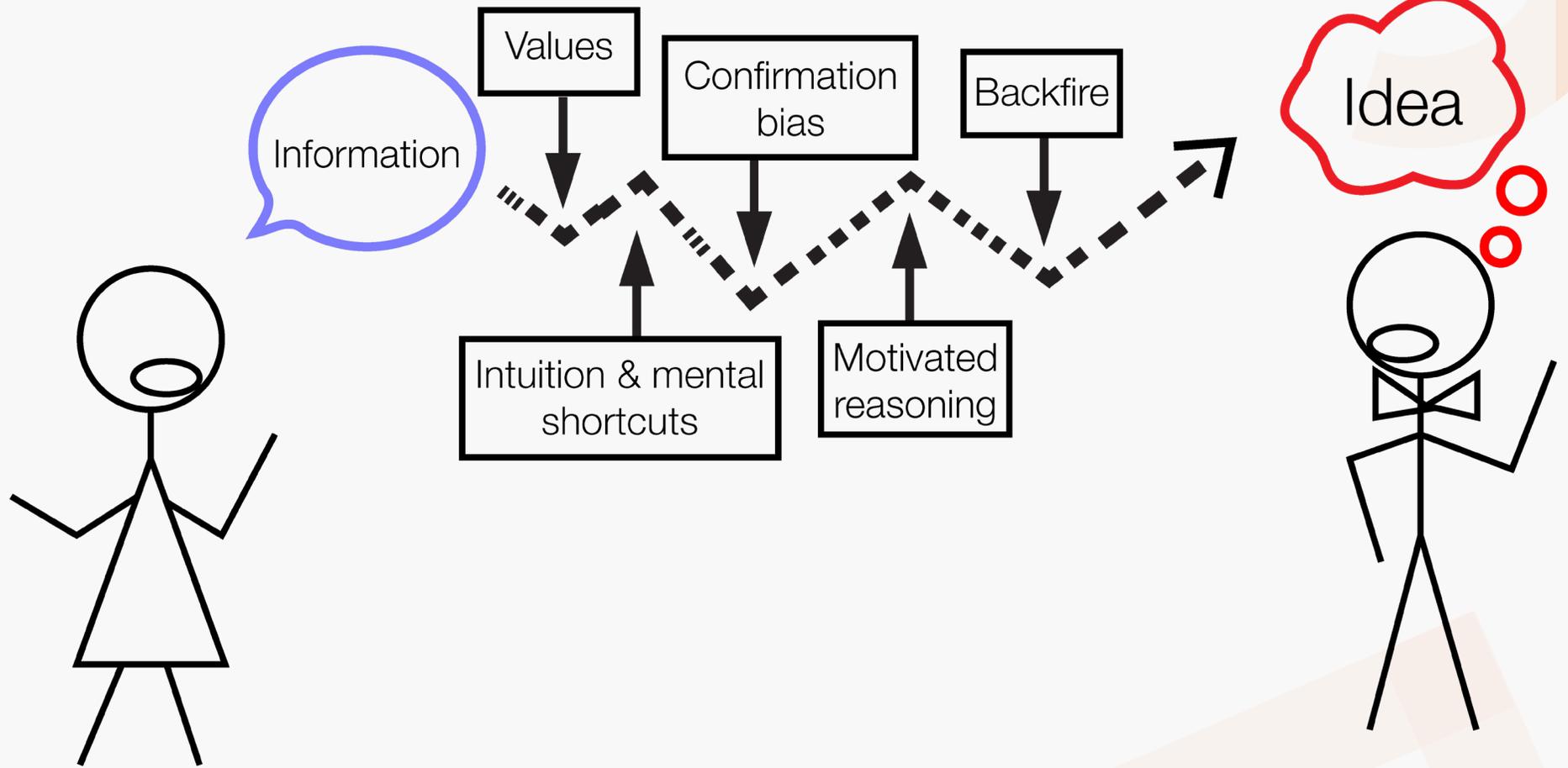
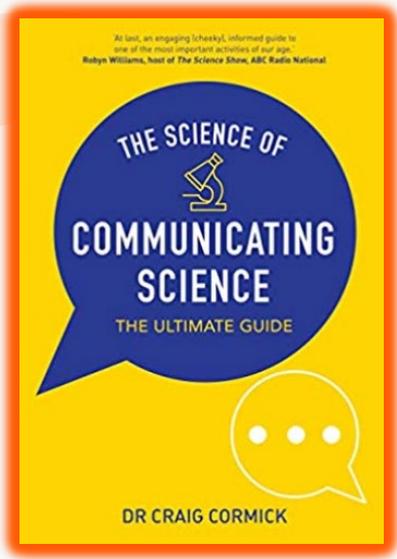
CLIMATE SCIENCE



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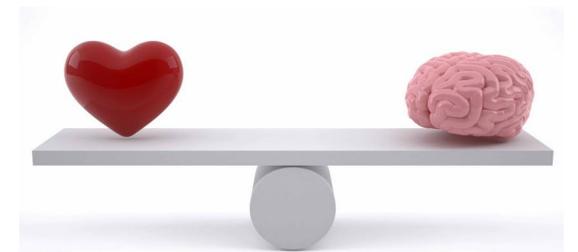
The imagined path of information to attitude



The actual path of information to attitude

Key insights from the 'science of scicomm'

- ▶ People respond based on how they feel (not the facts)
- ▶ People need information, but more information does not equal more support
- ▶ Facts are important, but not enough
- ▶ Giving facts only makes scientists appear competent, but cold
- ▶ People respond to warmth; trust depends on emotional connections
- ▶ Trust is probably more important than facts
- ▶ **Facts are the core, but emotion is the key!**



Reflections from the science of science communication

– **Brossard & Scheufele (2022)** - <https://morgridge.org/story/developing-the-science-of-science-communication/>

- People look for science that confirms their beliefs, but ignore evidence that doesn't (this means people like information that aligns with their values and views, but avoid/reject information that challenges or threatens them)
- Don't blame people for lack of knowledge, rather focus on addressing their concerns
- Constructive dialogue requires scientists to be humble (and willing to listen to and learn from public groups)



Key tips from 'science of scicomm'

- Balance 'competence' and 'warmth' (humanise the science; make it personal)
- Respect your audience
- Build trust through active listening and respectful dialogue (don't try to fight feelings with facts!)
- Be open about uncertainty
- Anticipate (and prepare for) how they may respond
- Use clear language and visuals; tell better stories

Key question: Do we want 'blind' trust, or critical dialogue?



NANOTECHNOLOGY
PUBLIC ENGAGEMENT

What is nanotech?

Nanotechnology is the manipulation of matter at the nanoscale to create new materials of any size that have new properties and functions.

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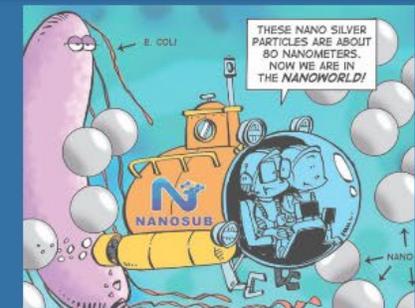
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J Nanopart Res (2019) 21: 86

<https://doi.org/10.1007/s11051-019-4524-3>

PERSPECTIVES

What is the problem? A literature review on challenges facing the communication of nanotechnology to the public

Åsa Boholm  • Simon Larsson



Check for
updates

Nanotech (public) communication challenges

1. **Complex, abstract, jargon (requires knowledge of fundamental concepts in science that are difficult to comprehend)**
2. **People may find it difficult to grasp concepts they cannot visualize; and may not see its relevance 'everyday' life (may be perceived as distant, unfamiliar, and intangible)**
3. **Experts disagree on how some nanotechnology terms and concepts are defined**
4. **Nanotechnology has many different applications – adding to complexity and public uncertainty about potential risks or benefits**
5. **Public attitudes are diverse and may fluctuate – ranging from opposition to indifference to support**
6. **Public opinion vary according to type of application – more supportive for water and medicine; less so for cosmetics and food**
7. **Perceived uncertainty about its nature, benefits, environmental risks, human health effects, and safety**



Sources of media (mis)representation

1. **Complexity**
knowledge/understanding
barriers; jargon
2. **Uncertainty**
work in progress; emerging
technology
3. **Non-science factors**
beliefs, values, vested interests



Nanotech (public) communication ‘solutions’

1. **Public education needed, but may not result in public support** (attitudes depend on values, beliefs, and worldviews)
2. **No such thing as a “one size fits all” approach** communication strategy must be tailor-made
3. **Invest in public in dialogue and co-creation**
4. **Prioritise transparency to build trust**
5. **Effective labelling is key,** also needs public engagement and buy-in



Recommendations for public communication about nanotechnology

1. Don't bombard people with facts; don't overwhelm them with new concepts
2. Listen first to assess the knowledge of the audience and what they want to know; then have a dialogue
3. Invest in plain language and effective visuals
4. Include stories linked to everyday life; make the science 'real'
5. Scicomm training





Public perception of nanotechnology: A contrast between developed and developing countries

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ABSTRACT

Nanotechnology is an emerging technology that has many proven applications and holds potential in many sectors. At the same time, the general public's lack of awareness about nanotechnology might polarize risk perception about this technology. Public discourse and upstream engagement are necessary for policymaking and responsible development of any emerging technology. While emerging countries have now joined the discussion on the public perception of emerging technologies just like the developed countries, yet there has been no review comparing the nanotechnology perception among developing and developed nations. This article presents a systematic review of factors influencing public perception and their attitude towards nanotechnology in developed and developing countries based on research papers published during 2001–2020. We have provided an in-depth comparative account of developed and developing countries in terms of factors affecting public perception of nanotechnology, namely –risk-benefit, knowledge, trust in science, religiosity, and demographics. In addition, we have also provided a contrast on how media representation of nanotechnology (newspaper coverage and social media) varies in developing countries compared to developed nations.

Nanotech (public) communication: A research gap?

More research to understand public attitudes and its drivers

How much do we know (evidence in South African context) about ...?

1. How nanotechnology is perceived by the public, and shaped by culture, education level, values, age, etc
2. How nanotechnology is represented and framed by the mass media
3. How nanotechnology is presented, visualised, discussed, and shared via social media
4. How media information affects public perceptions
5. How nanotechnology policy is formed and developed.



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