RETHINK framework for improving the use of science communication

Work package number and title: WP5 – SYNTHESISE: synthesis and policy guidelines

Deliverable: 5.2 Working paper: Improving and expanding the use of science communication

Lead-beneficiary: DBT

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Content

1. Introduction

The RETHINK project aims to nurture interactions between science and society in an open and reflexive way. To achieve this, the project has first mapped the digital and fragmented science communication ecosystem, explored sense-making practices, and investigated science communication quality and training to provide a 360℃ view of the current science communication landscape. A synthesis of this work can be found in D5.1 "Opportunities and barriers for strengthening the quality of interaction between science and society".

On the basis of this initial investigative work, the project has developed ways forward for a more open and productive relationship between science and society. For example, the project has provided suggestions for new roles and repertoires (see D1.4), strategies for enhancing openness and reflexivity (see D2.5), and training resources (see D3.4). The present working paper should be seen as a part of this effort to support more open and productive interactions between science and society by providing a framework for improving the use of science communication. This framework is based on the identified opportunities for improving practice layed out in D5.1 and serves to be a practical tool applicable to all types of actors practicing science communication.

This paper presents the framework and is structured in two parts. First, the process through which the framework was developed is described. Second, the actual framework and its application is presented.

2. How the framework was developed

According to the Merriam-Webster dictionary, a framework is either "a basic conceptual structure (as of ideas)" or "a skeletal, openwork, or structural frame"[1]. To concretize what this means in a RETHINK context, the following steps were taken:

1. Brainstorm with consortium partners on what a framework could be
2. Desk research on existing frameworks and models
3. Development of draft framework
4. Workshop with consortium partners and the European Sounding Board and integration of feedback

2.1 Brainstorm with the consortium

The first step in the development a RETHINK framework for improving the use of science communication was to gather consortium partners for a brainstorm on June 29th, 2021. Here, partners were asked to consider and discuss the question of: What could a framework be or what do we mean by "framework". Based on the brainstorm and following discussion, the consortium partners came to a common understanding that the framework should be:

1. Visual
2. Both descriptive and prescriptive
3. Include different layers
4. A synthesis of the work done in RETHINK so far
5. A lens to understand the "new" science communication landscape

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[1] https://www.merriam-webster.com/dictionary/framework

2.2 Desk research on existing frameworks and models

Having decided on some basic criteria for the RETHINK framework, existing frameworks were investigated both to avoid replication and to seek inspiration.

Through this search in the academic science communication literature, different frameworks were identified each with their focuses, advantages and disadvantages.

On the one hand, some frameworks focused primarily on the actors of science communication. Among these frameworks, some tried to capture the entirety of the science communication network, like the central model presented by Professor in science communication Bruce Lewenstein, Cornell University in 2011:
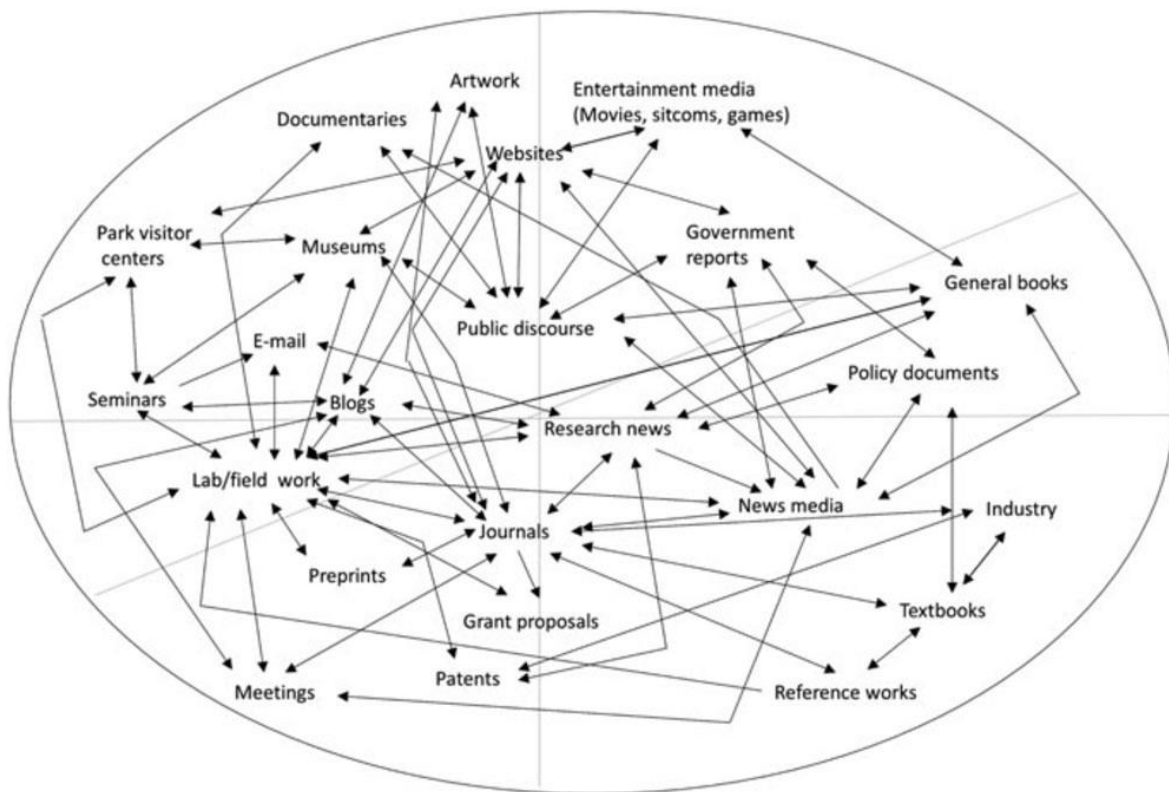

Figure 1 Lewenstein (2011)

This has the advantage of showing the complexity of the reality of science communication, but risks becoming chaotic and thereby difficult to comprehend and apply.

Other frameworks are more simple and easy understand, focusing on a few actors. However, such frameworks risk becoming too simplistic, focusing too much on a few traditional actors and blurring (potentially underestimating) the importance of non-traditional actors.

On the other hand, some frameworks are more focused on the varieties of interactions that actors can have in the science communication landscape, like the framework developed by Brian Trench in "Towards an Analytical Framework of Science Communication" in 2008:

| Base communication models	Ideological and philosophical associations	Dominant models in PCST	Variants on dominant PCST models	Science's orientation to public
Dissemination	Scientism	Deficit	Defence	They are hostile
				They are ignorant
	Technocracy		Marketing	They can be persuaded
Dialogue	Pragmatism	Dialogue	Context	We see their diverse needs
			Consultation	We find out their views
	Constructivism			They talk back
			Engagement	They take on the issue
Conversation	Participatory democracy	Participation		They and we shape the issue
			Deliberation	They and we set the agenda
	Relativism		Critique	They and we negotiate meanings

Figure 2 Trench (2008)

Such frameworks point the attention toward the different methods of communication that one could apply but seems to lack a description of the contexts in which they should be or are being applied.

Lastly, the RETHINK project had its own visualization of the different elements included in the project, which should be present in the final framework in one way or the other:

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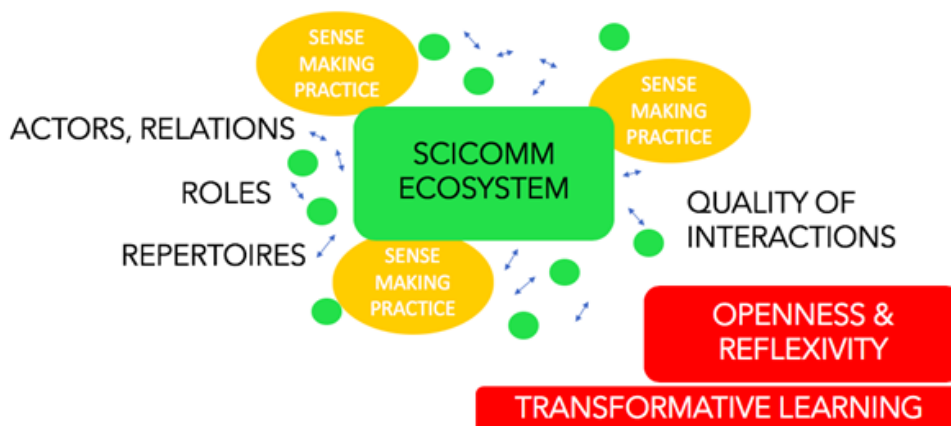
2.3 Development of draft framework

Inspired by these different approaches and examples, a mock-up framework aiming to synthesize the above examples, the RETHINK mapping of the science communication landscape and the project's theoretical underpinning was drafted:

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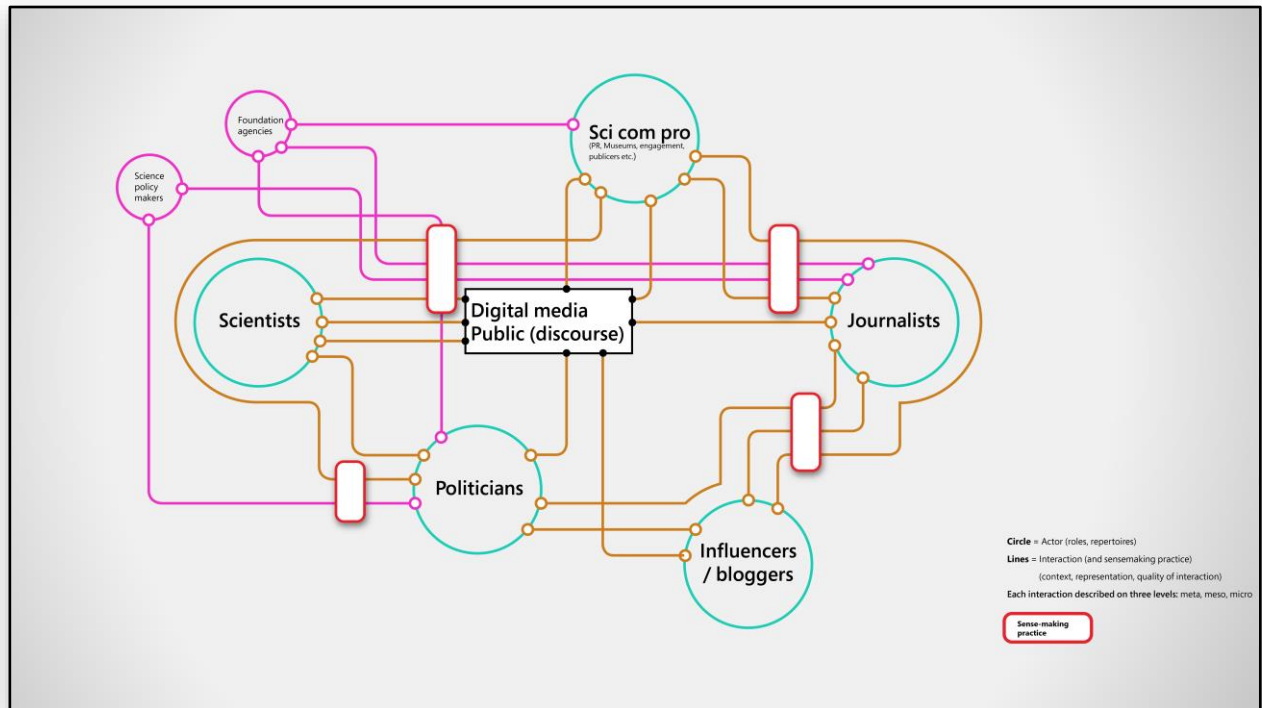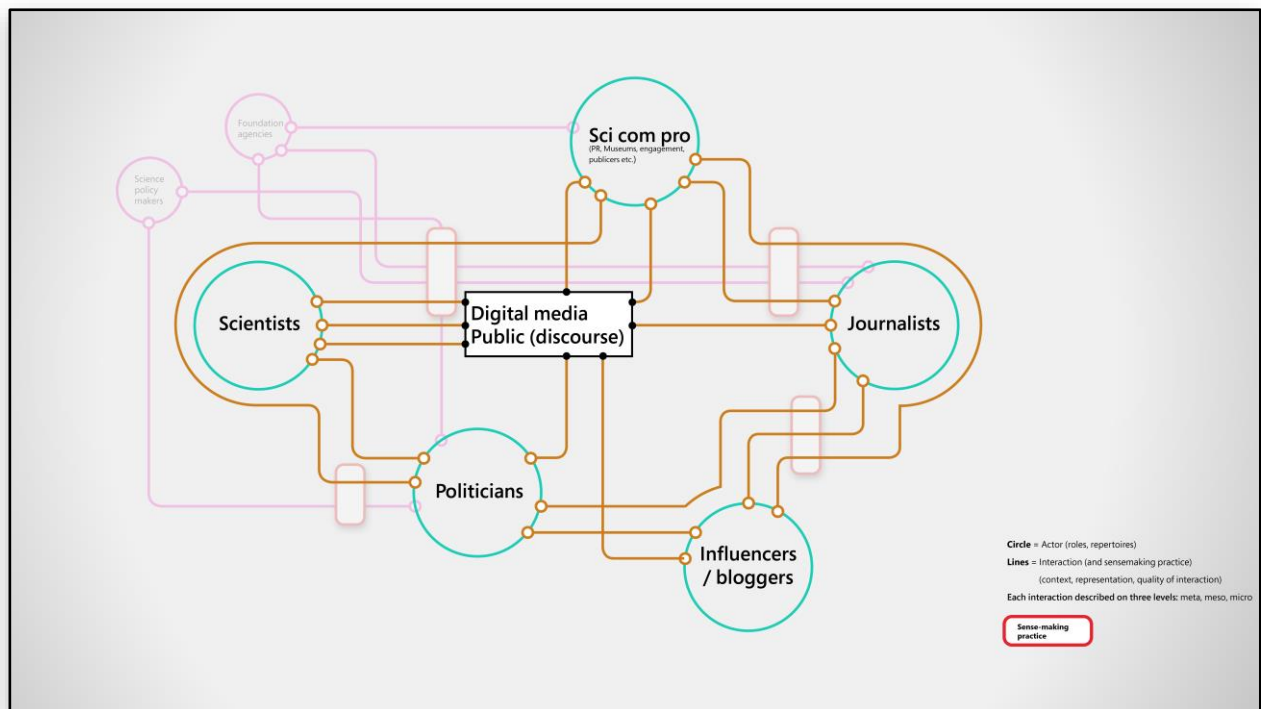
The idea behind this draft was to show what a final framework that was interactive and accessible online on the RETHINK website would look like. It illustrates a framework that aims to capture the complexity of the reality of science communication, taking into account the fact that the quality of science communication is highly context dependent and allowing the framework to be applicable and easy to use for multiple types of science communicators in practice. When entering the RETHINK website, one should be met by a descriptive framework depicting the complexity of the science communication landscape illustrated by the first figure. From here, the user should be able to click their way through the framework by removing layers so that relevant actors and interactions become visible illustrated by the second figure. For example, scientists should be able to click on a button and see the layers that are relevant to scientists. By relevant it is meant that scientists should be able to see their own position in the landscape based on the RETHINK mapping of experts. Moreover, the scientist should be presented to practice-oriented reflections and attention points derived from D5.1. This was thought as an attempt to incorporate a more prescriptive element to the framework that took into account the context-dependency of communication quality and aimed fostering a more reflexive relationship between science and society. So, instead of listing dos and don'ts, mimicking deficit thinking and lacking a sense of context, the identified opportunities and barriers for strengthening the quality of interaction between science and society in D5.1 were reformulated into points of practice-oriented reflections and points of attention (different from actor to actor) aiming to foster second-order reflections among the users of the framework about their own practice in all types of situations (more about this in section 3.1).

2.4 Workshop with consortium partners and European Sounding Board and internal review

On September 17th, 2021, DBT hosted an online workshop with 13 participants in total (6 consortium partners and 7 from the RETHINK European Sounding Board[2]) to discuss the drafted framework presented above (see Annex I for the workshop slides). First, key insights from D5.1 were presented to provide the participants with the basic information that the framework was intended to convey. Second, the drafted framework was presented and participants were allocated into three breakout groups focusing on each of their actors: Science communication professionals, scientists, or policymakers, respectively. In these groups, the participants were asked to discuss the following questions:

Focusing on the overall framework:

- Do you think the presented model gives a fair and balanced representation of the science communication system in 2021?
- Any important actors or interactions missing?
- How do we include information on roles and sensemaking?

Zooming in on the actor [i.e. science communication professional, scientist, or policymaker):

- Do you find the listed points of attention meaningful?
- Anything missing in the points of attention?
- Do you find the listed praxis-oriented reflections meaningful?
- Anything missing in praxis-oriented reflections?

If you have the time:

- Any thoughts on the next step: the concrete recommendations?

From these discussions, the overall feedback on the framework was (see Annex II for the notes from the group discussions):

- In general, the framework is understandable and the idea with the layers works nicely
- Make sure to include all investigated actors and their interactions
- It would be nice to illustrate that different actors play different roles
- Sense-making and the fact that it happens everywhere should be more prominent
- Society should be more prominent

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[2] https://www.rethinkscicomm.eu/eu-sounding-board/

Regarding the last point, a discussion arose on how to depict society, which resulted in the wish to illustrate that all actors engage in or are part of different and multiple fragmented public discourses that varies across topics, a point which was investigated in D1.1.

Based on the inputs from the workshop, DBT sought to integrate the feedback by reviewing the RETHINK deliverables and incorporate i) as many actors as possible investigated throughout the project, ii) findings from the investigation of the discourses on artificial intelligence, healthy diets, and climate change, and iii) findings on the roles that different actors play. Experimenting with different variations of the drafted framework, however, showed that it was challenging to categorize actors, incorporate the fact that the actors play different roles, and illustrate the fragmentation of the public discourses while keeping an intuitive and easy to comprehend framework. In other words, compromises were made prioritizing an intuitive and applicable framework. Concretely, it was decided to simplify the fragmentation of public discourses, to cluster actors visually, and to create a stand-alone visualization of the points concerning the roles that actors play. The result is presented below.

3. Framework for improving the use of science communication

Overall, the following framework aims to support the improvement of the quality of science communication by:

1. Providing an overview of the science communication ecosystem
2. Raising awareness of the challenges that this ecosystem poses, and
3. Posing practice-oriented reflexive questions that can help address these challenges

The framework can be used by anybody involved in science communication and is based on the project's research into the digital communication landscape, sensemaking practices, and quality. As mentioned, the framework is layered and intended to be interactive and integrated on the RETHINK website so that science communicators can click their way through it and seek the information that is relevant to them.

3.1 Navigation through the framework

The first layer of the framework aims to depict the high complexity of the science communication landscape. It is important to note that the framework does not include all details or all actors. The main idea here is to show how the science communication landscape has changed significantly when compared to earlier models where scientists and media were the dominating actors. The turquoise color symbolizes organizational actors whereas the orange color symbolizes individual actors.
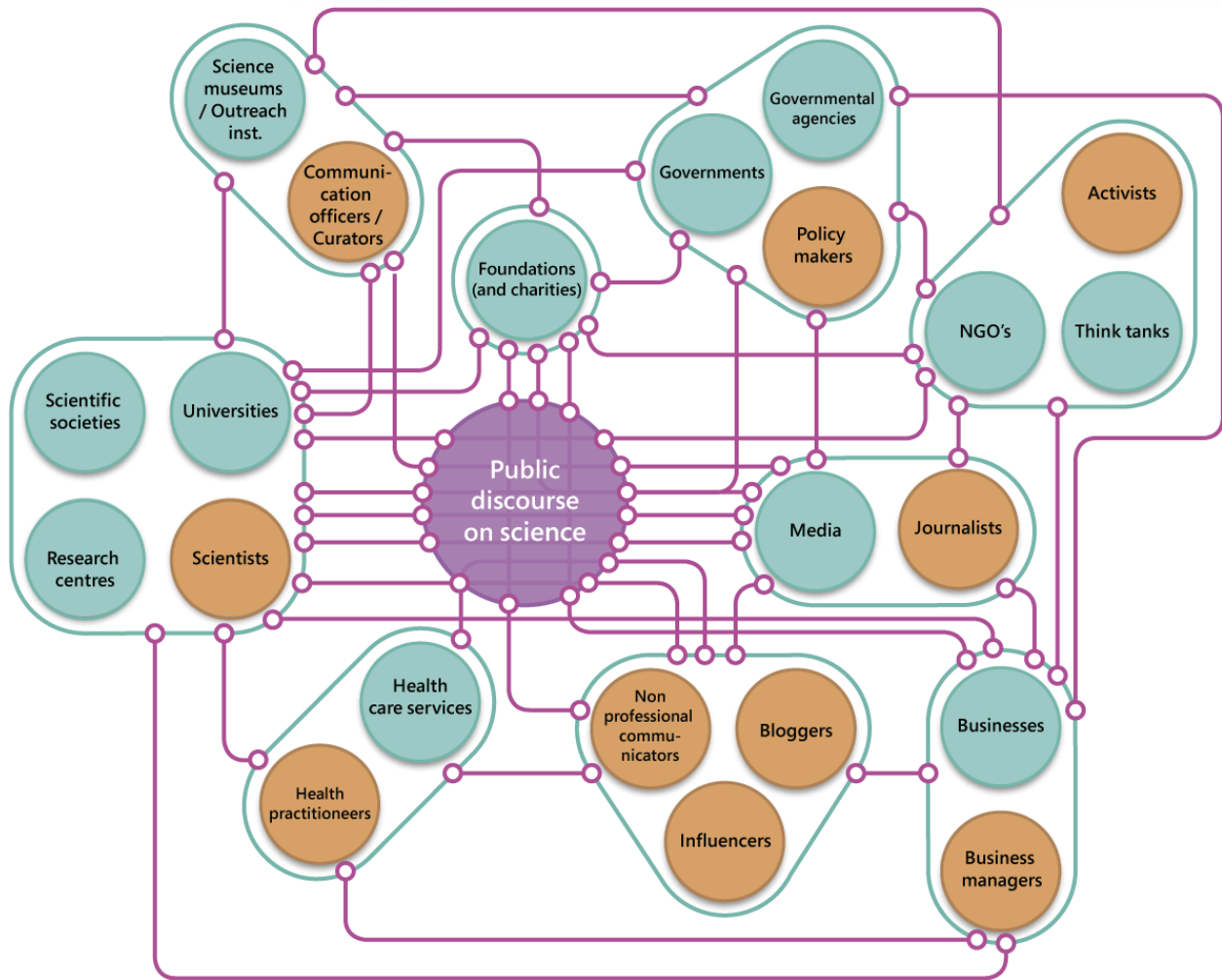
The circle in the middle called "public discourse on science" represents the multiple different discourses on scientific topics that science communication contains (this becomes visible when navigating through the framework) Each line represents interactions that can take many forms and vary in scope.

Accompanying the first layer of the framework, a list of praxis-oriented reflections, points of attention, and conditional factors that are relevant to all types of science communicators have been developed on the basis of the findings of D5.1.

Praxis-oriented reflections:
- What role are you playing and why?
- Who is your target group and how do you make sure to reach it?
- How is your relation to your audience and how does that affect your praxis?
- What do you expect from your audience and how does that affect your praxis?
- Do you consider whether your communication is a one-way or two-way street? How?

- Which platforms do you use and why?
- What is the added value of science communication?
- How could you create better conditions for communicating science (individual, organizational, cultural, etc.) in your professional life?

Points of attention
- There is a tendency to play the role [link to roles] of conduit wanting to inform the public
- There is a tendency to focus on people with a pre-existing interest in science
- The potential of new media settings is not always exploited
- Dialogue and two-way communication is an important quality criteria

Conditional factors
- The value of science communication is not self-evident
- Sensemaking practices are heavily dependent on people's personal situations, emotions and a priori beliefs
- The quality of science communication is context-dependent
- People are overloaded with information both online and offline

From the first layer, it is the idea that one can click one's way through different layers that reveal:

- Practice-oriented reflections and points of attention relevant to actors within science and policy
- How the landscape changes within different topics or discourses
- Reflections about sense-making, which is at stake in all communicate actions

So, if one clicks to reveal the second layer relevant to science actors, one will see:
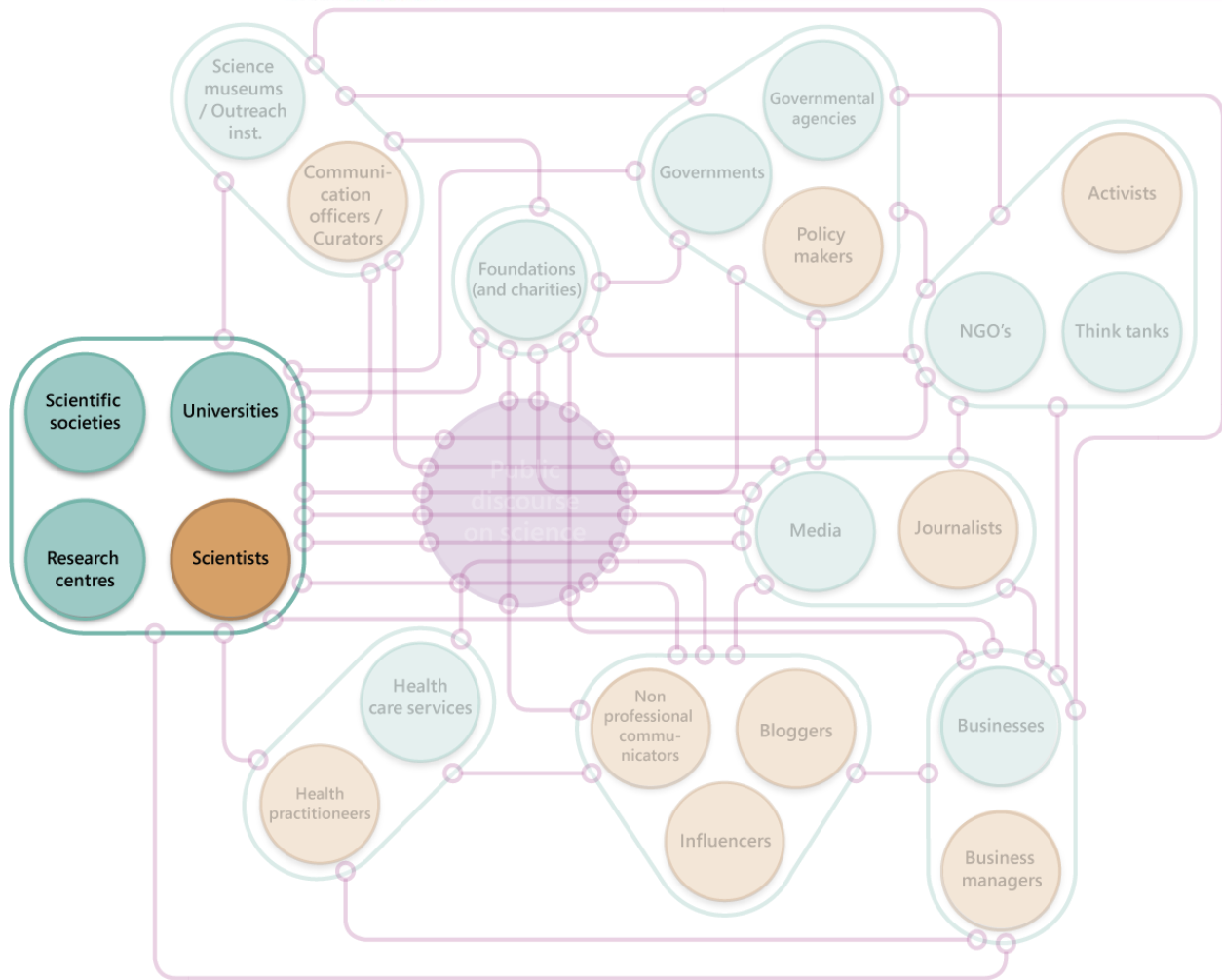
This illustration is accompanied by the following praxis-oriented reflections and points of attention (also based on D5.1):
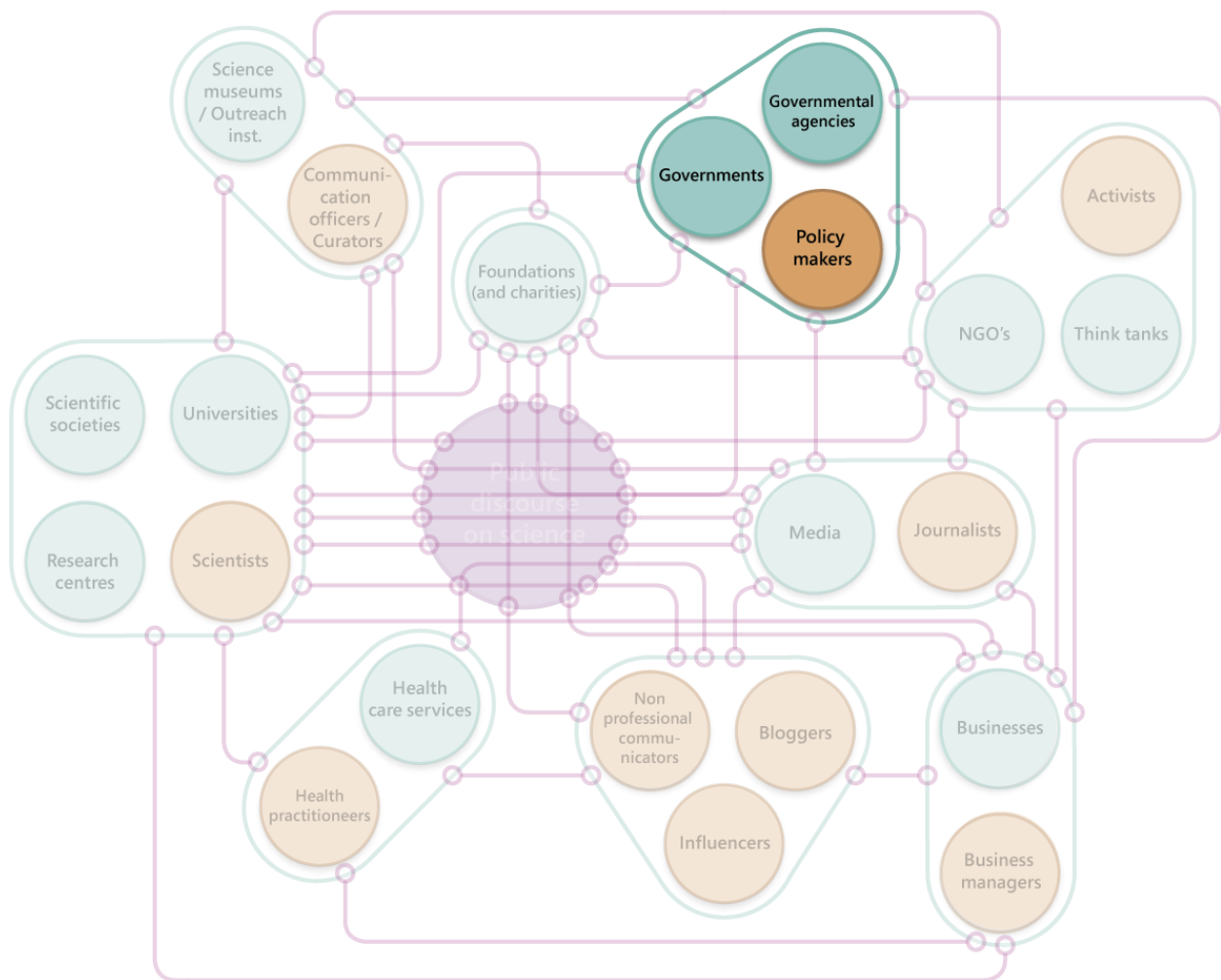
Praxis-oriented reflections:
- What role are you playing and why?
- Who is your target group and how do you make sure to reach it?
- How is your relationship to your audience and how does that affect your praxis?
- What do you expect from your audience and how does that affect your praxis?
- Do you consider whether your communication is a one-way or two-way street? How?
- Which platforms do you use and why?
- What is the added value of science communication?
- How could you create better conditions for communicating science (individual, organizational, cultural, etc.) in your professional life?

Points of attention
- There is a tendency to play the role of conduit wanting to inform the public
- There is a tendency to focus on people with a pre-existing interest in science
- The potential of new media settings is not always exploited
- Dialogue and two-way communication is an important quality criteria

If one clicks to reveal the third layer relevant to policy actors instead, one will see:

This illustration is accompanied by the following praxis-oriented reflections and points of attention (also based on D5.1):

Praxis-oriented reflections:
- What is the added value of science communication?
- How could you create better conditions for online science communication (individual, organizational, cultural, etc.)?

Points of attention
- Science communicators often lack time and resources for communicating science
- Bad online interactions can be deterrent to science communicators and their praxis
- Some science communicators are not familiar with the digital media environment

If one clicks to reveal the fourth layer that depicts the landscape characterizing the public discourse on climate change based on, one will see:
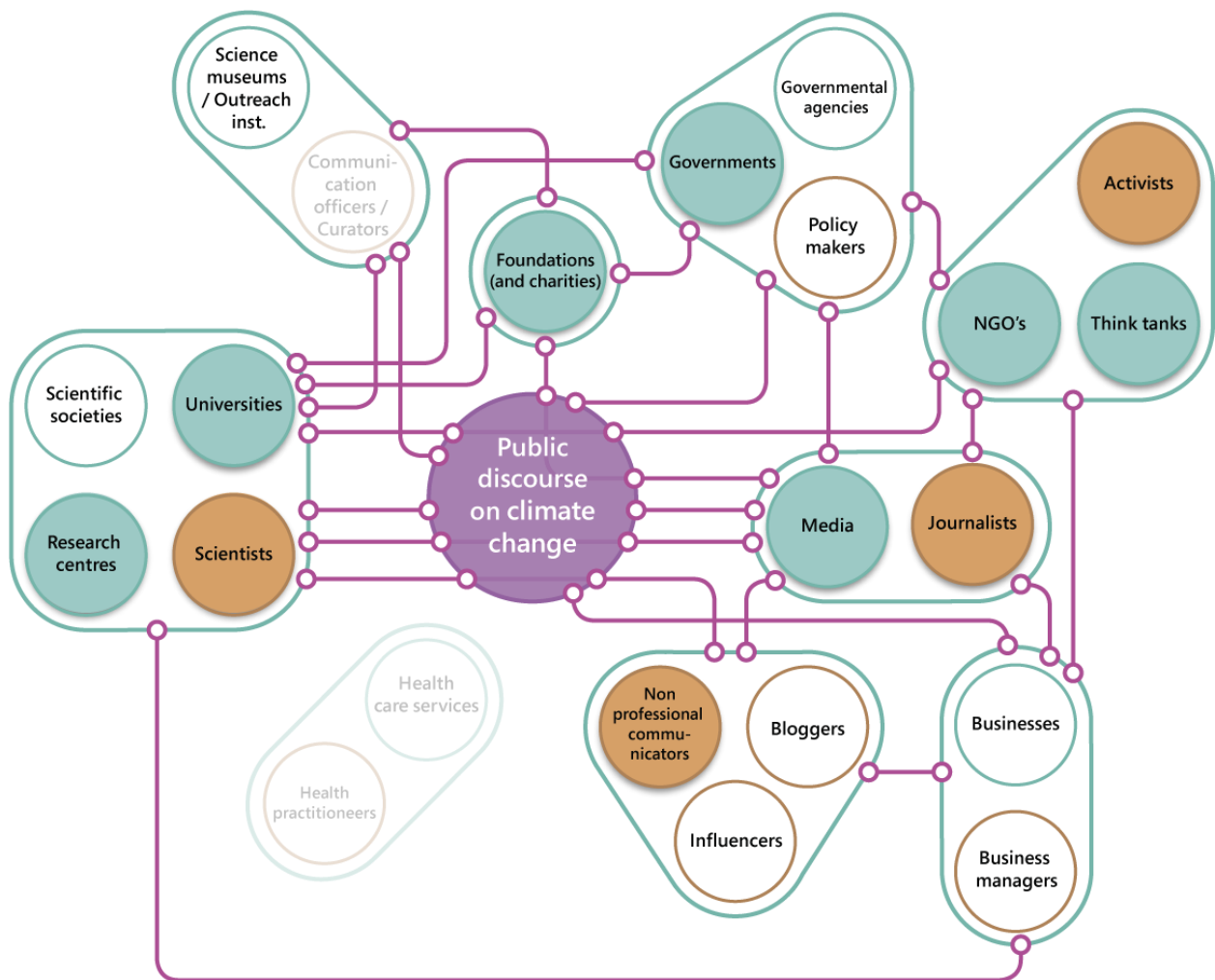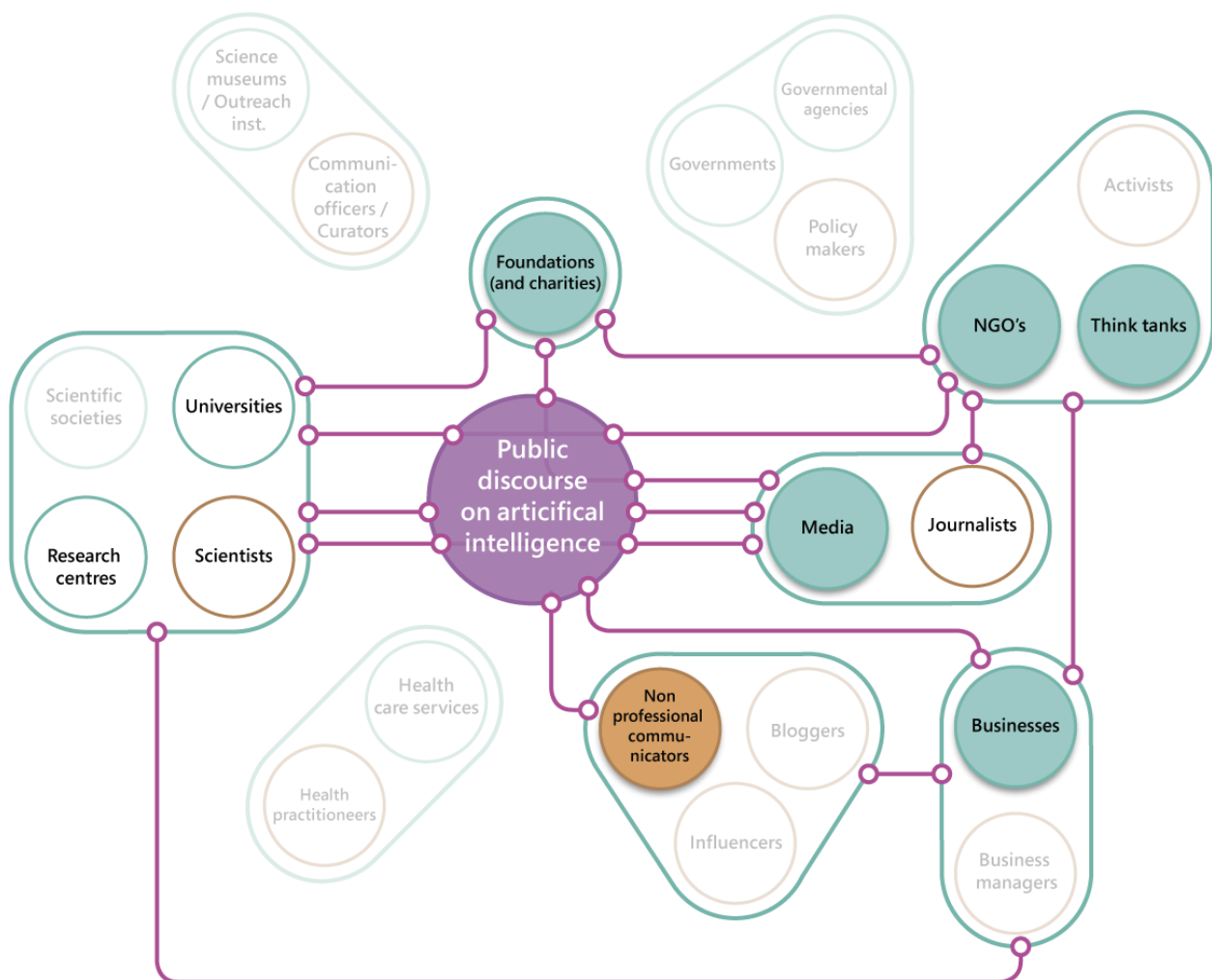

This illustration shows how the digital communication landscape concerning climate change is characterized by a broad and diverse range of actors. Both institutions and individuals,

academics and non-academics, traditional gatekeepers (e.g. journalists) and non-traditional ones (e.g. non-professional communicators), share content on climate change with publics.

All these actors communicate about climate change using different platforms to share different types of content. This variety potentially allows Internet users to encounter different opinions and pieces of information about the topic, but at the same time, it can allow misinformation and misinterpretation of climate change issues to be disseminated online.

If one clicks to reveal the fifth layer that depicts the landscape characterizing the public discourse on artificial intelligence, one will see:

This illustration shows how the digital communication landscape concerning artificial intelligence is not as diverse as that of climate change. It is dominated by institutions, and media organisations, businesses, non-professional communicators and support communities are the most common actors. Unlike in the case of climate change, journalists, entrepreneurs and policy makers are almost absent from this landscape.

If one clicks to reveal the sixth layer that depicts the landscape characterizing the public discourse on healthy diets, one will see:
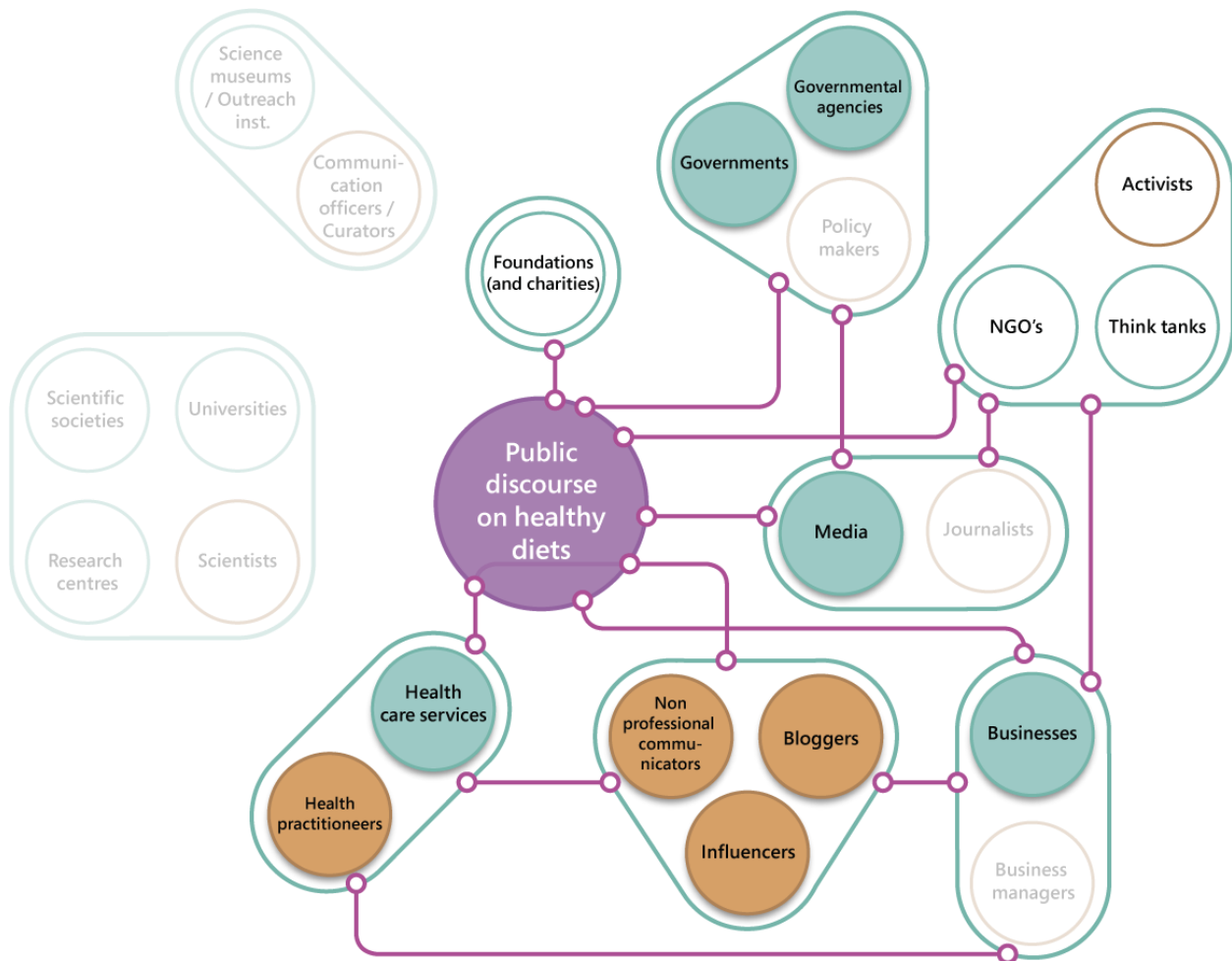
This illustration shows how the digital communication landscape concerning healthy diets varies in the types of actors and types of content. Both institutions and individuals, and traditional and non-traditional experts (e.g. health practitioners and non-professional communicators) are common. In this landscape, media organisations and businesses are as common as in the artificial intelligence digital landscape. Among individuals, health practitioners and non-professional communicators have the highest visibility online.

In the online communication about nutrition, experts and non-professional communicators compete to reach online audiences. Both claim to debunk misinformation about healthy diets and show their everyday lives and eating habits as examples to follows.

If one clicks to reveal the seventh and last layer that depicts how sensemaking is present in all interactions, one will see:
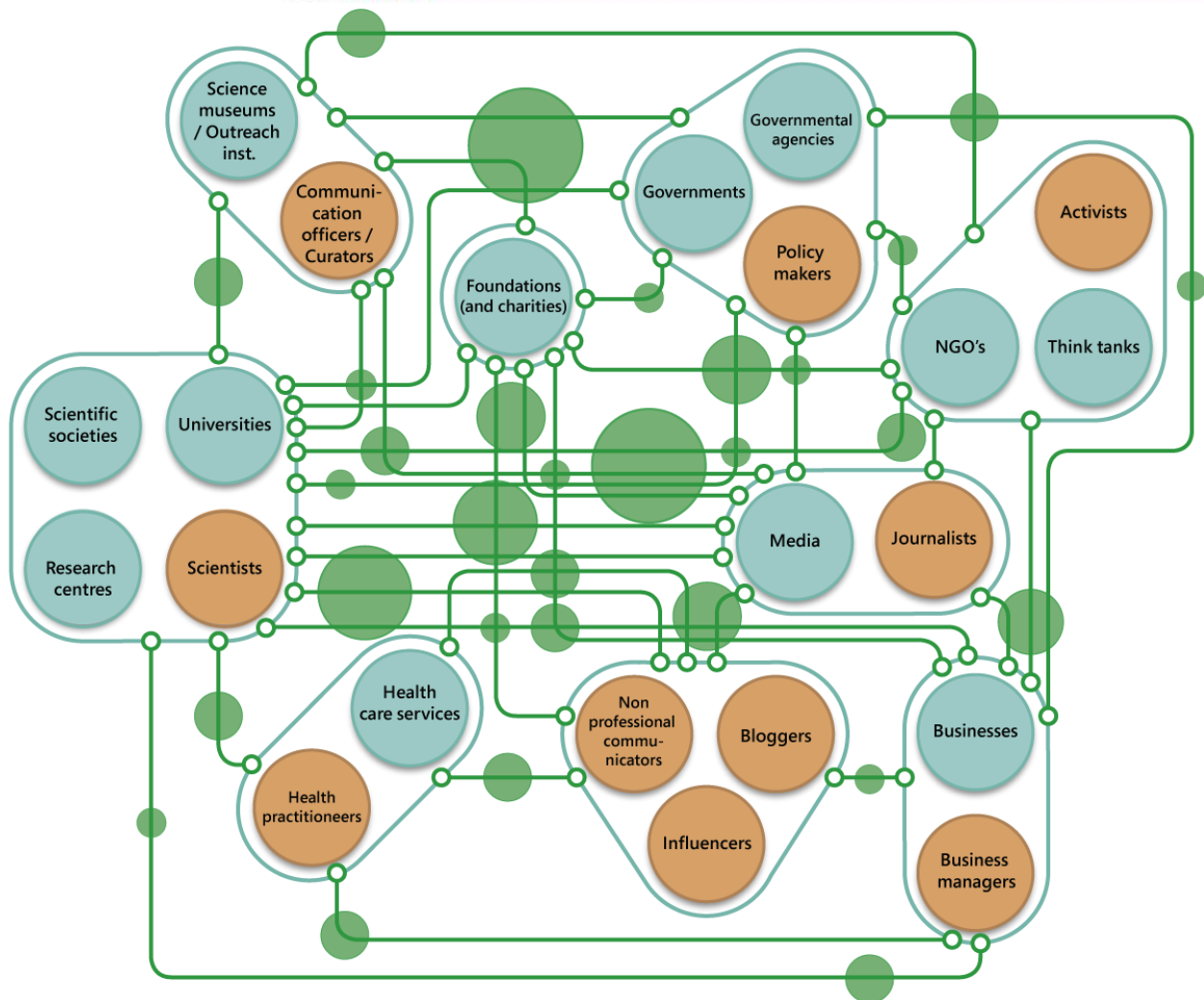
This illustration is accompanied by the following text:

> According to sensemaking theory, gaps in knowledge are a human condition, which is why knowledge is never complete. People are constantly making sense trying to bridge the gaps in their knowledge as they are moving through time and space. In order to do so, the people draw on a variety of sources such as previous experience, expectations, emotions, values and interest (Dervin, 2010). Such sensemaking practices are illustrated by the multiple green dots.

Finally, as mentioned, it was challenging to integrate into the framework the fact that different actors play different roles. Therefore, it was decided to add a stand-alone illustration and description of the different roles with its own URL.

> There is no one single objective way of communicating, which is why communicators inevitably need to choose between different potential roles to play in different contexts. The term role describes a characterization of the activities of an individual engaged in science communication (Pielke, 2007). Depending on which role a communicator plays,

the communicator draws on different repertoires representing a certain perspective on the relation between knowledge production and use as well as a set of work-related activities that complement these (Turnhout et. al, 2013).

Science communicators mainly play the roles of:

1. Conduits: Explaining or translating science from experts to non-specialists.

2. Convenors: Bringing together scientists and non-specialists to discuss science-related issues.

3. Civic educators: Informing non-specialists about methods, aims and limits of their scientific work.

4. Watchdogs: holding scientists, industry and political organizations to scrutiny.

It is hoped that the framework will be used widely and will support the improvement of the use of science communication by fostering a clearer conception of the current science communication landscape as well as more reflexive and open practices.

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Pielke, Roger A. (2007). *The Honest Broker: Making sense of Science in Policy and Politics*. Cambridge: Cambridge University Press.

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Slides from the framework workshop September 17th, 2021.

Workshop
Building a framework for improving and expanding the use of science communication

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824573

The overall objective of RETHINK is to contribute to making **the European science communication ecosystem more open, inclusive, reflexive and adaptive**.

We aim to **improve the quality of interactions between science and society** by providing **concrete recommendations** and **training resources** for nurturing open and reflexive science-society interfaces.

WP5.2: Building a framework

Providing a framework for improving the use of science communication .

The key focus for will be **how the quality and reliability of science communication can be improved**, and **identification of new openings for practice or improvement.**

Next: 5.3 Guidelines and recommendations

This task will provide **guidelines and recommendation** on how to improve the practice of science communication for three main actor groups: **practitioners, policy-makers, and scientists**.

Based on the synthesis in task 5.1, 5.2, and the materials and learnings from RETHINK, this task will present **how and where science communication could be improved** in terms of quality, reliability and areas of practice, and develop **specific guidelines and recommendations for the specific stakeholders**.

- Develop our current suggestion for the framework
- Identify ways of improving science communication

Agenda

9.05-9.15: Findings from Rethink project
9.15-9.45: Reflection on findings

Break

10.00-10.15: Framework: Presenting model
10.15-10.45: Discussions in group

Break

11.00-11.45: Presenting thoughts + discussion
11.45-12.00: Wrap up, next steps

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Any questions or remarks?

Analysis

1) Mapping of landscape: Actors, platforms, audiences

2) Incentive structures for scientists to engage in science communication + sensemaking practices of European citizens

3) Science communication training + quality

The ecosystem is complex

The digital communication environment has become more complex and diverse in terms of the amount of actors, information, interactions and practices.

The online ecosystem is different in different countries in terms of platforms and communicators.

Barriers:

Social media algorithms and APIs limit the sources that one is exposed to online.

Opportunities:

A diversity of science communication actors exist using a variety of platforms and formats.

Roles

Science communicators play a variety of roles but mainly the ones of:

- Conduits
- Convenors
- Civic educators
- Watchdogs

However, the role of conduit seeking to inform the public by translating science from experts to non-experts is the most **prevalent**

Sensemaking

Emotion, trust, personal context and worldviews are crucial to how people make sense of science.

Sensemaking practices are not merely influenced by access to knowledge or getting the facts straight. It is heavily dependent on:

1. Which personal contexts these facts are put into
2. How the facts relate to what people already know and believe
3. What the relationship between the communicator and the audience is, i.e. whether one trusts the source or not.
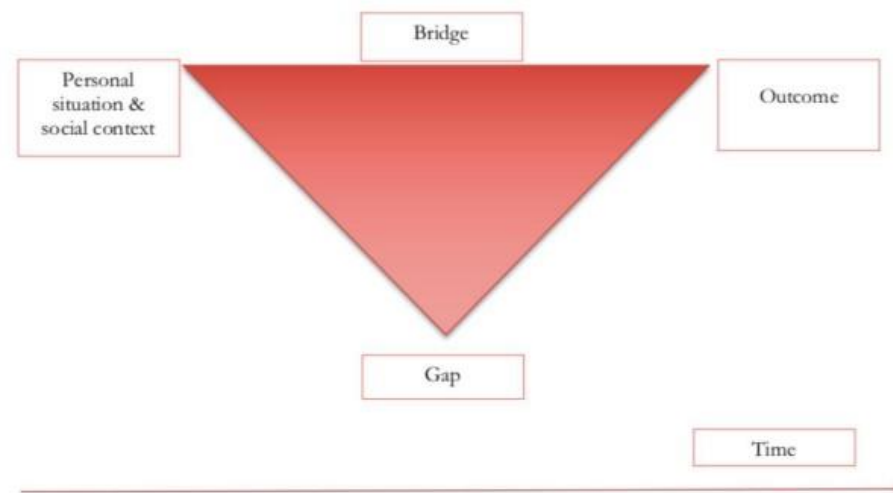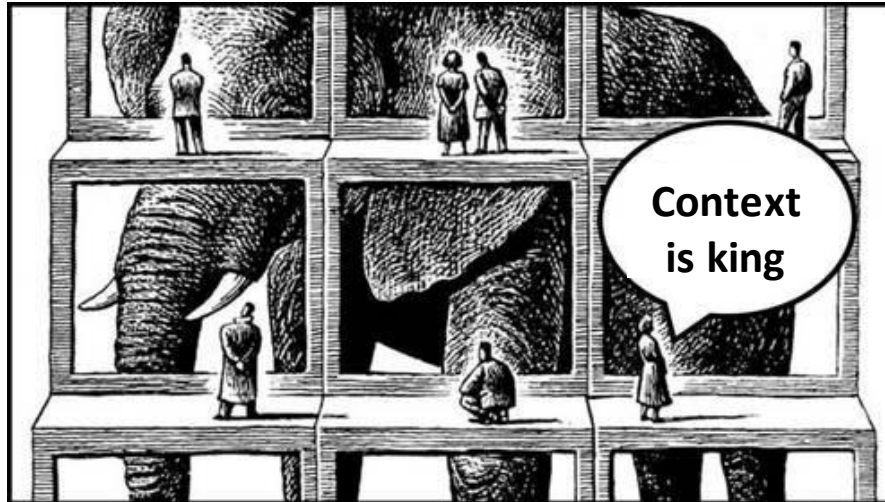

Figure 2 Mirco-moment triangle that illustrates the five dimensions of the sensemaking process (modelled after Reinhardt & Dervin, 2011)

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Context is king

- Most information online is passively received
- Sensemaking practices are heavily dependent on their personal situation, emotions, a priori beliefs and trust in the source
- Quality of science communication is context-dependent
- Science communication praxis is constrained by organizational and cultural conditions

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Good intensions

- A majority of science communicators **aim to create conversations** between researchers and the public

- Many scientists feel an **intrinsic motivation and sense of responsibility** to engage in science communication

- General **acceptance of quality promotion** by professional science communicators

Old school dissemination dominates

- A majority of science communicators play the role of **conduit** and aim to **inform** the public about science

- A majority of science communicators aim to reach **audiences with a pre-existing interest** in science

- The potential of new media settings is not always exploited

A sense of disconnect

- Science communicators experience a **sense of disconnect** with their audiences.

- Science communicators **experience a lack of time**, resources, support and incentives for engaging in science communication.

- Scientists experience **bad and non-constructive interactions** online causing them to stop engaging in conversation.

Hard to define quality

- Science communication scholars **don't agree** on how and if we should strengthen quality standards,

- ...but most point to **dialogue and two-way communication** as important quality criteria.

No clear picture of training

- Academic science communication programs overall aim to help them to serve as professional communicators in a complex science communication environment,

- ... but some programs convey a more traditional perception of science communication as a one-way process in which the public is informed.

- We still know little about training in dialogue-based science communication outside the universities' academic programs.

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Reflection

Spend 10 min. in groups of two discussing

1. What do you find most surprising / interesting?
2. Anything, you don't agree with?

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Agenda

9.05-9.15: Findings from Rethink project
9.15-9.45: Reflection on findings

Break

10.20-10.30: Framework: Presenting model
10.30-11.00: Discussions in group

Break

11.15-11.45: Presenting thoughts + discussion
11.45-12.00: Wrap up, next steps

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WP5.2: Building a framework

Providing a framework for improving the use of science communication.

The key focus for will be **how the quality and reliability of science communication can be improved**, and **identification of new openings for practice or improvement.**

Our framework should

- Be simple an applicaple
- Foster reflection and improvement of science communication
- Provide an overview of our findings

Deliverables:
1.1, 1.2, 1.3, → D5.1 → Framework
2.1, 2.2, 3.1, 3.2
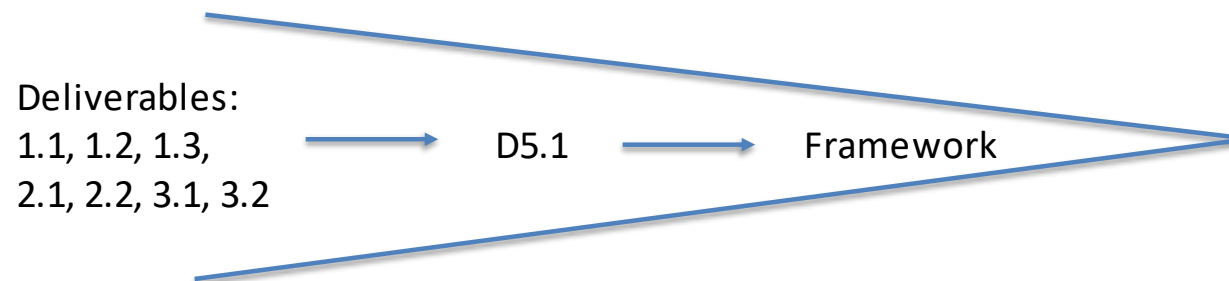
Models in science communication
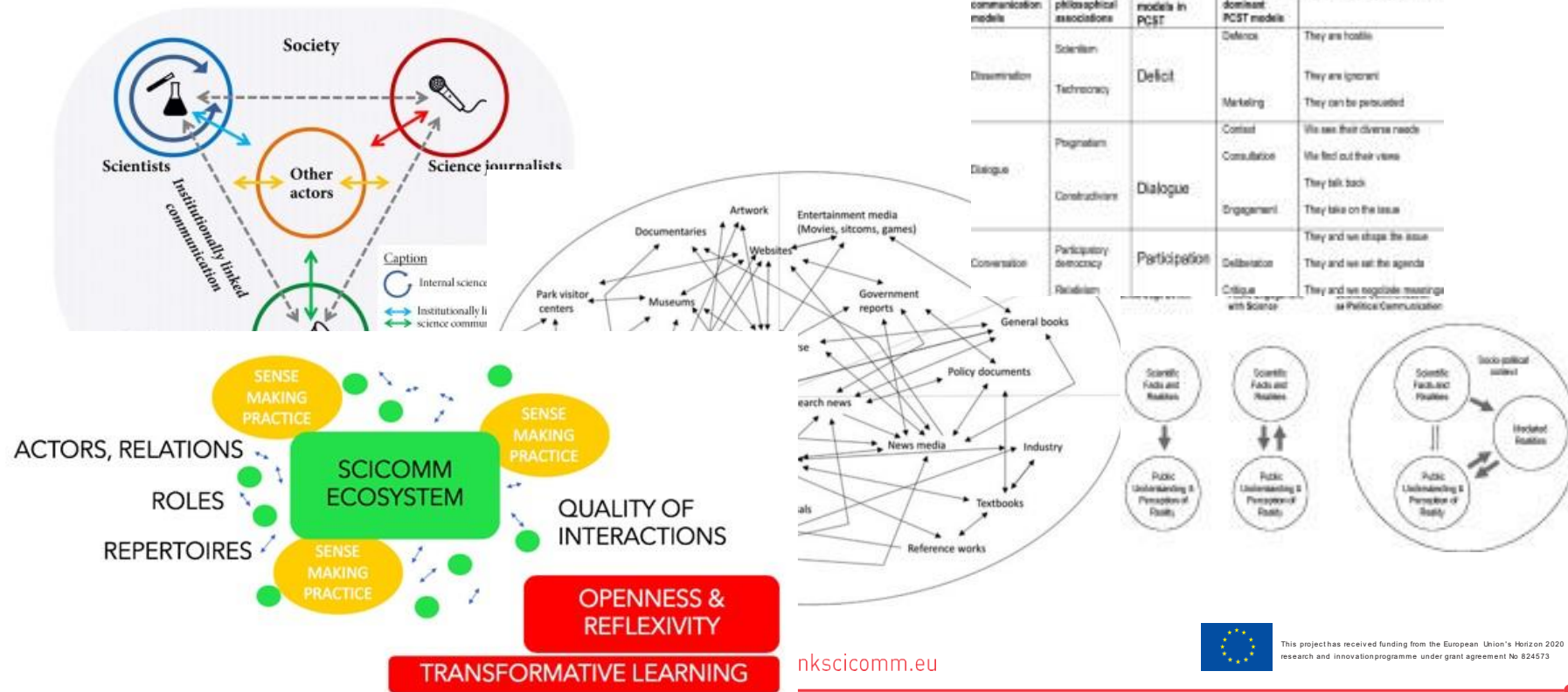
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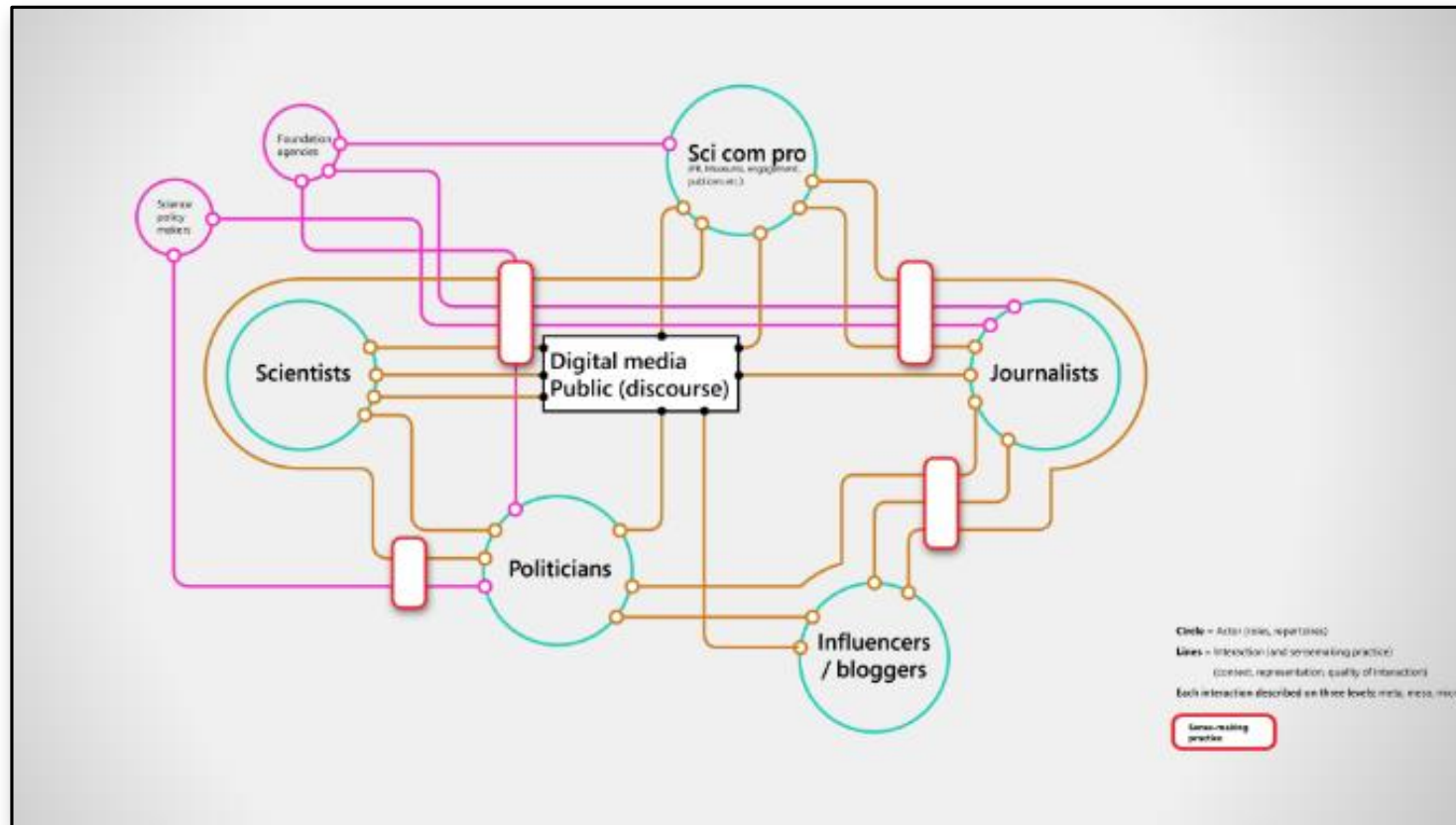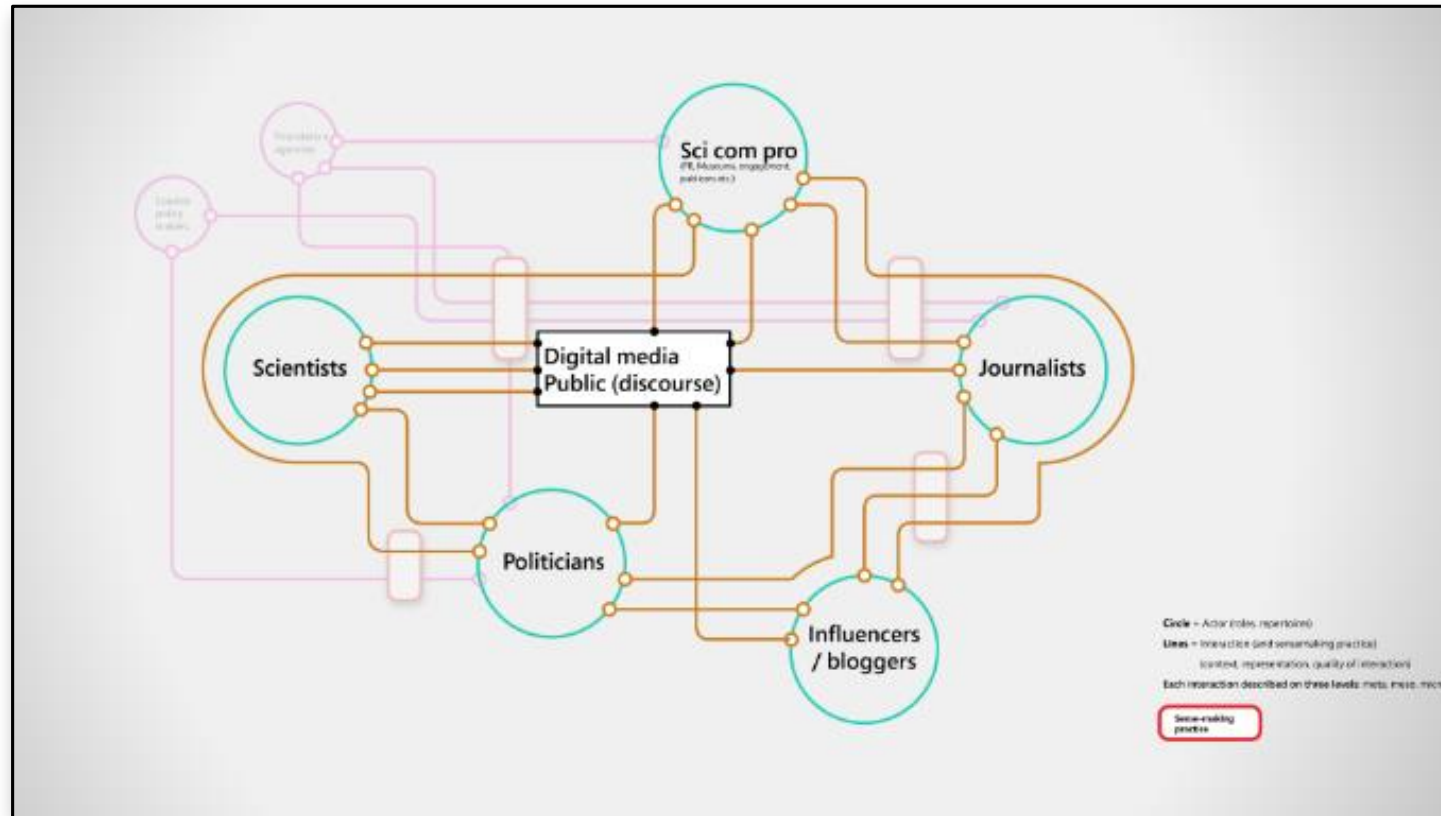
Sci comm professionals

Examples of actors: journalists, science museums, media organizations, and press officers

Praxis-oriented reflections:

- What role are you playing and why?
- Who is your target group and how do you make sure to reach it?
- How is your relation to your audience and how does that affect your praxis?
- What do you expect from your audience and how does that affect your praxis?
- Which platforms do you use and why?
- What is the added value of science communication?
- How could you create better conditions for communicating science (individual, organizational, cultural, etc.) in your professional life?

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Sci comm professionals

Points of attention
- There is a tendency to play the role of conduit wanting to inform the public
- There is a tendency to focus on people with a pre-existing interest in science
- The potential of new media settings is not always exploited
- Dialogue and two-way communication is an important quality criteria

Conditional factors
- The value of science communication is not self-evident
- Sensemaking practices are heavily dependent on people's personal situations, emotions and a priori beliefs
- Quality of sci comm is context-dependent

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Any questions or remarks?

In groups, discuss the provided questions

Please take notes

We will reconvene at 11.15
(take a break around 11.00)

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Mentimeter: Two questions

Go to menti.com
Code: 6847 6726

Next steps

1. Refine the framework and include the inputs in a small report
2. Send the framework and report with the possibility of providing feedback
3. Develop guidelines and recommendations

Annex II

Notes from the group discussion of the framework workshop September 17th, 2021.

Group 1 – focusing on policy makers

General discussion

- Why aren't policy makers in the blue circles? Politicians vs. Policy makers?
- Should we distinguish between organization level and individuals (e.g. Royal Society)
- Scientists interact with politicians in a mediated manner, through civil servants (front-end) or directly (cf. Climate change policy)
- Why is the public not an actor? The lack of society in the framework is very worrying.
- Perspective of co-production is missing! Particularly important regarding action, i.e. what should we do? Role of society/citizens in knowledge production/question formulation --> from propagation to conversation
- The categories are contested
- Who is driving the conversation? Ecosystem very context-dependent.
- Different roles of science (brokering literature?)
- Decisions underlying the model seem unclear: where are the actors coming from? Why aren't citizens, civil society, the public (behind the black rectangle?)
- Is the model supposed to be descriptive or (prescriptive)/or ideal? Perhaps there could be two! --> morphing between the two?
- Focus on digital media may be very limiting/simplistic
- Emotions, worldviews (sensemaking?) should perhaps play bigger role in current framework depiction.

Ideas on how to move forward:

- IPCC wants to be policy relevant, not prescriptive --> voice of science should be a voice at the table, not the only voice – to illuminate decisions
- Society should be prominently in the framework and also be unpacked in a similar way SciComm practioners are differentiated as well e.g. civil society, NGOs...
- NB also sensemaking now only seems to take place at certain points: all the lines have sensemaking elements/is multidirectional
- Sensemaking is made up by different (rich) elements: worldviews, values, emotions --> should these elements be unpacked as well?
- Spectrum of different opinions/views on socio-scientific topics is always there: there will always be a split --> should such differences be included in the framework as well?

The model looks nice – like the layered approach, innovative idea. Will always be an issue in terms of capturing everyone. How do we capture people who take up multiple roles e.g. scientist and journalist.

Sensemaking – does the map show and reflect all places where it takes place?

Does the sensemaking look as important as it should be? It's so fundamental to the whole process. The model may not reflect that. Needs to be emphasised as a key part of the whole process.

People are missing from the diagram. The 'publics' - it should be clearer that they are an actor. Needs to be split into different publics. The central area needs defining more clearly. Industry/business are missing, funding agencies.

Does it mean that scientists don't speak to journalists unless its digital media.

Should we include the roles in the diagram eg convener, educator.

There's a lot more overlap between actors in terms of what they do than we might expect. Is there a way to show that they have more in common?

Change praxis – eg practice orientated questions.

Like the approach of posing questions – self-reflective practice.

How do you consider your target audience before you start? Who is your target group? How can you ensure it's a target. Important not to create a one-way interaction. Is there equality in the interaction? Need to create questions together with the publics. Is this genuinely a two way process.

Group 3 – focusing on scientists

<u>Overall assessment</u>

- Are people participating in science communication in the model?
- Audience perspective?
- Shows professional communicators – what about the interface with users/audiences/those addressed in scicomm?
- Links missing, e.g. scientists and journalists or at least press offices
- Face to face interaction missing, influence of traditional media
- Other social players?

- Platforms as actors who influence public communication
- Wider societal framework is not represented
- Terminology (e.g. bloggers), other actors who have a stronger influence (example Andrea from Eurovision Song Contest)
- Overlap of roles
- Reorganize proportions: where are we (prof. science communicators) as compared to the entire society?
- "science in context" (e.g. pharma industry, agriculture >> would not use term scicomm)
- Other forms/spaces of journalism also as science communication (e.g. popular formats >> cooking, baking, handmaking honey >> link to distinction of insects)

Scientists' perspective:

- Training as overall concept for broad range of different actors from society
- Ethical and philosophical issues as important parts of science communication training (for all scientists, equipping them with awareness for these issues)
- Media literacy