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Introduction

"We put people on the moon and robots on Mars, we teach our children that the earth is not flat but roughly spherical and that water conducts electricity, we happily submit to laser surgery on our eyes and we invest heavily in studying the genetic structure of viruses. Rightly so – laser cataract surgery goes wrong only once in around 5000 times, you can fly round the earth to see for yourself, people get killed by using hairdryers in the bath and gene-based research has helped to develop vaccines that prevent deadly illnesses. Clearly, we can trust that much of what science teaches is reliable and so too are a very great many of the predictions it yields as well as technologies it spawns. What is it about science that makes it reliable?"

These are the opening remarks of *The Tangle of Science*.[1] The question there posed is immediately followed by a preliminary exploration of some standard answers to it: science is reliable because of its use of the scientific method, or because it is systematic, objective, evidence-based, etc. etc. And the list includes not just well rehearsed philosophical answers. Bodies such as the US National Academy of Sciences, the UK's Science Council, and the American Physical Society (in fact, all the different scientific societies of the different sciences – from natural to social) also explain what is good about science, and why science is good: it is 'systematic', it is 'testable', it uses 'empirical evidence'.

These connotations of 'good' when it comes to science are then well under pressure: what do they actually mean, and to what extent should they be predicated of science? Does being systematised via sets of equations make some sciences more scientific than others (e.g. physics vs anatomy vs anthropology)? What should count as 'evidence' for or against something, and are facts evidence enough (and if so of what kind and variety) or should extra-factual element be also included (and of what kind and variety too)? Is science required to make *novel* predictions in order to be good, and to be good how precise should predictions be? Etc.

All these issues have been both widely and critically discussed. Still, they all have something in common: they are centred on the issue of science's own trustworthiness – the criteria, the properties, the traits that make science itself (its products, its outputs, its claims) believable and justifiable from an epistemological point of view.

However, *being worthy of trust* in the epistemological sense does not immediately translate into being an *object of trust* in practical contexts. To appreciate the difference let's compare the following two examples.

[1] The reference is to Cartwright N., Hardie, J., Montuschi, E., Soleiman, M., and Thresher, A.C. 2022 *The Tangle of Science. Reliability Beyond Method, Rigour, and Objectivity*. Oxford: Oxford University Press.

In the 1950s Barry Marshall discovered that the cause of gastric ulcers, against the prevalent views at the time (an excess of acidity in the stomach, stress, eating hot food) is a bacterium.[2] Marshall was a doctor, so presumably he formulated his hypothesis about the likely cause of gastric ulcer by following standard protocols of scientific research which he trusted could lead to the result sought for. He trusted the veridicity of his hypothesis to the point that he was prepared to drink a broth containing helicobacters developed in the lab in order to prove his theory true. And indeed by doing so, in less than 10 days he developed severe inflammation of the stomach which eventually led to the appearance of an ulcer.

This is a case in which someone's trust in something (in this case a scientific hypothesis about a causal mechanism) follows from someone's trusted knowledge of the process that leads to a certain result (what goes into the formulation of that very hypothesis).

But let's now look at a second example.[3] The World Health Organization conservatively estimates that between 2013 and 2016 there were 28.616 cases of, and 11.310 deaths due to, an outbreak of Ebola in Guinea, Sierra Leone, and Liberia. The international community responded with a large-scale intervention which also included the distribution of vaccines among the affected population. However, this effort was met with considerable distrust and resistance from the communities targeted by efforts of assistance. In Sierra Leone and Liberia, many people failed to report to clinics for treatment, or hid their illness when medical teams arrived. There were also more violent forms of resistance in Guinea (e.g. doctors and health carers were forcefully prevented from entering villages).

The European Union was substantially involved in the international intervention effort. It contributed €1.8 billion by July 2015, €869 million of which was from the European Commission (Quaglio et al, 2016). Individual EU nations also organised their own independent intervention efforts. Overall, EU involvement in the international intervention was severely criticised, mostly on the grounds that there was a lack of coordination between EU agencies (Gostin & Friedman, 2014; European Parliament, 2015) and that shows a lack of European readiness for future international infectious disease outbreaks (Speakman et al, 2017). However, being able to intervene effectively in cases of global/transnational epidemics requires more than just coordination between agencies, and the Ebola case is a particularly instructive case when it comes to point out what factors should be taken into account. Trust is one of them, though of a different kind from what I referred to in the example of the discovery of the cause of peptic ulcer.

In the Ebola case the purported reliability of the knowledge in question (western medicine) does not translate automatically into trusting that that very knowledge is what is needed in order to bring about the expected results. How can one (say a community of villagers in Sierra Leone) trust a certain health policy intervention if the institutional and cultural framework that drives that intervention (say western medicine and western societies) is not part of one's social and public

[2] For a history of the discovery see Marshall (2002). See also Atwood (2004).
[3] For an interesting discussion of this case, I rely on Furman (2020).

experience? A policy issued on an arguably trustworthy science-based intervention is not automatically worthy of trust for those who are supposed to benefit from an implementation of that policy.

The question of trust is not only epistemological. It is also social, institutional. Trusting science entails not only, or not specifically, an understanding of the epistemological and methodological protocols followed by science in producing its results. It also requires awareness of the contexts where these protocols are used, including their purposes, functions and agents involved – all of which goes well beyond what happens within the closed doors of a research laboratory.[4]

This form of disjunction on matters of trust brings to the fore an essential issue:
If the trustworthiness of bodies of knowledge is most naturally within the remit of those categories of people who are in control of the conditions and protocols for producing this knowledge (e.g. the community of scientists), how can people who do not belong to the same community achieve at least an acceptable degree of trust towards that very knowledge? In other words, how can we trust the experts when we are not experts ourselves? What are the conditions and constraints that play a part in building this type of trust? And what is the institutional framework that makes this type of trust possible, and even desirable, in view of achieving the type of social cohesion and participation which makes the very activity of science thrive, possibly for the right reasons?

In view of addressing these questions, I will proceed as follows:
First, I will explore what brings us to trust (or not trust) the experts without being one of them. Secondly, I will comment on what it takes to trust the institutions that call on scientific advice. Finally, I will bring in some reflections on the role of scientific literacy in the debate on trust and expertise.

1. Trusting the experts without being one: what brings us to do so

If we go back to the opening remarks of *The Tangle of Science*, a considerable emphasis is put on what we feel entitled to do as a consequence of trusting science: *we* put people on the moon and robots on Mars, *we* teach our children that the earth is not flat, *we* happily submit to laser surgery on our eyes, *we* invest heavily in studying the genetic structure of viruses.

However, when we ask ‘what makes science reliable’, the answer to this question radically changes depending on who is the ‘we’ that is referred to. As illustrated above, the way a scientist relies on science is not the same way a layperson does so. There is a double-edged reason that accounts for this difference. On one side, in contemporary democratic societies there is an exponential growth in the specialization of scientific knowledge. This is something that ordinary citizens are aware of, and it is perhaps what sometimes makes them wary of science. On the other side, ordinary citizens are not by norm well equipped to understand highly specialised scientific and technological

[4] A similar issue can be raised in the context of the covid pandemic: ‘Are vaccines trustworthy’ and ‘Do we trust them enough to take them?’ are two different questions.

knowledge, even though it is precisely this type of knowledge that often runs their lives and the decisions they make – from getting involved in slowing down global warming to getting vaccinated. Here trust emerges as a crucial condition: it becomes a means for citizens to participate in societal action even when the required competence is missing.

Participation is not though a self-referential act. *Good* participation arguably requires a degree of self-awareness, that is being able to express reasons (hopefully well justified reasons) that make us believe that some decisions and choices made by others are both sound and just. It is in this sense that we can argue that the type of trust that informs good participation should not be blind, but rather *engaged*. Blind trust refers to situations in which people do not question their implicit reliance in something/someone. This feeds into the view of the so called 'uninformed' public, who in practice is not necessarily more 'trusting', but in principle at least is expected to trust 'whoever knows better'. However, when people can question their implicit trust by engaging with the reasons to trust the experts, and with the reasons to trust the knowledge that informs the experts, trust ceases to be blind and passive. Participation becomes meaningful for the very people who intend to engage themselves. This goes well beyond the electoral. An 'engaged public' should be able to develop well thought out strategies of inclusion, effective representation and shared deliberation in debates of public concern.

So, how can engaged public trust be promoted? When it comes to trusting science, ordinary citizens need to find specific ways to access and to assess scientific knowledge and choose what types of access and assessment are most suitable to use. Trust in science here translates into trusting those who bring science to us. There is a number of categories of people that should be taken into account as trust holders – starting from the scientists themselves, but also the journalists, and the politicians, and the policy makers.

2. Figures of trust

Let's start from the scientific expert. To trust the scientists, we need to identify reliable second-order criteria that could put citizens in a vantage position to evaluate both the reliability of expert knowledge and whether it is good for them to rely on that knowledge. In other words, citizens should be able to form sound opinions on who can be trusted and why. How can this be achieved? First, we must put ourselves in the position to decide that a scientific expert has authority. Secondly, we need figure out what type of 'understanding' of science is required in order to trust the expert in question.

As to the first condition. Appealing to the authority of an individual entails an argument of the following sort:
P1. A is considered to be an authority in the field F
P2. A claims x regarding F
C. x is true

There are at least two problems with arguments from authority. First, that *A* has the claimed authority is an empirical question, and often a contested and controversial one in practice. It relies on facts identified by contexts, and on contexts where those facts prove their relevance to the claim of authority. So any conclusions inferred from a claim of authority is equally contextual and potentially contested. Secondly, that x is true is made dependent on who asserts it, but that is not necessarily the case. 'If A is an authority what A claims is true' does not follow, because first, what makes A an authority is inductively open-ended and second, also a non-contested authoritative A can make a false claim. Logically, arguments from authority are fallacies: the truth of their conclusions cannot be necessarily inferred from whoever asserts them. This does not entail that the conclusions in question are always false, only that the person who asserts them is not a sufficient condition for their truth.[5]

But we do resort to arguments of this sort quite often in practice. So, how do we proceed to demonstrate that an individual *A* possesses enough authority to claim legitimately *that x*, and in such a way that we have reasons to believe *that x* be true? The philosopher Elizabeth Anderson (2011) suggests that citizens should be able to make at least three types of assessments: an assessment of expertise, an assessment of honesty, an assessment of responsibility towards research. For each type she believes citizens can rely on a number of indicators. For example, regarding expertise we look at whether scientists are research-active in the field, or whether their research is widely recognized by other experts in the field. All this can be determined by considering factors such as citation counts, impact factors of the journals in which they publish, record in winning major grants, etc. Regarding honesty, we assess whether the scientist's personal records do not include unresolved conflicts of interest, evidence of previous scientific dishonesty (plagiarism, faking experiments or data, etc.). Regarding responsibility, we look at all the things that makes a subject accountable, so we become suspicious when the scientists do not share their findings or their methods and procedures, when they fail to submit research to peer-reviewed journals, when they publicize their ideas in the press or in political circles before making their case before experts, etc.

Another important indicator in Anderson's list is scientific consensus. Acknowledging the fact that science progresses in the midst of disagreement should not make us lose sight of the value of consensus even in the face of some dissent. Criteria for determining whether there is a consensus over trustworthy and responsible experts are needed. Laypeople can rely on a range of sources: open access archives collecting peer-reviewed literature and making results available, consensus statements and reports of leaders in the field, for example reports by the National Academy of Sciences, etc.

Anderson makes us notice that ordinary members of the public, equipped with some school education, basic Web search skills and access to the Web, can resort to all these criteria and be in a position to make reliable second-order assessments of whom to believe. But here is an equally interesting things to notice. Having these criteria at hand and being able to make use of them with

[5] For a discussion of arguments that appeal to authority see for ex. Ch. 7 of Walton (2008).

relative ease, does not imply that citizens actually go through the process of using them. Even when they do, this does not magically transform individuals in trusting, 'engaged' citizens. In fact, if we look at some of the big debates in contemporary society – even those that summon widespread consensus among the experts, such as that on climate change – there is evidence that this is not often the case. Citizens either do not access the information needed, or even after accessing it they remain sceptical.

This brings us to a further crucial point. It is not enough to have suitable means at hand to adopt and use. There need to be appropriate incentives to use them. Incentives of this sort only come from being part of a social environment where a critical disposition towards science is nurtured, and where public debate is carried out by avoiding rigid and sterile polarisation of positions. As I said earlier: trusting science is first and foremost trusting those that bring science to us. Besides scientists, a large responsibility falls on how science is communicated, and on the institutions that involve science in their decisions.

As to the former. We often hear about objective media reporting. The idea is to produce a reporting of scientific views that is both balanced and reliable, besides being approachable by non-scientists. But each feature comes with provisos. (Gerken 2019) A *balanced reporting* in journalistic terms consists in a broad commitment to representing diverse viewpoints in a manner that does not favour any one of them. So balance in this context points in the direction of neutrality, or impartiality. A possible assumption behind this commitment is that all views are equal, namely that they have equal scientific weight. We know, however, that this is not the case, and the idea of balance often creates the false scenario that epistemically unequal views are equal. (Porritt 2018) But not all views are equally valuable in scientific terms, nor equally well established, equally relevant, etc.

An alternative idea is *reliable reporting*, meaning reporting of reliable views. This type of reporting does not treat all views as equal. For the reporting to be reliable, the science that is reported about should be reliable, that is science for which the nature and degree of epistemic justification can be made explicit, according to the criteria adopted by the scientific community in producing science. Reliable science is not though uncontroversial. When journalists report opposing theories, they should be able to report on the different nature and strength of justification for each theory they describe. The focus should not just be on the theories but on the differential weights of evidence.[6] Journalists should also not shy away from making purported risks explicit. Communicating uncertainties to the public, as some empirical studies show (e.g. Gustafson and Rice 2019), can affect the way citizens understand scientific results without detracting from the acceptance of those results as reliable.

[6] The widely discussed case of Dr Wakefield and the false correlation between combined vaccines in children and the developing of autism is instructive in this context.

Sound and fair communication and dissemination of scientific results is indeed a delicate and complex balancing act, with deep repercussions on the task of educating the public, specifically on the social endeavour known as citizens' *scientific literacy* – a topic that will be discussed below. But before, what about policy and politics?

3. Trusting the institutions

It is well established in political theory that modern democracies cannot efficiently operate, or be managed effectively, if trust between institutions of governance and various categories of social actors is low or absent (Dunn 1988; Walker-Ostrom 2009; Warren 1999; Putnam 1993; Glaser-Hildreth 1999). It is also well- established and documented that there has been a steady and substantial 'decline in trust' in governance (predicated at different levels: governments, political and economic institutions, private and corporate actors, financial regulators, and the like) over the last couple of decades in the world, including in some European Member States and Europe itself, with consequent impact on public participation, democratic support and sustainability and efficiency of governance.

Survey data are consistent in showing that citizens express less trust in Parliaments and political parties, as well as in politicians and experts (Norris, World Value Survey/European Value Survey; Edelman Trust Barometer). Many of these studies correlate decline in trust with the 2009 economic crisis and its related consequences, for example the rise in unemployment and policies of austerity (e.g., Foster-Frieden 2017; Tonkiss 2009). Among other suggested causes are regulatory failures, the inability of public authorities to protect public welfare and health (Löfstedt 2005), and a lack of fairness, transparency and accountability (Levi 1998). However, what these failures interestingly point out is that the expression 'decline in trust' is as a matter of fact imprecise, since it would imply that trust has been only steadily and progressively disappearing. Instead, what has been happening is that trust has been drained away from traditional repositories of authority, like politicians and scientists, to be alternatively re-distributed among a wider and motley range of actors. The credibility of information is no longer associated with, say, academic status or institutional role, but it rather stems from less conventional forms of recognition and reputation. In this context those who are perceived to be legitimately entitled to express policy-relevant views on – let's say – the consequences of vaccination or the long-terms impacts of climate change are not limited to 'experts in' medicine or climatology. Fully legitimate policy processes are inclusive of actors who hold non-conventional, minority and non-scientific points of view. In this case of course, criteria *à la* Anderson prove difficult to apply, and the question of who to trust and why more challenging to assess.

This development does not hold only negative consequences. It might also produce some positive output: scepticism and distrust on the part of citizens force experts and politicians to explain reasons for policy choices more fully and openly– and in so doing improve system accountability. Redistribution and diffusion of relations of trust also promote pluralism of viewpoints that might prove valuable, particularly when they develop in situations of radical uncertainty.[7] Decreasing trust

[7] See O'Neill (2002). On pluralism of viewpoints, see Weale (2002).

in institutions may then promote a discussion on the value of the competence of governance to deliver its tasks – competence in the sense of a joint function of a knowledge base and the ability to use that appropriately in the making of decisions. This joint function requires to be spelled out further.

For governance to be competent – about the decisions, actions, regulations, or structures and arrangements delivered – it should be seen as being based on the best available evidence and on good reasoning made available by the latest, most advanced scientific knowledge. Governance nonetheless should also be seen as being responsible, as well as just – namely, meeting the relevant moral requirements in the contexts where it operates. These two dimensions are interrelated – corrupt government institutions, where members are allowed to decide in their own interest, are unlikely to make sound, reasons-based decisions, and even well-intentioned regulators can sometimes make decisions that unfairly harm one social group when the decisions are based on faulty knowledge.

Competence and responsibility are jointly at the very foundation of well-functioning democratic institutions. Political institutions are under a duty to make the best use (i.e. most efficient and most responsible) of the best available scientific evidence. Good science used at the right time and in the right circumstances can save lives, help to foresee environmental disasters, and address major social problems. Conversely, ignoring robust evidence may have far-reaching negative consequences. By means of examples, a more rigorous review of the scientific evidence in the 1970s on the sudden infant death syndrome could have prevented the high rates of incidence in 1970s and 1980s in the UK (2.30 deaths per 1,000 live births, and 1,593 deaths in 1988)[8]; or in South Africa, the delivery of anti-retroviral drugs would have been beneficial to millions of AIDS-infected persons if it had not been encountering political scepticism towards viral theories of HIV-AIDS. (Roeder 2009) Or else, if interest groups are allowed to plant doubt on the scientific consensus regarding human-made climate change, including through purposeful misinterpretations of the nature and scale of scientific uncertainty related to that change, disastrous policies and irreversible consequences for our planet might follow.

However, let us ask ourselves, how does science reach policy? It is not a case of a straightforward transfer of information from one domain to another. It takes more than science to build good scientific advice. When the aim is social, science advice becomes a complex type of *judgment* that combines disciplinary/interdisciplinary competence and expertise in the delivery of the advice. Conversely, making decisions receptive of that advice cannot be secured by formal methods, or by plain application of rules. The process ought to be *deliberative,* that is it should include collaborative thinking (that does not exclude disagreement), disciplinary expertise combined with local/contextual knowledge, and professional experience from both sides (science and policy).

[8] For details see Duncan-Byard (2018).

What is good evidence for policy? In the Introduction of his (2017) Parkhurst defines appropriate evidence as "that which speaks to the multiple social concerns at stake in a policy decision, which is constructed in the ways that are most useful to achieve policy goals, and which is applicable to the local policy context." This means that, if one of the practical outputs of science advice is *trust* in what that advice is able to deliver, then attention to how that advice is formulated and communicated becomes mandatory. When we get into the details of how that advice is brought forward, we might not like what we see. There is more uncertainty, and risk, and hazard, than we are prepared to accept. Policy makers and citizens expect conclusive statements from science. Often this is possible, but there are also many areas where scientific evidence is complex, controversial, ambiguous.

The acknowledgement of uncertainty is of crucial importance when it comes to trust science, but even more to trust the institutions that vouch for it. Uncertainty is not equal to absence of knowledge, and in the case of science it is often the result of a lot of knowledge.

Uncertainty is a source of controversy. When hidden away it brings about a distorted picture of how science progresses, which can only disappoint those who rely on science. But also, when it is made explicit it might feed on corrosive scepticism, which itself turns into a decline in trust. The way in which risk and uncertainty are presented to the policymakers and communicated to the public is then of fundamental importance both for policymaking and for the public perception and acceptance of the risks we are prepared to take. Trusting the institutions that resort to science in their decision-making entails trusting that scientific advice is not idealised nor overestimated. This requires that sound decision making puts scientific advice in a larger framework of evaluation where matters of science combine with other relevant factors (social, economic, ethical, practical). This does not mean that by doing so science loses credibility or objective input. As I argued elsewhere “using the objectivity of science in matters of social concern must be part of a public conception of what is *correct* and *reasonable* to use in the resolutions of those very matters and the decisions they call for.” (Montuschi 2017, 6)

I said earlier that in order for citizens to be able to form sound opinions on who can be trusted and why, we should also count on a second condition: we need to figure out what type of ‘understanding’ of science is required by citizens to trust the experts in question.
It is to this side of the issue that I will turn in the final section of this paper.

4. Scientific literacy: its meaning, value and role

‘Science literacy’, an expression first popularized by the professor of Education Paul Hurd (1958), has been since widely used to stress the importance for ordinary citizens, living in the so called ‘knowledge societies’, to master some elements of contemporary science. (e.g. Feinstein 2011; Huxster et al. 2018; Slater et al. 2018). Science permeates a great deal of our lives, both private and public, and it informs many of our decisions, behaviour, and choices. To avoid that trusting science as being the right guide in all that does not amount to blind faith, or become the effect of a bandwagon fallacy, at least some understanding of what science is and how it works should be within

the grasp of citizens.

What 'understanding science' consists of has been the subject of a deep-seated discussion within the literature on public engagement, public understanding of science, and beyond. There is a variety of approaches that address this issue.[9] Citizens, it has been claimed, should be able to understand some science content (i.e. facts and evidence), or else grasp how science proceeds (i.e. its methods), or else appreciate the social and political contexts wherein science operates. (Phillips et al. 2018, drawing from Friedman et al. 2008). It has also been pointed out (Keren 2018) that what citizens should understand is that in our society there is a cognitive 'division of scientific labour' between them and the scientists. Citizens could be at most 'competent outsiders' (as opposed to scientists being 'expert insiders'), and as such they are not required to master first-hand scientific evidence to form their beliefs about scientific issues (the type of understanding that professional scientists engage themselves with). What they need is to acquire a second order understanding that allows them to judge what and who to trust when it comes to scientific issues.

However, choosing one answer over others about the meaning of 'understanding science' can hardly be done in principle, or as if by following a general formula.[10] Arguably, the appropriate answer will depend on the type of issue that citizens are confronted by in particular circumstances or contexts of discussion. A more profitable piecemeal approach could be that of identifying types of science-related issues, each type displaying specific features to be understood, and being guided by them in the choice of the appropriate type of understanding that citizens should adopt in view of forming a sound opinion on those very issues.

As analysed and illustrated in detail in Montuschi-Bedessem (2023), there is a difference, for example, when the issue at stake is well established and thoroughly researched, or when there is a large amount of uncertainty, risk and disagreement about it, either coming from within the same disciplinary field or cutting across different disciplines. In the former case, understanding scientific consensus might prove to be the answer of choice (as in the case of anthropogenic climate change), in the latter an understanding that involves the methodologies as well as the values that guide the choice of (or emphasis put on) certain pieces of evidence might be more pertinent (e.g. in the case of the effects of endocrine disruptors on human health, or that of the regulation of the use of GMOs in agriculture). This is not to claim that answers to what 'understanding science' amounts to are mutually exclusive. It is rather to argue that, for 'understanding science' to become meaningful at least as a minimal requisite, we must identify what in context proves to be necessary and sufficient for citizen to form a belief not so much about science in general (or about the quantity of scientific notions that one has), but about the real science-related issues encountered in real situations of debate. That said, nothing prevents that the kind of understanding needed for a given type of issue could also prove to be interesting and useful (without being necessary) for other types, or that some other type of understanding can prove to be interesting or relevant (without being sufficient) in some contexts.

[9] For an analysis of this discussion see Montuschi-Bedessem (2023)

[10] This is what often is found in the literature on public understanding of science, as explained in Montuschi-Bedessem (2023).

Nonetheless, the general point still stands: what understanding science is *about* strongly depends on the features displayed by specific science-related issues, and on the way those issues structure and affect corresponding scientific debates. It is on these specific issues that citizens should prove to be 'literate' about. What 'understanding science' amounts to on the part of citizens is an issue-specific question.

Conclusions

Trusting science, despite us living in a 'knowledge society', is far from an easy choice for ordinary citizens with no specific claim to expertise. Trusting science cannot be done in isolation. It is not an individual exercise of faith. It entails trusting those who bring science to us, including the institutions that make use of science in their decision-making practices and in the governance of the public good.

There are a number of tools, available to the public, to access and assess scientific knowledge, in the different forms that this is brought to us in our everyday lives, and to understand science in view of trusting its results (or form opinions about them that incline us towards trusting, or distrusting, them). In this paper I have analysed some of these tools and reflected on some of the channels that expose us to scientific outputs. I also emphasised that the mere existence of such tools is no guarantee of them being used, let alone being used appropriately. Attention to, and societal investment in, an active education of citizens – of which science literacy is just one example – is required to incentivise such use and promote participation in social debate. Having fair and shared access to spaces and tools of knowledge production is arguably central to gain at least minimal control over the decisions that affect our lives. Simple exposure to even torrential fluxes of information through the media, or in 'open' fora of discussion, are not necessarily conducive of real awareness or control – which is often the case when the public is exposed, in particular, to the unregulated market of news on the internet.

To grant citizens the type of education and literacy that an efficient democratic system should promote (the take-away message of the discussion conducted in this paper) a double-edged framework of implementation is to be envisaged:
1) individuals must trust that governing agencies and regulatory bodies have access to sound knowledge and good mechanisms for using it. It is therefore part of the business of good governance to ensure that there are institutional structures available to produce such knowledge, and norms and practices for how to use it for sound decision making.
2) what is also needed are well defined and institutionally implemented rules and procedures of communication – including communication of risks and uncertainties – among the scientific, the political and the stakeholder actors of governance, including the media, in order to improve trust relationships between regulatory institutions and citizens.

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