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RESEARCH ARTICLE

The Scientific Advisor in a Politicized World

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ABSTRACT

The role of scientific advice and the scientific advisor in policy development and execution has been studied and described in many documents, but seemingly always from the point of view of the policy makers. Questions that are discussed in that context are amongst others, how to get unbiased advice, how to know whether an advisor is competent, how to select the subjects for which advice is needed and how to get a complete picture of the problem. In this paper we argue that the scientific advisor needs to consider some other questions too: Am I unbiased; Does the "client" try to influence the scientists' point of view and if so what to do? How certain is the advice? How to convey uncertainties? How to prevent the user of the advice letting it sound more certain than it is? What to do if the client does not follow the advice but suggests he does? How to prevent the client hiding behind the advisor? If the advisor thinks the problem has more angles than are within his expertise, how to convey that message? How to deal with other views, whether scientific or otherwise? How to deal with confidentiality demands? In the remainder of the paper, we discuss these issues, using actual political and societal examples.

1. Introduction

Over decades, governments, policy makers and decision takers have been struggling with acquiring the data, information and knowledge necessary to make a well-informed decision. The objective of this article is to discuss the role and position of the advisor given that the issues confronting decision makers have become increasingly complex, and therefore the need for assistance from outside the governmental organizations has increased steadily. These issues ranged from questions, such as how high should the sea-defenses be[1, 2], what safety measures should be taken around airports to prevent a disaster[3, 4, 5], what should the maximum allowable concentration of a certain chemical be, how to respond to a nuclear emergency such as the Chernobyl accident[6], what measures to take to mitigate climate change or the effects thereof, whether a new illness is serious enough to take measures, whether it will evolve into a pandemic, should measures be taken to reduce the rate of spread of infection and what would proportionate measures be, to whether vaccines can be administered to a population on a large scale[7, 8].

1.1. Study design

As the objective of this study was to discuss the role and position of the advisor, we studied a number of cases for which the role of the advisor was described in evaluation reports or could be inferred from the media. Several guidelines and reports have been issued on how to obtain scientific advice. These reports are invariably commissioned by some governmental institution and written by scientists. It is the combination of these guidelines and the way the government uses them, that determines the context in which an advisor needs to operate. Therefore, we first summarize the conclusions and guidelines in these reports, in the next section

2. Guidelines

The earliest well-known document explicitly documenting guidelines and procedures to use by decision-takers and policy makers, was the guidelines produced for the Health and Safety Executive (HSE) in the United Kingdom (UK). The document was based on an earlier advice by the Chief Scientific Adviser to the UK government, Robert May.

2.1. Policy, risk and science

In "Policy, risk and science"[9], recommendations are made, aimed at improving the quality of scientific advice received by government. It identifies themes that were emerging at the time of developing the advice, such as the different levels of representation of the various stakeholders in policymaking and to a certain extent in the formulation if the scientific advice. Generating scientific advice is distinguished from scientific research, the latter involving the generation of new data and knowledge and the former assembling, evaluating, summarizing and concluding from existing knowledge. The report advises strongly against subjective judgements. The report describes a process of acquiring the advice, the steps of which closely follow the steps of a risk management process such as described in ISO 31000 standard[10] nine years later: that is –

- identify the issue,
- establish the context including the available options,
- Seek input from the stakeholders in the selection of advisors to avoid biases and promote the acceptance of the advice later in the process,
- define what needs to be known,
- formulate the questions to be answered and
- agree on the definition of the problem and the process to get the advice.

These considerations resulted in seven principles for scientific advice.

1. Scientific advice should be based on theory and data. The conclusion and their uncertainty as deduced by scientific reasoning should be described
2. The scientific advisor, the policymaker, the decision-taker and the stakeholder are different functions and they should be separated if possible
3. The process of seeking and using scientific advice should be public. Comments from interested parties should be encouraged. The advice should be published as soon as it is complete.
4. Scientific advisers should be competent in the field for which their advice is sought. As it is unavoidable that advisers have interests in the policy question, the process should ensure that these interests are public, and any biases created by these interests are taken into account in the decision-making process.

5. Scientific advisors should try to stay as objective as possible, given their interests
6. Policy makers and their scientific advisors should be candid about their uncertainty and assessment of the risks associated with the available policy options
7. The effort expended on securing scientific advice should be proportionate to the importance of the issue and the difficulty of getting the science right.

These considerations and principles are copied in later guidelines such as the guideline for "robust science for policy making" of the Joint Research center of the EU[11,12]

2.2. OECD

On 6th April 2009, a major earthquake with a magnitude of 5.9 occurred in the Italian city of L'Aquila. This resulted in extensive damage and the deaths of 309 people. Previous to the earthquake, in January, small earthquakes were felt. At the end of March, a meeting took place between several scientists and the Major Risk Committee. Their conclusion appeared to be that no major problem should be expected. After the earthquake, the scientists involved were prosecuted and convicted. This conviction was overturned by the court of appeal and the scientists were acquitted, but not the deputy head of the civil protection agency who communicated the results of the deliberations to the public[13].

The conviction of scientists after their advice proved to be wrong, raised general concern about the position of scientific advisers. Several international organizations commissioned studies into the way scientific advice should be obtained and also how the advisers should be protected against legal action. It was feared that without proper procedures and protection, scientists would no longer be prepared to give advice on policy issues, especially when human health and lives would be at stake.

In 2015, the OECD published a report on scientific advice on policy making[14], which has similar conclusions and recommendations as were given in the HSE document[9]:

- Have a clear remit, with defined roles and responsibilities for its various actors,
- Involve the relevant actors and
- Produce advice that is sound, unbiased and legitimate,

It also recommends that OECD members should try to harmonize their procedures for scientific advice. They also ask that attention be given to the legal position of scientific advisers, as most advisory structures and advisers do not have a clear understanding of their legal status and responsibilities.

2.3. Academia Europea

In 2019, the Academia Europea issued a report on making sense of science for policy[15]. In the report, science is defined as a "rigorous and methodological study of a subject[16]". In this report a unique position is claimed for scientific advice, although it is admitted that science is only one of the considerations in political decision making. It recognizes that public debate and scrutiny of advice is unavoidable. Again, it is concluded that advice should be based on good scientific procedures, rules and academic conventions. Uncertainties caused by lack of knowledge and unavoidable subjective interpretation of observations should be recognized and made explicit. Advice should inform, but not prescribe policies; biases should be recognized and where possible mitigated, reduced of avoided. Stakeholders should be involved in the process. The report cautions against the effect that being asked for advice might have on experts, perhaps leading to overconfidence and transgressing the boundaries of their field of competence. This in turn feeds the illusions held by policymakers of certainty, truth and general applicability and the dismissal of uncertainties. Scientific advisors should refrain from steering the decisionmaker towards a particular option. They should present the available options, the consequences thereof, the uncertainties and the limits of science[17]

2.4. European Commission

In September 2019, the group of scientific advisers to the European Commission issued an independent expert report[18], in which they gave recommendations on how to generate high quality scientific advice for European policy. These recommendations were to a large part derived from the report by the Academia Europea discussed above. The recommendations were based on three principles:

- Advice should be based on high, quality science
- scientific advisors should be trustworthy and acceptable to all stakeholders involved and

- the process of advising should be transparent, unbiased and not influenced by politics.

From these principles they arrive at recommendations, which are similar to those set out in the HSE report[9]: science, scientific advice and politics should be separated; the questions should be defined; use all science available, technical, medical engineering and social; the synthesis of available science should be comprehensive and transparent; bias should be avoided or reduced as much as possible; avoid conflict of interests; analyze, assess and communicate uncertainties. It is interesting to note, that in this advice the role of social media in any discourse and ways to deal with disputes arising from these media is absent.

2.5. Utopia

These recommendations and prescriptions not only are very similar, they also have in common that they are made from the point of view of making decisions. They depict a situation, in which, ideally among other things, the decision maker wants unbiased advice, wants to be transparent, wants to address uncertainties and take responsibility for the decisions taken. It also seems to be assumed that scientists can, or will agree on the science involved, or at least, try to arrive at a common understanding of observations, data and science. There have not been many experimental or observational studies into the actual workings and reality of these advisory processes[19]. What studies have been done, indicate that experts do not really agree on their role in a policy dialogue. They also have different views on the need for precaution in their advice and the need to involve stakeholders, whether experts themselves or not. On the matter of how to manage risks, their views can be even further apart[20].

For this reason alone, it is not surprising that reality does not conform to the utopian image of what constitutes a good scientific advice procedure. The practicalities of political decision making, the lack of time for proper research or reflection, the speed in which a problem evolves and the lack of information, all contribute to less-than-optimal advice. In the next section we will discuss these realities in more detail.

3. The real world

In the real world, decision making and the advisory processes to support it, are much more confounded than ideal. In many cases the separation of roles between decision-taker, policymaker, stakeholder and scientific adviser are somewhat blurred and the institutions and the people involved in the process, have multiple roles from the start. When the report by Atkinson et al[21] on the policy dynamics of COVID 19 in the UK concludes to recommend what HSE recommended two decades earlier, it can be concluded that these recommendations have not adopted in practice as yet. Health care and COVID-19 are not exceptions. When major decisions need to be made and the stakes are high, the processes and the relationships between the actors are often blurred from the outset and the scientific advisers are, at best, caught up in the process and at worst become a part of it, as we will illustrate in the examples to follow.

3.1. Airports and nitrogen deposition

The major airport in the Netherlands is Schiphol Airport near Amsterdam. A smaller airport, located to the east, is called Lelystad Airport. Schiphol wanted to use Lelystad to outplace holiday flights and in doing so, increase its own capacity. Schiphol is the home base of the Dutch branch of Air-France-KLM. It is considered to be of vital importance to the Dutch economy. The state of the Netherlands owns 70% of the shares in Schiphol Airport, and Schiphol owns Lelystad. The state also holds 10% of the shares in Air-France-KLM.

In the Netherlands there is a problem with the deposition of Nitrogen. To reduce these depositions, enterprises with emission levels exceeding the threshold level needed to apply for a special permit. The permit had to be applied for to the state The impact of emissions on the surroundings is calculated by the National Institute for Health and Environment (RIVM), by an agreed model Aerius, which is in the public domain.[22]. The applicant enterprise supplies the emission data. For Schiphol, these data are generated by the National Institute for Space and Air-traffic. (NLR), on the basis, of amongst other factors, transport volume, aircraft type and distribution of traffic over the runways. The results of the calculations of NLR are given to Schiphol. Schiphol does not give these data to RIVM directly. It gives them to the Minister of Transport, who then gives them to his colleague, the Minister of nature, who commissions the calculations to be done by RIVM. After the first round of calculations were done, the ministry of transport noticed that the emissions and resulting depositions by Schiphol were over the threshold and therefore Schiphol needed the permit. Subsequently the ministry initiated a second round of calculations by RIVM,

Now the result was that Schiphol did not need a permit[23]. This troubled the local interest groups, which have been opposing the use of Lelystad by Schiphol for decades. The expert of these interest groups – who is a naval architect and software engineer – discovered an anomaly in the second round of results produced by RIVM. The results did not correspond to the data as well. After a series of legal procedures, it turned out that the ministry of transport had changed the data supplied by NLR before passing them to RIVM. They set the temperature at the exhaust of the engines to 0. In a final legal procedure State Council judged that Schiphol needs to apply for a permit.

In this case: the decision-taker is the state, which has vested interests in the expansion of air traffic through Schiphol and controls the information passing between Schiphol, NLR, RIVM the ministries and the population. The question as to why neither RIVM, nor NLR, noticed, or reported the anomaly, is to date unanswered. Both institutions are funded by the state. Therefore, the roles of decision-taker, policymaker, advisor and stakeholder are inextricably intertwined from the start: with the notable exception of the surrounding population, the expert of which group, found and reported the anomaly and the cause thereof.

3.2. The Grenfell Fire

The tragic fire in a Hi-rise block of flats in west London on 14 June 2017, has raised a disturbing number of questions about how the government guidance on the acceptability of cladding supposedly tested as Class 0safe, as laid down in their Building Regulations ignored laboratory fire test evidence which clearly showed that the cladding installed, approved as non-combustible, was evidently highly flammable.

There is a current formal Inquiry[24] which it is hoped will eventually provide some of the answers. Unfortunately, precedents are not encouraging as, following a select committee inquiry in 1994, into a similar fire on 11 June 1999, in a hi-rise block in Garnock court in Scotland[25], which recommended the abandonment of class 0 and that all cladding systems should be non-combustible, the recommendation was ignored.

After this, testing of materials was continued, but undertaken by the Building Research EstablishmentBRE, under a contract which effectively precluded them communicating anything other than the fire test results. What is inexplicable, is that the test on the actual cladding used on Grenfell, carried out by the BRE, failed so disastrously that it had to be halted prematurely, when the flames exceeded some 20 meters in height, on the test rig.

In the UK, it is the duty of the Secretary of State for Housing, Communities and Local Government to approve and issue practical technical guidance with respect to the requirements of the Building Regulations1984. The Secretary of State takes "scientific advice" on setting standards for the design and construction of buildings from a committee of experts - the Building Regulations Advisory Committee (BRAC).

Already a commissioned review[26] has recommended that the BRAC be replaced by 'a new structure of advice and assurance', and this new body should be guided by another new body, the Joint Competent Authority (JCA).

But the issues for this paper are why the scientific evidence, which was obvious to independent fire experts and patently available to the Government decision makers, was either misunderstood, or ignored: and whether perhaps, the advice available was not sought to protect decisionmakers, with a defense of plausible deniability[27]

Indeed, it strengthens the view held by many people, that to address the problems revealed in the Grenfell case, "scientific" advice and standards should be developed by independent experts and seen to be transmitted directly to those politically responsible. However, the endurance of Class 0 and the BRE small-scale tests upon which it is based – despite criticism and recommendations to successive governments that it was inadequate – show that the current process to produce technical guidance in England is not satisfactory."[27]

3.3. COVID-19

There are many similarities between the United Kingdom and the Netherlands regarding the structure of the scientific advice process in case of an epidemic or a pandemic. In the UK the primary advisory body on emergencies is SAGE (Scientific Advisory Group for Emergencies) which in turn is advised by specialist scientific committees such as NERVTAG (New and Emerging Respiratory Virus Threats Advisory Group), SPI-M (Scientific Pandemic Influenza Group on Modelling) in the Department for Health and Social Care, and the Independent Scientific Pandemic Influenza Group on Behaviors (SPI-B). In the Netherlands it is the OMT (Outbreak Management Team). In a small country such as the Netherlands, but also in a much larger country such as the UK, virologists are rare. In practice, in the Netherlands, those involved in studying contagious diseases and epidemics had all

been working for the National Institute for Public Health and Environment at some time in their career. It is also unavoidable that the group of people who can explain issues regarding subjects such as epidemiology, health care and vaccination to the media is small. As a result, these individuals in the eyes of the public, become associated with the governmental policies, even if they are just advisers and do not take any decisions. In the Netherlands, the chief virologist became the target of groups and individuals who were against the measures taken, including vaccination, to such an extent that he needed round the clock police protection.

During the years 2020-2021 there were, and still are, many uncertainties around these issues. Therefore, all scientific advice must be, at best, uncertain[28]. The problem that arises for policymakers, is how to convey the science including these uncertainties; and at the same time convince people that the measures make sense and should be followed even if they involve considerable restrictions of personal freedoms, such a lock-downs, the obligation to show proof of vaccination and restrictions on travel.

In the Netherlands, outside the institutional advice structure, two main groups of scientists and others emerged. Such as "the red team"[29] and "Artsen Covid Collectief"[30]. In the UK a former Government Chief Scientific Advisor formed a similar "independent" SAGE. They gave their advice mainly through social media while accusing the newspapers and TV channels mainstream media of not letting their voice be heard. The red team was of the opinion that the measures taken were insufficient, especially to protect the vulnerable, and promoted much tougher policies. The Artsen Covid Collectief on the other hand emphasized the collateral damage of the measures, which they found to be disproportional, in view of the goal, which they interpreted as protecting the elderly and vulnerable, who had only a limited remaining lifespan anyway, at the cost of the freedom and the income of the rest of the population. The narrative of the Artsen Covid Collective found support especially in parliament and in part of the population, resulting in resistance against vaccination passes and refusal of vaccination. It appears that the scientific opposition in the UK was less vocal. Nevertheless, in the Netherlands, 86% of the eligible populations has been fully vaccinated[31]. In the UK this was 85%[32]. In any case the question of whether to involve these independent groups in the advisory process and make their "peer review" involvement more explicit and visible is a still matter of fierce discussion: The first official evaluation of the policies recommends that they should, if only to counter the claim that alternative voices are not heard; which may erode the willingness of the population to follow the governmental guidelines and regulations in the future[33].

4. The advisor

Science, literally "knowledge", can be thought of as the consensus of our currently accepted understanding of the body of verifiable, validated experimental data on the known universe and the observations and explanations advanced to rationalize them. Science is not "truth", but "advice" on science needs a truthful report on the extent of our knowledge of a particular aspect, at a particular time and place. Experiments are designed to test behaviors and from the observations, construct theories or working hypotheses, to explain them. So, this knowledge is only as good as the latest validated experiment; and the test that needs to be met is whether this really does show, demonstrate, or prove the validity of the theory.

The adviser then must make an ethical attempt to present this understanding, however imperfect, to decision-makers, policy developers. politicians. lay clients and the public. Thus any "scientific" advice has to be taken as "best endeavors" and not given uncritical acceptance for continuing confirmation of convenient conjecture. The explanations of the basis for those "beliefs" should stress the strength of the evidence and consensus of the body of independent universally recognized, experts or "scientists[34].

A similarly objective view needs to be taken of the "advisor". There is now an extensive body of work which shows the fallibility of human judgements, affected by a whole range of pressures from personal to political. What we as humans "perceive" as reality is not necessarily 100% real, but inevitably colored by all kinds of individual conscious and unconscious biases[35], so that expert's judgements can be affected by environments, past and present, and their perceptions of reality and context, are subject to personal physical, psychological and unknowing prejudicial preferences.

Finally, and most importantly, what and who is the advice for and what is its intended use? This almost requires an impact and risk assessment of its significance and some way of ensuring it is not misconstrued or misused. This means that any process designed to provide this service, must be sufficiently sophisticated to recognize that it is

operating with real people, in real situations; based on a realistic appraisal of real,,not perceived, evidence. Similarly, it requires an equally sophisticated and aware of real limitations client, to enable the advice to be obtained transparently, without further biasing or manipulation through translation or application.

4.1. Role definition

The advisor, therefore, should be aware of their role and the significance of the advice in the decision-making process[36]. Special caution is required when it appears that decision-makers and policymakers seek advice only to support previously taken decisions and seek their advisors accordingly[37]. Although this may be profitable for an advisor, it also diminishes the credibility of the advisor. This is especially problematic when decisions have to be discussed in the public domain. It could make a scientist willingly or unwillingly the "hero" of a party in a societal discussion, as is illustrated by the discussions between the medical faculty of the university of Marseille on the one hand, and the Institute Pasteur on the other hand. What started out as a scientific discussion about the effectiveness of a drug against COVID-19 ended up in fierce public debates in the media between the scientists advising the French government and Dr Raoult who became – probably unintentionally - the figurehead of the protests against anti-COVID-19 policies in France[38].

Similarly, the "scientific" credibility of NLR and RIVM in the debate on Lelystad airport has been seriously affected, even though it was the "political" ministry that manipulated the numbers. That neither institute noticed the discrepancies is hard to believe and that neither reported it at the time therefore is still held against both of them.

4.2. Independent advice

In contrast there are the problems which arise, when independent advice, especially by institutes that are created to provide independent advice and expertise which is aimed at protecting the public from harm, is ignored, or set aside, for economic, or policy reasons. Although it is not the role of the advisor to take the decision, and therefore they have to accept that when their advice is not taken into account, they should be vigilant against this advice being made confidential, or restricted. Should, at some time in the future, policy based on this advice be proven to be wrong, it should be made clear as to who, or which agency was responsible, and that it was not the advisor. This can only be achieved by making sure the advice is transparent and published. in which case, the decision-taker rightly has to justify the decision taken.

This also means that an advisor should not take the place of the decision maker in defending policies and policy choices. As was described in the case of COVID-19, virologists are rare. It is therefore inevitable that the same scientists' figure in many advisory bodies and appear in meetings of policy developers and decision-takers to explain the science to people who predominantly are not experts. If these same scientists also appear in press conferences next to the decision-makers, however, they become associated with the line taken, even if it is contradictory to their advice. In the Netherlands, the OMT was blamed for the consequences of closing the schools during lockdowns, although they advised against it[33] and subsequently for all decisions taken. This was amplified by the repeated statements by the policy makers that they were "following the science", using the advisors as lightning rod. This went as far as the fact that several members of the OMT needed 24/7 police protection. Therefore, if a policy maker in a public appearance directs a question to the advisor because "he can explain this better", the advisor should be careful to restrict her contribution to the strict science.

4.3. Conflicts of interest

The HSE report[9] had already signified that it is almost impossible to find scientists who are not affiliated with some party that may have an interest in the decision. Policies to reduce public spending of research efforts, the promotion of public-private partnership and the drive to let universities and other research institutes to seek funding from industries and other private enterprises, has not made this any better[39]. In this age of social media, it is unavoidable that the ties that exist, or have existed between an expert and any party involved, will be subject to public scrutiny. An expert should therefore contemplate carefully as to whether their past, or present affiliations may compromise their position, before embarking on an advisory commission; and whether they really want the public exposure. In any case it is advisable to make sure that any curriculum vitae, lists all their current and previous affiliations in full. As the developments around COVID-19 show, any connection with a pharmaceutical industry can make an expert suspect. Having shares in a company that may profit from the decision, will only make things worse, even

if there is nothing untoward with the scientific expertise, reputation and standing of the expert[40]

4.4. Uncertainty

All science is uncertain and some science is more uncertain than others. The attitude towards uncertainty in policy making is ambiguous. On the one hand it is assumed that uncertainty makes it more difficult to convince people to act in a way the politicians would like them to act. On the other hand, it is a cause for anger if certain statements are made to appear more certain than they really are. Whereas in the past it would have been possible to bury the uncertainties in the complexities of a scientific paper or report, it certainly is not possible today. Scientists are human and therefore have a natural tendency to be overconfident[35, 41]. Although in the Netherlands it was the choice of the politicians to choose the worst case to decide on actions against COVID-19; and RIVM presented multiple scenarios in their reporting, the outcomes were often presented without the uncertainty bands the scientists indicated[33]. Politicians will exploit the tendency to overconfidence if given a chance[42]. Therefore, scientists should be aware and resist any tendency to down-play their uncertainty. Politicians should decide the course of action in an uncertain world.

4.5. Confidentiality

In many cases the party that seeks advice will demand some form of confidentiality. Sometimes there are legal reasons, such as the protection of privacy of patient data. Sometimes there are commercial reasons, such as the protection of intellectual property rights. There are also operational reasons. Sometimes the decision maker does not want to have the advice published before the decision.

There is generally also a wish to keep any draft reports confidential and only publish the final report. At first sight this sounds reasonable: why publish a report that is not final. But there are also downsides. First of all, there is the problem as to whether, or not, the extent to which the client has been successful in their attempts to influence the results. Unfortunately, this is common, and that clients will try, especially if they do not like the results, is almost a given. Secondly in many countries draft documents that are exempt from public information acts and therefore keeping the document in draft status permanently, is thus a method of maintaining secrecy.

Advisors would do best to keep control over the publication of their advice and require that confidentiality agreements are limited in time and that the advisor, and not the client, determines whether a document is no longer draft, but final.

5. Conclusion

A scientific advisor can be caught up in policy and political discussions, that extend beyond their field of expertise. This could compromise their ability to advise on the basis of the science only. It could also compromise their reputation in the eyes of their colleagues, the clients and the public.

There are a few steps the advisor can take to protect themselves and their advice. These include being aware of present and past affiliations, being open about them and considering whether it remains credible that these affiliations do not introduce biases in his evaluation of the available science and the advice.

In the present day and age, the advisor should be aware that not only will their advice be public, if the stakes are high enough, there will be a public debate on social media about the validity of their advice and about their credibility. Previously made confidentiality agreements are often seen as attempts to hide something and should be temporary at least and preferably avoided

In certain issues with the advisor had better be aware that politicians may try to hide behind “the science” and thus the scientist, if the measures proposed to be taken are expected to be unpopular.

Appearances in the media may increase the image that the scientist is responsible for the policies. The media setting also may tempt the advisor to answer questions that are related to the subject, relevant for the policy but outside his expertise.

Finally, the advisor is well advised to evaluate regularly, whether or not, they and their expertise is still valid for the decisions that have to be taken and the policies that have to be developed. They also should evaluate whether they are still the right person for the role they are in. After all, the role may have evolved significantly from strictly scientific advice on the subject that the advisor started in. If the role and the advisor do not match anymore, the advisor should consider his position, be it only for the sake of his own scientific future.

So, in a post truth world, there is a need for scientists to be especially aware of their responsibility to be truthful; not just about the accuracy of any interpretation of scientific issues,

but also to be candid and transparent about the extent of any assumptions, uncertainties, and reservations that most experts tend to believe are self-evident. In science truly, the "one-eyed man" can be presented as king, but in fact, should just be recognized as an indispensable and independent advisor.

References

1. Jonkman SN, Kok M, Vrijling JK (2008) Flood Risk Assessment in the Netherlands: A Case Study for Dike Ring South Holland, Risk Analysis, Vol. 28, No. 5, 2008, DOI: 10.1111/j.1539-6924.2008.01103.x
2. Jonkman SN. Hillen M, Nicholls R, Kanning W, Ledden M (2013). Costs of Adapting Coastal Defences to Sea-Level Rise— New Estimates and Their Implications. Journal of Coastal Research. 290. 1212-1226. 10.2112/JCOASTRES-D-12-00230.1.
3. Ale BJM (1998) The management of third-party risk around a major airport, in A. Mosleh and R.A. Barieds PSAM Probabilistic Safety Analysis and Management 4, Springer (1998)
4. Ale, BJM., Piers W. (1999), Dealing with third party risk around a major airport, in L.H.J. Goossensed Risk Analysis, Facing the New Millennium, Delft University Press, Delft, ISBN 90 407 1954 3
5. Ale BJM Piers M (2000) The assessment and management of third party risk around a major airport, JHazMat, vol 71 nos 1-3,pag 1-16, ISSN 0304 3894
6. Renn O (1990) Public Responses to the Chernobyl accident, Journal of Environmental Psychology 10, 151-167
7. Ale, BJM, Slater, DH, Hartford, DND (2021) Vaccination with vector type vaccines – is it worth the risk?, Medical Research Archives vol 9 issue 6. DOI: 10.18103/mra.v9i6.247
8. Ale, BJM., Slater, DH., & Hartford, DND. (2022) The ethical dilemmas of risky decisions. Risk Analysis, 1–15. https://doi.org/10.1111/risa.13893
9. HSE (2000) Policy Risk and Science. Securing and using Scientific advice, HSE contract research report 295/2000, HMSO, Norwich, Crown copyright (2000)
10. ISO (2009) ISO 31000:2009, First Edition: Risk management - Principles and guidelines, ISO, 978-9267109121
11. JRC (2006) Joint Research Centre: Robust Science for Policy Making. A guideline towards integrity and veracity in scientific support and advice. Report CA0655.
12. Holmes J, Clark R (2008) Enhancing the use of science in environmental policy-making and regulation, environmental science & policy 11, 702 – 711
13. NN (2022) https://en.wikipedia.org/wiki/2009_L%27Aquila_earthquake (as per 7/3/2022)
14. OECD (2015) "Scientific Advice for Policy Making: The Role and Responsibility of Expert Bodies and Individual Scientists", OECD Science, Technology and Industry Policy Papers, No. 21, OECD Publishing, Paris. http://dx.doi.org/10.1787/5js33l1jcpwb-en
15. SAPEA (2019) Science Advice for Policy by European Academies. Making sense of science for policy under conditions of complexity and uncertainty. Berlin: SAPEA. https://doi.org/10.26356/MASOS
16. Wilsdon, J., Allen, K., & Paulavets, K. (2014). Science advice to governments: diverse systems, common challenges. Auckland: ICSU/Office of the PM's Chief Science Adviser. https://dpmc.govt.nz/sites/default/files/2021-10/pmcsa-Synthesis-Report_Science-Advice-to-Governments_August-2014.pdf (as per 8/3/2022)
17. Van Dijk HFG, van Rongen E, Eggermint, G, Lebret E, Bijker WE, Timmermans DRM (2011) The role of scientific advisory bodies in precaution-based risk governance illustrated with the issue of uncertain health effects of electromagnetic fields, Journal of Risk Research, Vol. 14, No. 4, April 2011, 451–466
18. DGRI (2019) Group of Scientific Advisors, Scientific advice to European Policy in a Complex World, scientific opinion No 5, sep 2019; ISBN 978-92-76-12558-7
19. Spruit P, Knol AB, Vasileiadou E, Devilee J, Lebret E, Petersen AC (2014) Roles of scientists as policy advisers on complex issues: A literature review, environmental science & policy 402014 16 – 25
20. Spruit P, Knol AB, Petersen AC, Lebert E (2019) Expert Views on Their Role as Policy Advisor: Pilot Study for the Cases of Electromagnetic Fields, Particulate Matter, and Antimicrobial Resistance, Risk Analysis, (Vol. 39, No. 5, 2019)

21. Atkinson, P., Gobat, N., Lant, S., Mableson, H., Pilbeam, C., Solomon, T., Tonkin-Crine, S., & Sheard, S. (2020). Understanding the policy dynamics of COVID-19 in the UK: Early findings from interviews with policy makers and health care professionals. Social science & medicine1982, 266, 113423. https://doi.org/10.1016/j.socscimed.2020.113423
22. RIVM (2020) Aerius, https://www.rivm.nl/aerius as per 11/3/2022 and https://www.aerius.nl/nl (as per 11/03/2022)
23. Adegeest, L (2021) Problems with the calculation of Nitrogen deposition by airtraffic. https://satl-lelystad.nl/wp-content/uploads/2022/03/aerius-warmte-inhoud-gesjoemel-stikstof-depositie.pdf; https://satl-lelystad.nl/stikstof/ (as per 11/03/2022)
24. Moore-Brick. M (2019) Grenfell Tower Inquiry, phase 1 report, OGL, HMSO, UK, ISBN 978-1-5286-1602-7 https://assets.grenfelltowerinquiry.org.uk/GTI%20-%20Phase%201%20full%20report%20-%20volume%201.pdf (as per 15/03/2022)
25. https://en.wikipedia.org/wiki/Garnock_Court_fire (as per 15/03/2022)
26. Hackitt J (2018) Building a Safer Future Independent Review of Building Regulations and Fire Safety, OGL, HMSO, UK, ISBN 978-1-5286-0293-8
27. Carrington, J. (2019) 'Class 0' and the End of Government's Guidance on Building Regulations. Available at: https://www.law.ox.ac.uk/housing-after-grenfell/blog/2019/01/class-0-and-end-governments-guidance-building-regulations (as per 15/03/2022)
28. Van Dissel J (2022) Presentatie Tweede Kamer https://www.tweedekamer.nl/downloads/document?id=97f5049b-b821-4a33-a451-754de4ae7dd0&title=presentatie%20van%20dhr.%20Van%20Dissel%20-%20RIVM.pdf (as per 15/03/2022)
29. https://www.c19redteam.nl/ (as per 15/03/2022)
30. https://artsencollectief.nl/ (as per 15/03/2022)
31. https://coronadashboard.rijksoverheid.nl/landelijk/vaccinaties (as per 15/03/2022)
32. https://coronavirus.data.gov.uk/details/vaccinations (as per 15/03/2022)
33. OvV (2022) Approach to COVID-19 crisis – Part 1: through to September 2020 https://www.onderzoeksraad.nl/en/page/16666/approach-to-covid-19-crisis-%E2%80%93-part-1-through-to-september-2020 (as per 15/03/2022)
34. Hopkins A, Foxen A, Olivier K, Costigan G (2021) Science and advice in the UK, The foundation for Science and Technology, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019888/Science_Advice_in_the_UK.pdf (as per 9/3/2022)
35. Kahneman, D (2011). Thinking, Fast and Slow, New York: Farrar, Straus & Giroux.
36. Gluckman, P (2018) The role of evidence and expertise in policy-making: the politics an d practice of science advice, Journal & Proceedings of the Royal Society of New South Wales, vol. 151, part 1, pp. 91–101. ISSN 0035-9173/18/010091-11
37. Ale BJM, Kluin MHA, Koopmans IM (2018), Safety in the Dutch chemical industry 40 years after Seveso Journal of Loss Prevention in the Process Industries Volume 49 Pages 61-67
38. Fuhrer J, Cova F (2020) "Quick and dirty": Intuitive cognitive style predicts trust in Didier Raoult and his hydroxychloroquine-based treatment against COVID-19, "Quick and dirty": Intuitive cognitive style predicts trust in Didier Raoult and his hydroxychloroquine-based treatment against COVID-19
39. House of Commons Science and Technology Committee, Scientific Advice and Evidence Based Policy Making, Seventh Report of Session (2005–06), Volume I, Report, together with formal minutes, House of Commons, UK, 26 oktober (2006.)
40. https://en.wikipedia.org/wiki/Ab_Osterhaus
41. Sahibzada, K (2019) How to Resist the Lure of Overconfidence, A practical guide to putting things in perspective, Scientific American, https://blogs.scientificamerican.com/observations/how-to-resist-the-lure-of-overconfidence/ (as per 19/03/2022)

42. Aven T, Renn O (2018) Improving government policy on risk: Eight key principles, Reliability Engineering and System Safety 1762018 230–241