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Scientists and Legal Accountability:
Lessons from the L'Aquila Case

Alessandra Arcuri and Marta Simoncini

European University Institute
Department of Law

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Abstract

On 6 April 2009, an earthquake hit the city of L'Aquila in Italy, destroying much of the historical centre, injuring thousands of people and killing more than 300. In an unprecedented verdict, in October 2012 the court of first instance in L'Aquila condemned for manslaughter the six Italian scientists, members of a national scientific advisory committee. The reasoning underpinning the verdict centres around the scientists' poor assessment and communication of the seismic risk. Two years later, in November 2014, the Appeal Court of L'Aquila reversed the first instance verdict, acquitting the scientists. This trial is of paramount importance, being the first (criminal) trial to regulatory scientists in contemporary history. Unsurprisingly, the first instance verdict has attracted much criticism. In contrast to most commentaries harshly criticizing the verdict, we find that the first instance verdict invites broader reflection on the role and possible responsibility of scientists in risk governance. We take the L'Aquila trial as a case study and look at the general relevance of this case for a debate on accountability of regulatory science. This article defends the view that, in a world where scientists retain a certain degree of regulatory authority, they should be held accountable for their contribution to regulating risks. While we find criminal liability not necessarily the most appropriate way to establish accountability, it is equally incorrect to have no accountability at all. Drawing on the L'Aquila case, this article shows the overall desirability of a legal framework for accountability of regulatory science.

Keywords

Regulatory science; accountability; risk regulation; judicial review; L'Aquila earthquake

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Introduction*

In June 2008, a wave of seismic shocks began to hit the city of L'Aquila and surrounding provinces in the Abruzzo Region of Italy. Gradually intensifying, and almost uninterrupted, the tremors continued until 30 March 2009, when L'Aquila was struck by an earthquake measuring 4.1 on the moment magnitude scale (M). Although this earthquake did not cause major damage, it fuelled fears among the population of L'Aquila and the neighbouring region that a major earthquake could occur in the near future. On 31 March, the Head of the Italian Department of Civil Protection (DCP) convened a special meeting of the Italian National Commission for Forecasting and Preventing Major Risks (*Commissione nazionale per la previsione e la prevenzione dei grandi rischi*; hereinafter Major Risks Commission) to assess risks and to inform the population. Some scientists participating in the meeting released reassuring messages to the media. Sadly, the rest of the story is known. On 6 April 2009, an earthquake measuring 6.3 M hit the city of L'Aquila, destroying much of the historical centre, killing more than 300 people, and injuring thousands more.

After the earthquake, criminal charges were laid against the scientists who had participated in the March meeting. In an unprecedented verdict, in October 2012, Judge Marco Billi, sitting as the Tribunal of L'Aquila in a monocratic composition, convicted the seven Italian scientists of the manslaughter of 29 of the 309 victims of the earthquake (hereinafter, the verdict).¹ Two years later, the Court of Appeal of L'Aquila has overturned the verdict and released all the scientists from the conviction, but one: the only one who was wearing the hat of public official as Vice Head of the Civil Protection Service. The first instance verdict has attracted the attention of the international media. In a letter to *Nature*, scholars from the Harvard Kennedy School voiced their concern, and wrote: 'L'Aquila reflects troubling tendencies in modern Western governance: Italy seems to have made scientists co-responsible for governing the country'.² Other commentators have read the verdict as indicating that science itself was on trial, and comparisons with the trial of Galileo were suggested by the then Minister of the Environment.³ Even before the verdict was issued, on 29 June 2010, Alan Leshner, Chief Executive Officer and executive publisher of *Science*, wrote a letter on behalf of the American Association for the Advancement of Science to the President of the Italian Republic, Giorgio Napolitano, labelling the 'charges against the scientists' as 'unfair and naïve'.⁴ Other media

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¹ See Tribunale dell'Aquila, crim sec, n 380/2012.

² E Aarden et al, 'L'Aquila: 'Governance Flaws Exposed' (2012) 491 *Nature* 192; available at <http://www.nature.com/nature/journal/v491/n7423/full/491192a.html>.

³ The words of Corrado Clini (Minister at the time) were reported by major newspapers. He is reported to have said: 'L'unico precedente a questa sentenza è Galileo' (The only precedent to this verdict is Galileo); see for instance, http://www.repubblica.it/cronaca/2012/10/25/news/terremoto_aquila_intercettazioni-45259736/; however, the Minister was somewhat milder in his wording, introducing his statements by saying that he was waiting to read the motivations of the verdict. The original statements by Clini can be heard at <http://video.repubblica.it/dossier/terremoto-in-abruzzo/clini-sentenza-dell-aquila-neanche-ai-tempi-di-galileo/108816/107201>.

⁴ The letter is available at http://www.aaas.org/news/releases/2010/media/0630italy_letter.pdf.

have been less harsh in assessing the case. For instance, an article published in *Science* immediately after the first instance verdict was released has portrayed the case as a complex one, casting doubts on the proper conduct of the scientists who attended the March meeting.⁵

In this article, we take issue with a number of critiques raised against the L'Aquila first instance trial. What we find most problematic is that the role of scientists in the regulatory process is highly underappreciated. We claim that scientists often exercise a form of regulatory authority and should accordingly be held accountable. While we find criminal liability possibly the wrong way to establish accountability, it is equally wrong to have no accountability at all. Against this background, this article sets out to initiate a debate on accountability of scientists involved in risk regulation and governance. We investigate the facts surrounding the earthquake in L'Aquila and the subsequent trial as a case study and look at the general relevance of this case for risk regulation. It should be clear from the outset that we do not aim to pass judgement on whether the scientists were tried and judged properly under Italian criminal law. Regardless of criminal liability issues, which were addressed in the trial, the verdict invites reflection on whether the risk was well managed in the L'Aquila case, and, more generally, whether the scientists involved in the risk governance can be faulted on certain grounds. Our main goal is to identify how scientists are involved in the process of risk regulation and, accordingly, how can they be held accountable. To do this, we scrutinise the motivations of the verdict, which arguably convey valuable information concerning these issues. In particular, we discuss the role of scientists at the intersection of the process of risk assessment, risk management, and risk communication. Thus, beyond shedding light on the L'Aquila case, this article aims to introduce a more general reflection on the role and responsibilities of scientists advising policy makers. Most importantly, it draws attention on the need for accountability mechanisms also in this area of the regulatory process.

The article is organised as follows. Section 2 introduces the reader to the concept of regulatory science and it outlines the tripartite paradigm of risk regulation, composed of the phases of risk assessment, management and communication. We further introduce the thesis that scientists enjoy a certain degree of regulatory authority in contemporary societies. In Section 3 we show that the Major Risks Commission is no exception; to provide further support to the idea that scientists are authoritative in the regulatory process we present some facts relating to the controversial meeting held on 31 March 2009. We also argue that when communicating risk the Major Risk Commission has de facto 'managed' risk and by doing that has exercised regulatory authority. In Section 4, we identify different forms and conceptions of accountability. Drawing on the L'Aquila case, we explain how legal accountability offers a venue for realising accountability of scientists working within regulatory bodies. To provide empirical backing to this claim, we turn back to the reasoning behind the first-instance verdict and, in Section 5, we show how the Judge has assessed the behaviour of scientists against the rule of law. Section 6 provides an illustration of how legal accountability may be instrumental for learning. We draw conclusions in Section 7.

⁵ E Cartlidge, 'Aftershocks in the Courtroom' (2012) 338 *Science* 184, Available at <http://www.sciencemag.org/content/338/6104/184.full>.

An introduction to regulatory science

If expertise is so intimately bound up with democracy and the welfare of citizens, then we should not be surprised to find political questions and problems swirling around this even more important instrument of governance.

Jasanoff, 2003⁶

The L'Aquila case disclosed a taboo concerning regulatory scientists and responsibility. Before the first-instance verdict, it was unthinkable that regulatory scientists could be convicted because of their work within regulatory institutions. The first disdainful reactions from prestigious scientific institutions can be seen as manifestations of shock arising from the fact that scientists had been criminally prosecuted. While we do not argue as to whether the scientists were rightfully convicted (and later acquitted), we draw attention to a paradox involving our modern regulatory state. If, on the one hand, scientists have gained a central role in the regulatory process, on the other hand, their accountability has remained under-articulated within the regulatory space and under-theorised among scholars in the field of risk regulation.⁷ To illustrate this paradox, we should examine briefly the role of scientists in regulatory processes. Contemporary legal systems rely to a great extent on the advice of individual experts and expert bodies. This phenomenon is so diffuse that a new term – 'expertocracy' – is being used to underline the authority and power that experts have come to exercise in contemporary societies.⁸ Sheila Jasanoff, one of the most influential scholars in the field of science and technology (STS) studies, talks of 'regulatory science' to refer to the body of science produced and employed within the regulatory process.⁹ When studying this phenomenon in the US context, she added to the public powers the – by now famous – 'fifth branch', which in essence refers to the group of scientific advisors to policy-makers. The institutional settings in which scientists operate vary to a great extent, ranging from regional and domestic independent agencies¹⁰ and international bodies¹¹ and

⁶ S Jasanoff, '(No) Accountability for Expertise?' (2003) 30 *Science and Public Policy* 157, 162.

⁷ This is not to say that scholars have completely neglected the question of accountability; however this theme has remained peripheral to the general debate on risk regulation. Studies more directly touching on issues of accountability include Jasanoff (n 6); J Lentsch and P Weingart, *The Politics of Scientific Advice: Institutional Design for Quality Assurance* (Cambridge University Press, 2011). More generally, scholars in the field of risk regulation have focused the attention on the challenge that the current model of risk regulation poses to democracy and the delicate relationship between politics and democracy, a theme which is indirectly relevant to the question of accountability; most influential studies in this area include: S Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Harvard University Press, 1990); S Jasanoff, 'Contested Boundaries in Policy-Relevant Science' (1987) 17 *Social Studies of Science* 195; E Fisher, 'Framing Risk Regulation: A Critical Reflection' (2013) 4 *European Journal of Risk Regulation* 125; S Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States* (Princeton University Press, 2005); E Fisher, *Risk Regulation And Administrative Constitutionalism* (Hart Publishing, 2007); V Heyvaert, 'Governing Climate Change: Towards a New Paradigm for Risk Regulation' (2011) 74 *Modern Law Review* 817.

⁸ See, for instance, the English Summary of the Fronesis Issue on Democracy and Expertocracy *Fronesis* 29-30 (2009), available at: <http://www.eurozine.com/articles/2009-06-09-fronesissum-en.html>.

⁹ See S Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Harvard University Press, 1990). The origin of the concept of regulatory science is sometimes ascribed to Alan Weinberg. Weinberg in fact had already used the term in 1985, but Jasanoff has elaborated on its meaning. For this reason, we prefer to attribute the concept to Jasanoff who has explained extensively what the term refers to. See A Weinberg, 'Science and its limits: The Regulator's Dilemma' (1985) 2(1) *Science and Technology* 67. See also S Jasanoff, 'Contested Boundaries in Policy-Relevant Science' (1987) 17 *Social Studies of Science* 195.

¹⁰ European examples include the European Food and Safety Authority (EFSA) and the European Medicine Agency (EMA); in the US, examples are the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA).

¹¹ The Codex Alimentarius Commission is a classic example of an international body in which experts play a critical role.

organisations¹² to individual experts chosen *ad hoc* to advise governments and international organisations.¹³

Within this regulatory model, a division between assessment and management has come to dominate a number of institutions that regulate risks.¹⁴ Virtually all OECD countries have adopted a risk regulation model, built on a process of risk assessment and risk management.¹⁵ The process of risk assessment is typically conceived as a purely scientific enterprise, dealing with the ‘identification, quantification, and characterisation of risk’.¹⁶ Risk management pertains to politics, and it deals with taking a decision when the ‘scientific questions’ have been answered by the scientists; it addresses the questions of what risks are acceptable, of ‘how safe is safe enough’.¹⁷ Most policy documents also include a phase of risk communication.¹⁸ This tripartite division suggests a clear-cut distinction between the phases of scientific assessment, policy making and communication. However, such division has been largely criticised for not taking sufficient account of the intimate relationship between science and politics underpinning the process of risk regulation.¹⁹ Scientists advising governments conduct a scientific analysis that is policy oriented; they can for instance choose to be conservative in their assessments (e.g. choosing a high safety factor when extrapolating data from animal bioassays) because of the demands of politics.²⁰ Without reiterating arguments already well-articulated in the literature,²¹ we emphasise that the clear-cut functional separation between risk assessment and risk management is misleading in so far as it overshadows the role played by scientists in the regulatory process. By conceptualising risk assessment as a Mertonian scientific process, purely aimed at assessing risks and functionally separated from the phase of risk management, the regulatory authority *de facto* exercised by scientists remains concealed.

The regulatory authority *de facto* retained by scientists is well evidenced by the fact that the scientific opinions given by regulatory scientists have often formed the basis of legal standards. Take, for

¹² The World Health Organization cooperates with several expert bodies; an example is the WHO EMF Project International launched in 1996 to assess the health and environmental effects of exposure to electric and magnetic fields. Within this project the WHO cooperates with the Agency for Research on Cancer (IARC, a WHO specialized institution), and the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which is a non-profit association that produces guidelines in the field of non-ionizing radiation protection.

¹³ For instance, the International Seabed Authority relies on technical studies drafted by ad hoc experts to shape its regulatory policy; see <http://www.isa.org.jm/en/documents>.

¹⁴ For a description of the ascent of risk assessment as a normal phase of risk regulation, see A Arcuri, ‘Risk Regulation’, in AM Paces and RJ Van den Bergh (eds), *Encyclopedia of Law and Economics: Regulation and Economics* (Elgar, 2nd ed., 2012), 303-338.

¹⁵ See OECD, *Recommendation of the Council of Regulatory Policy and Governance*, 2012.

¹⁶ For definitions of risk assessment that include these dimensions, see WD Ruckelshaus, ‘Risk in a Free Society’ (1984) 4 *Risk Analysis* 157; see also A Alemanno, ‘The Shaping of European Risk Regulation by Community Courts’ 2008 *Erasmus Law School, The Jean Monnet Working Papers*, n 18, 4-5 at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1325770 (who defines risk assessment as the ‘Grundnorm’ of risk regulation).

¹⁷ See B Fischhoff, P Slovic, S Lichtenstein, S Read and B Combs, ‘How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits’ (1978) 9 *Policy Sciences* 127; P Slovic, ‘Beyond Numbers: A Broader Perspective on Risk Perception and Risk Communication’, in D. G. Mayo and R. D. Hollander (eds), *Acceptable Evidence - Science and Value in Risk Management*, (Oxford University Press, 1991), 48-65.

¹⁸ According to some scholars risk communication remains underdeveloped in contemporary risk-related regulatory policy; see, for instance, P Slovic and EU Weber, ‘Perception of Risk Posed by Extreme Events’, in Applegate, Gabba, Laitos, and Sachs (eds) *Regulation of Toxic Substances and Hazardous Waste* (Foundation Press, II ed, forthcoming. Available at SSRN: <http://ssrn.com/abstract=2293086>).

¹⁹ For an overview of the arguments raised, as well for the policy documents advocating a dialogic relationship between the different phases of risk regulation E Fisher, ‘Framing Risk Regulation: A Critical Reflection’ (2013) 4 *European Journal of Risk Regulation* 125.

²⁰ For more examples of how certain assumptions do play out in the risk assessment process see Arcuri (n 14).

²¹ Fisher (n 23).

instance, the various scientific bodies operating within the European legal system, such as the European Food and Safety Authority and the European Medicines Agency (EMA). While these bodies are officially only performing an advisory function, it has been amply shown that their opinions are almost invariably translated into regulatory decisions.²² Likewise at the international level, the opinions of the scientific bodies of the Codex Alimentarius Commission are commonly followed, and thus become standards.²³ One of the main features of these scientific bodies, also referred to as regulatory scientific institutions (RSIs),²⁴ is that their authority is of a hybrid nature: the epistemic authority traditionally exerted by science is confounded with a legal-administrative authority. In thinking about accountability of regulatory science, we try to take in due account the possible challenges that such hybridity may present.

The major risk commission and authority of regulatory science

The Major Risks Commission, which is the key institution in the L'Aquila trial, fits well the category of RSIs, as the Commission co-produces decisions of administrative nature. After offering a brief overview of the nature of the Major Risk Commission, we show in what ways the Commission exercised regulatory authority in the case under study. The Major Risk Commission is the 'advisory body of the Department of Civil Protection (DCP) on technical–scientific matters.'²⁵ Interestingly for this case, the history of the Major Risks Commission is related to that of earthquakes in Italy. In fact, it originates in the establishment of a scientific committee (called the Interdisciplinary Technical–Scientific Commission) created in 1981, after a devastating earthquake struck the Irpinia region in the South of Italy.²⁶ In 1986, in the aftermath of Chernobyl, this technical Commission was restructured into six divisions corresponding to different typologies of risks, with each division having its own set of experts. In 1992, by virtue of Law 225, this technical body morphed into what is today the Major Risks Commission.²⁷

²² For a discussion of the uptake of the scientific opinions of European scientific institutions by the European Commission see G Permanand and E Vos, 'Between Health and the Market: The Roles of the European Medicines Agency and European Food Safety Authority' (2008) *Maastricht Faculty of Law Working Paper* 2008/4; E Chiti, 'An Important Part of EU's Institutional Machinery: Features, Problems and Perspectives of European Agencies' (2009), 46 *Common Market Law Review* 1395; F Sabel and J Zeitlin, 'Learning from Difference: The New Architecture of Experimentalist Governance in the EU' (2008) 14 *European Law Journal*, 271–327; A Alemanno and S Mahieu, 'The European Food Safety Authority before European Courts: Some Reflections on the Judicial Review of EFSA Scientific Opinions and Administrative Acts' (2008) 5 *European Food and Feed Law Review*, 320–33. For an overview of the argument see E Madalina Busuioc, 'Blurred Areas of Responsibility European Agencies' Scientific "Opinions" under Scrutiny', in M AmbrusK Arts, E Hey and H Raulus (eds.), *The Role of 'Experts' in International and European Decision-Making: Advisors, Decision Makers or Irrelevant Actors?* (Cambridge University Press, 2014).

²³ A Arcuri, 'The coproduction of the global regulatory regime for food safety standards and the limits of a technocratic ethos' (2014) *EUI Working Papers, RSCAS* 2014/97, available at <http://ssrn.com/abstract=2500705>.

²⁴ O Perez, 'The Hybrid Legal-Scientific Dynamic of Transnational Scientific Institutions', (2014) *European Journal of International Law*, forthcoming, available at: <http://ssrn.com/abstract=2437400>.

²⁵ Art 4, DL 245/2005, as converted in L 21/2006. It should be noted that the very nature of the Commission was previously changed by DL 343/2001 as converted in L 401/2001 and the Minister of Interior's Decree 12 April 2002, insofar as the number of members coming from institutions was increased in comparison with the members having scientific expertise. The following DPCM 3 April 2006, n 23582, has finally reduced the number of the Commission's members and introduced a register of experts to be involved in the Commission's activity.

²⁶ DPCM n 1282/82.

²⁷ Law n. 225, 24 February 1992, establishing the National Civil Protection Service, published in the Official Journal n. 64, 17 March 1992, hereinafter referred to as L 225/1992 (Italian text: Legge n. 225 del 24 febbraio 1992: istituzione del Servizio Nazionale della Protezione Civile 24 febbraio 1992 Pubblicata nella Gazzetta Ufficiale n. 64 del 17 marzo 1992)

The Major Risk Commission advises the DCP on all the activities aimed at the forecasting and *prevention* of risks.²⁸ If the forecasting activity can be associated with the process of risk assessment, risk prevention is clearly falling within the scope of risk management. By treating risk assessment together with risk management, the legal framework regulating the Major Risks Commission seems to treat the Commission as a hybrid body operating at the intersection of science and policy-making. This legal framing can thus be read as bestowing some regulatory authority to the Commission. Besides the authority bestowed on scientists by the law, the institutionalisation of science within a policy-making process, in itself, may confer a form of discursive authority, as shown in the next subsection.

The controversial March meeting and the authority of science

The meeting is not because we are scared and worried, but because we want to reassure the people, and instead of us doing the talking, we let the most important scientists in the field of seismology speak.²⁹

Guido Bertolaso, Head of the Italian DCP

The quote above is an excerpt from a telephone conversation held on 30 March 2009, between Guido Bertolaso and Daniela Stati, the Regional council member delegated to Civil Protection for the Abruzzo region. This instance of wiretapping was leaked to the media after the trial had already begun. As regards an overall assessment of what happened in terms of risk management, this conversation casts a dark shadow on the operation of the Major Risks Commission. During the trial, Bertolaso was questioned by the prosecutor, and had the opportunity to clarify the content of this conversation. The Judge seemed to accept to some extent Bertolaso's explanation regarding his own wording: namely, that the idea of reassuring the people was circumscribed to the fact of mitigating the fears that 'intoxicated the territory'.³⁰ In fact, the citizens of L'Aquila and of the surrounding territories were under considerable stress, and were confused by some conflicting streams of information.³¹

Nevertheless, the wording, 'instead of us doing the talking, *we let the most important scientists in the field of seismology speak*' (emphasis added) sounds like the scientists were being used to justify a risk management choice already taken by the Head of the DCP. To be sure, in that conversation Bertolaso also said that the meeting was expected to be a 'media operation', since 'the luminaries of earthquakes in Italy will come' and 'the highest experts will say: it is normal, earthquakes are normal phenomena, (...) better that there are 100 shocks of magnitude 4 on the Richter scale (M_L) rather than silence (...) because 100 shocks free energy and the evil shock that hurts will never come'. From these words it is plausible to conclude that one of the reasons for convening the meeting was to reassure the population

²⁸ Some laws and decrees have slightly revised the legal framework under which the Commission operates, but the original tasks remain virtually the same: compare Art 9, L 225/1992 with Art 2, DPCM 7 October 2011. The Commission was originally composed of 21 members, and only three of these were official experts on seismic risks. In 2011, after the organisation of the Commission was reformed, new members were appointed. There are now 11 members for the seismic risk only, DPCM 23 December 2011. Information on the Major Risks Commission is available at the official website: http://www.protezionecivile.gov.it/jcms/it/commissione_grandi_rischi.wp. The website can also be consulted in English.

²⁹ Wiretapping of the telephone conversation between Guido Bertolaso and Daniela Stati. The full telephone conversation can be heard (in Italian) at <http://www.6aprile.it/media/video/2012/10/23/video-ecco-le-frasi-che-incastano-la-commissione-grandi-rischi.html> (the quoted passage is translated by the authors).

³⁰ Tribunale dell'Aquila, 380/2012, pp. 154-155 of the motivations. It should be noted that these conversations are the basis for criminal allegations against Bertolaso, and that he remains under investigation in a pre-trial phase until December 31, 2013. See Ordinanza dell'Ufficio del Giudice per le Indagini Preliminari, Tribunale dell'Aquila, n 289/12 RGNR.

³¹ On the one hand, certain official statements from local representatives of the Italian Department of Civil Protection (DCP) indicated that there was no risk of a major earthquake. On the other hand, fears were fuelled by the prediction, made by a technician at the National Institute of Nuclear Physics, Gioacchino Giuliani, that a major quake was about to occur. This complex context may shed some light, and even some legitimacy, on Bertolaso's words.

rather than to genuinely allow the scientists to assess the risk at hand. Above all, the words of the wiretapped phone call between the Head of the DCP, Guido Bertolaso, and the Regional Council member, Daniela Stasi, emphasised the importance of letting the scientists speak, and disclosed that, at least in their view, the voice of scientists embedded in the regulatory process is *authoritative*, and can have a direct effect on laypeople's perception of risks.

Scientists' authority and the blurred boundaries between risk communication and risk management

At a more fundamental level, the *de facto* authority exercised by scientists can be explained by showing that the boundary between risk communication and management is a blurred one. One of the main thrusts of the verdict is that the message of reassurance by the scientists altered the precautionary activities normally carried out by some of the victims.³² In fact, after the meeting, a press conference was held and two scientists (Barberi and De Bernardinis) were also interviewed by the media.³³ Reassuring statements were made by some of the scientists during the meeting, the press conference, and the interviews.³⁴

Several scholars and experts in the field have criticised the risk communication in the L'Aquila case.³⁵ Generally, it has been argued that the message from the scientists was over-reassuring, and uncertainty was not properly communicated.³⁶ One more specific critique is that, even if the information was to some extent technically correct (i.e. the probability of a major earthquake on that particular day was low in absolute terms), the way it was framed was highly unhelpful. As stated by Sirota and Juanchich, '[r]esearch on risk communication and its socio-cognitive and behavioral consequences indicates that the negative verbal probabilities that were frequently used to quantify the earthquake risk in L'Aquila, such as "unlikely" and "very improbable", express a "decreasing trend of risk". Findings suggest that these terms draw attention towards the non-occurrence of the outcome and discourage preventive measures'.³⁷ While most scientists and commentators may still find the manslaughter convictions extreme, most of them acknowledge by now the problems with the risk communication by the convicted scientists.³⁸

³² For an in-depth analysis of this part of the verdict see *infra* section 6.

³³ The press conference was organized with the active participation of prof Barberi and prof De Bernardinis, and in the presence of prof Calvi and prof Dolce.

³⁴ In this context it worth noting that during the meeting, no strategy of risk communication was discussed. Moreover, the meeting specified no confidential policy rules to the participants, which implied that what was said during the meeting was effectively of a public nature. It should also be noted that one (controversial) interview was released before the meeting.

³⁵ M Sirota and M Juanchich 'Risk Communication on Shaky Ground' (2012) 338 *Science* 1286; D Ropiek, 'Do Bad Earthquake Predictions Kill People? No. But Bad Risk Communication Might', BigThink Blog, September 26, 2011, available at <http://bigthink.com/risk-reason-and-reality/do-bad-earthquake-predictions-kill-people-no-but-bad-risk-communication-might>; S N Shore, "'But since the affairs of men rest still uncertain, let's reason with the worst that may befall" Probability, risk, and the 2009 L'Aquila Earthquake' (2012) *Scienza e Pace, The journal of the Interdisciplinary Center for Peace Studies* (Centro Interdisciplinare Scienze per la Pace), University of Pisa.

³⁶ See Editorial, 'Communication at risk' (2013) 6 *Nature Geoscience* 77.

³⁷ M Sirota and M Juanchich (n 35), 1286-87.

³⁸ Another problem with the risk communication in this case was that, far from being participatory, risk communication was a process within which the public was merely reassured. Scholars in the field of risk communication have long advocated for participatory processes in risk communication. In one of the seminal papers on risk communication, Baruch Fischhoff has traced the evolution of the process of risk communication in the US, and has emphasised how risk communication may transcend the act of merely sending 'risk messages'. The evolution of a theory underpinning the practice of risk communication shifted from a model in which the public was simply a receptor of information to a more participative idea in which the public is in a dialogical relationship with the regulator. Conceptualised as such, risk communication is not a mere vector of information, but is an element of risk management that enables participation and interaction between laypersons and experts. B Fischhoff, 'Risk Perception and Communication Unplugged: Twenty Years of Process' (1995) 15 *Risk Analysis* 137.

From this angle, the L'Aquila case elucidates how risk communication is intertwined intrinsically with risk management, by unveiling the relation between victims' fatal behaviour and the scientists' communication of risk. The assessment and communication of risks effectively morphed into risk management because of the individual behavioural responses to the risk communication. In other words, knowing that risk communication triggers certain behavioural responses means that risk communication becomes in itself a form of risk management. Thus, if in general it may remain disputed whether risk assessment, management, and communication are clearly distinguishable, it is clear that when mitigating actions include individual behaviour triggered by risk communication, the boundaries between assessment, communication, and management become even more blurred. Gaining awareness of the nature of risk communication and its contiguity with risk assessment and management is one fundamental step in understanding the way authority is exercised by regulatory scientists.

Conceptualising accountability for regulatory science

Against this background, it is paradoxical that regulatory scientists, who *de facto* retain some regulatory authority, have remained largely outside the discourse on the accountability of the regulatory machine.³⁹ Our main claim is that, to the extent that some degree of regulatory authority is exercised, accountability mechanisms also ought to be applied to scientists. While accountability remains an elusive concept, it is commonly described as a mechanism necessary to limit the abuse of power.⁴⁰ More specifically accountability has been conceptualized as a social relation between 'an actor and a forum, in which the actor has an obligation to explain and to justify his or her conduct, the forum can pose questions and pass judgment, and the actor may face consequences.'⁴¹ On the normative level, accountability has been considered to fulfill three purposes: 1) controlling public powers (democratic perspective), 2) limiting abuse of power (constitutional perspective) and 3) develop learning (learning perspective).⁴² In the words of Mark Bovens, '[b]ehind these three perspectives lurks a far bigger, more abstract concern of accountability. Accountability is indirectly of importance because, ultimately, it can help to ensure that the legitimacy of governance remains intact or is increased.'⁴³ Accountability thus becomes an essential element in the construction of legitimate governance systems; accordingly, if scientific experts are to be part of this system, they need to be subjected to accountability mechanism. In other words, accountability of regulatory scientists is necessary to render a regulatory system that relies on experts sustainable.

³⁹ Only a few authors have addressed the issue of accountability of regulatory scientists; most notably, Jasanoff (n 6) and the works of different authors collected in Lentsch and Weingart (n 7). While in this contribution we focus on the concept of accountability for regulatory scientists, we realise that it is important to study more broadly the possibility of applying accountability also to private actors that indirectly contribute to policy-making process. If private actors rely on scientific expertise, then we should consider also the implication in terms of accountability for these scientists; for an early reflection on this theme see W Wagner & D Michaels, 'Equal Treatment for Regulatory Science: Extending the Controls Governing the Quality of Public Research to Private Research', 30 *American Journal of Law and Medicine* 119, 122 (2004)

⁴⁰ R Mulgan, "'Accountability': An Ever-Expanding Concept?" (2000) 78(3) *Public Administration* 555; C Scott, 'Accountability in the Regulatory State' (2000) 27 *Journal of Law and Society* 38; R W Grant and R O Keohane, 'Accountability and Abuses of Power in World Politics' (2005) 99 *American Political Science Review* 29.

⁴¹ M Bovens, 'Analysing and Assessing Public Accountability. A Conceptual Framework' (2007) 13(4) *European Law Journal* 447, p 450.

⁴² M Bovens, *Ibid*, p 463.

⁴³ M Bovens, *Ibid*, p 464.

The role of legal accountability

Accountability mechanisms can take different forms, including 'legal', 'peer', and 'reputational' accountability.⁴⁴ Criminal liability, assessed in the trial in L'Aquila, is a sub-set of legal accountability. It is one form of judicial review, with high standards of review (causation and culpability should be proven beyond reasonable doubts) and arguably the most severe sanctions, such as the limitation of personal freedom. From this perspective, criminal liability may be considered as highly problematic for reviewing regulatory science. Employing criminal liability for scientists may create a sort of 'regulatory science-chill', as scientists might become reluctant to engage in regulatory processes if threatened with very heavy sanctions. Moreover, the high standards of review on which criminal liability rests may be hardly met in cases reviewing scientific assessments for regulatory purposes, because these are typically fraught with high uncertainties. As criminal liability is constructed in a way that false positives should be minimised (the principle of innocence beyond reasonable doubts), the presence of uncertainties may lead to under-detection of misconduct. In that sense, the first instance verdict of the L'Aquila trial can be seen as an anomaly. The fact that on appeal, all scientists have been acquitted from all charges provides support to this thesis. Striking is that apart from the criminal trial, no institutional mechanisms were set in motion so that any political, administrative, and/or technical responsibilities could be publicly ascertained. Given the lack of other accountability mechanisms and the absence of a political-administrative scrutiny in the aftermath of the earthquake, the L'Aquila trial might be seen as measure of last resort.

We believe that, in spite of the undesirability of criminal liability for the review of regulatory science, the L'Aquila trial shows that *legal accountability* can be useful to scrutinize the behaviour of scientists involved in the political process. Legal accountability is established when courts or quasi-judicial bodies can review the behaviour of certain actors on the basis of legalised norms of conducts. Some scholars have shown why peer review may be a suboptimal strategy in regulatory policy.⁴⁵ The scrutiny of scientists' behavior by legal institutions is a process that may be particularly valuable because the standards of behavior of regulatory scientific institutions are not simply determined by the scientific community, but by the legal framework. Risk assessment does not exist in a vacuum and it is not per se a scientific concept; the boundaries of risk assessment are socially and legally constructed.

The evaluation of the process of risk assessment by the Judge in the L'Aquila trial well illustrates this point. In order to appraise whether the scientists performed risk assessment in an accurate fashion, the Judge had first to identify the constitutive components of risk assessment, such as what needs to be assessed and by whom. The reasoning driving the L'Aquila verdict has thus the merit of having identified the standards of behavior of the scientists within the existing Italian legal framework.⁴⁶ In other words, the L'Aquila verdict has identified the *legal* boundaries of risk assessment and the *legal* duties that come with it.

Addressing potential critiques

One critique that can be applied to the claim that accountability mechanisms for regulatory scientists are necessary is that it rests on a misconceived conception of science, as science cannot provide answers to politically loaded questions. But this is the vexing question that has led to the articulation of the concept of 'trans-Science'.⁴⁷ While we share the view that science cannot possibly answer purely political questions, it is erroneous to infer from this that scientists cannot account for what they

⁴⁴ M Bovens, *Ibid*, pp 36-37.

⁴⁵ L I Boden and D Ozonoff, 'Litigation-Generated Science: Why Should We Care?' (2008) 116 *Environmental Health Perspective* 117-122, pp. 19-20.

⁴⁶ For an in-depth analysis of how the Judge in the L'Aquila case has assessed the negligence of the scientists against a complex legal framework that establishes the responsibilities of the Commission, see Section 5 below.

⁴⁷ A M Weinberg, 'Science and Trans-Science' (1972) 10 *Minerva* 209.

do in the policy-making arena. In the case of L'Aquila, science was clearly, if not carefully, used as an authoritative factor in the decision-making process. To the extent that science is used to serve political purposes, it should meet certain accountability standards as well. This is important, *inter alia*, because scientists, like any other actor in the regulatory process, are prone to capture (and/or to errors) and need incentives to properly conduct their work.

Another critique to the proposal of legal accountability might be that judges – owing to their lack of specific expertise – are unable to assess the work of scientists. But this is just a rough assessment of judges' competence, and it rests on a superficial interpretation of the general principle of distinction of powers. The fact that judges are not scientists cannot be used as a general argument to exclude any kind of judicial review of scientific opinions. As a matter of fact, judges are already doing that in a variety of fields, including in the domain of medical malpractice, toxic torts,⁴⁸ litigation related to environmental damages⁴⁹ to the review of the decisions of specialised agencies, which rely of the work of scientific experts.⁵⁰ A wide variety of science-related questions has also been reviewed by international courts.⁵¹ Within this vast jurisprudence, it is possible to distinguish approaches that tend to focus on more substantive reviews⁵² to those privileging procedural reviews⁵³ and approaches that are more or less deferential to the science-based decisions of administrative bodies. In contemporary societies, characterised by their complexity, it appears unavoidable that science meets law in a Court room.⁵⁴

The innovative character of our argument is in suggesting that, rather than only the decisions of political bodies (e.g. European Commission) or agencies (e.g. EPA), regulatory scientists and/or the scientific regulatory committees should be held accountable and, possibly, their decisions subjected to judicial review. If we look at landmark cases in EU and US law, the subjects of judicial review are typically political bodies (e.g. the Council in *Pfizer* and *Alpharma*; the Commission in *Amflora*; the Occupational Safety and Health Administration (OSHA) in the *Benzene* case, etc.). In the L'Aquila case the subjects under legal scrutiny are the scientists themselves. Our main tenet is that, if it is

⁴⁸ See for instance W E Wagner, 'When All Else Fails: Regulating Risky Products Through Tort Litigation' *Georgetown Law Journal*, forthcoming; U of Texas Law, Public Law Research Paper No. 99. Available at SSRN: <http://ssrn.com/abstract=902412>

⁴⁹ For a recent analysis of the interplay of science and law in the context of the assessment of natural resource damages in the US see S H Knudsen, 'Adversarial Science' (2014) 100 *Iowa Law Review*, forthcoming; University of Washington School of Law Research Paper No. 2014-21. Available at SSRN: <http://ssrn.com/abstract=2436527>

⁵⁰ At the European level, Courts tended to be rather deferential to the decisions of agencies because these are often framed as advisory opinions and thus, technically, cannot be considered decisions subject to judicial scrutiny; for an overview of these cases see E Madalina Busuioc (n 22).

⁵¹ For an excellent overview and analysis of this body of international jurisprudence see C E Foster, *Science and the Precautionary Principle in International Courts and Tribunals: Expert Evidence, Burden of Proof and Finality* (Cambridge University Press, 2011).

⁵² In Europe, see for instance the landmark cases: Case T-13/99 *Pfizer Animal Health S.A. v. Council* 2002 ECR II-3305; case T-70/99 *Alpharma Inc. v. Council* 2002 ECR. For an early comment on this case law, see C MacMaoláin, 'Using the precautionary principle to protect human health: *Pfizer v. Council*' (2003) 28 *European Law Review* 723.

⁵³ European Courts have often focused on more procedural issues. For a recent case see Case T-240/10 *Hungary v. Commission* [2013] application for annulment of two decisions by the Commission to approve the genetically modified potato 'Amflora'. In this case, the Court stroke down the decisions on the basis of procedural deficiencies of the Commission decision (the Commission in authorizing the GMO failed to consider the most recent EFSA opinion on this question). If the Court reasoning can be seen as focusing on eminently procedural issues, it could also be argued that the line between procedural and substantive review is in fact thin. This is because in order to decide on the procedural question the Court had to show the relevance of the 2009 EFSA opinion in the first place (and its possible implications for the case).

⁵⁴ On this theme, see the 2009 Special Issue of *Law and Contemporary Problems* 72(1) on 'Conventions in Science and Law'. Some scholars have argued that the adversarial nature of the legal trial may be fruitful and lead to the production of new knowledge about risks and uncertainties; for an overview see Kundsén, above n 49.

impossible to test in any way the reliability of the work of regulatory scientists and scientific committees, then it seems equally wrong to confer a privileged status to this group in the regulatory arena. Certainly, we do not argue that the recognition of accountability mechanisms should be translated directly into the allocation of a specific form of liability, be it criminal, civil, or administrative. It is simply suggested here that legal institutions may prove important in holding scientists accountable for their actions within the context of their 'regulatory' sphere of action.

The L'Aquila case: Bringing regulatory science under the rule of law

In the first instance verdict, scientists have been found guilty 'for having assessed the risks related to the seismic activity in the L'Aquila territory in an inaccurate, generic and ineffective way' and for having provided to various authorities/political bodies and to the people of L'Aquila 'information which was imprecise, incomplete and contradictory as to the nature, the causes and the hazardousness, and on the future development of the seismic activity'.⁵⁵ The scientists' conduct had the effect of inducing the earthquake victims to stay at home, and not to follow consolidated preventive safety habits of leaving houses in the event of seismic shocks at night.

The reasoning of the Judge, articulated in over 900 pages of motivations,⁵⁶ is already clear from the first pages. The ruling revolved around two distinct lines of reasoning, which focused on the behaviour of both the Major Risks Commission's members and the victims. When a causal link between the two sets of behaviour was demonstrated, the Judge condemned the members of the Commission for multiple manslaughter and multiple unintentional injuries. In the 29 cases in which criminal liability was ascertained by the Judge, people had changed their behaviour as a direct consequence of the information released following the Major Risks Commission's meeting. From the reconstruction of facts made by the Judge, it emerges that the pattern of behaviour that was mostly influenced was what we could call 'individual risk management', that is the management of a situation of risks by the potential victims on the basis of the information received by the authorities. According to the Judge, it is the risk communication that caused the relaxation of preventive safety measures that, otherwise, might have saved the lives of (at least some of the) L'Aquila's inhabitants.⁵⁷

Risk assessment and legal duties

When analysing the (criminal) behaviour of the Major Risks Commission, the Judge articulated his judgment on a series of grounds of review that matched both substantive and procedural criteria of evaluation concerning the effective accomplishment of the specific duties of care connected to risk assessment and communication. Interestingly, the Judge conducted such a review against the background of a fragmented and unclear legal framework about the nature and the limits of the tasks and responsibilities allocated to the Major Risks Commission. To mention only the main issues, the relationship between the Major Risks Commission and the DCP is not clearly regulated and the allocation of tasks and responsibilities between the two bodies is not always easy to disentangle. For instance, both bodies are tasked with functions of risk forecasting and prevention, without clear

⁵⁵ Tribunale dell'Aquila, 380/2012, p 25 of the motivations.

⁵⁶ The motivations of the first instance verdict were published on 18 January 2013. According to Italian criminal procedural law, in fact, motivations should be published within 60 days after the verdict. The fact that most commentaries in the media appeared when the motivations of the verdict had not yet been published can be seen as problematic, because some critiques were formulated without taking into due account the reasons behind the verdict.

⁵⁷ The Judge compared and contrasted the behaviour of each victim before the Commission's meeting on 31 March 2009; the awareness of the single victims regarding the findings of the Commission's meeting; and the victims' behaviour in the aftermath of this meeting. This examination was conducted on the ground of testimonies of relatives and other people familiar with the victims. The validity of the evidence produced as well as the causal link between the fact of the death and the Commission's deliberation can therefore be challenged on appeal.

distinction on how both bodies are to contribute to these goals.⁵⁸ Risk assessment, management and communication are mixed in a dense decision-making process that is well exemplified by the meeting of L'Aquila. The application of legal standards to the case therefore contributed to framing the liability framework of regulatory science.

In doing this, the Judge preliminarily defined the legal criteria for evaluating the scientific activity of risk assessment and then tried to ascertain whether the experts had conducted it in an accurate fashion. First of all, the Judge pointed out the nature of the regulatory task of risk assessment and substantively set the legal borders of such a responsibility, by identifying the main factors to be considered in risk assessment. Only subsequently, the Judge looked at whether the Major Risks Commission had evaluated all these factors by conducting a procedural appraisal. The responsibility to assess the seismic risk is structured as a task aimed at analysing the risk at stake under particular conditions. In order to outline the duties related to this task, the Judge emphasised the limited nature of risk assessment: it does not consist of a deterministic prediction or an alert regarding an earthquake as a phenomenon, but an assessment of the possible consequences of a major earthquake. He made clear that given the current status of scientific knowledge, the occurrence of earthquakes cannot be predicted by any scientific means. Being the notion of risk an undetermined legal concept, the Judge had to define it according to the meaning designed by the legal framework.

Since the Civil Protection's statute does not define the notion of risk, the Judge had to rely on a notion generally accepted in the legal order and referred to the definition provided by the regulation on workplace health and safety: namely, risk as the probability of a potential level of harm.⁵⁹ It is important to emphasise that the nature of the tasks and duties related to the performance of risk assessment has been framed by the Judge against the law on Civil Protection and structured according to the rule of law and not merely to scientific parameters.⁶⁰ The consideration of scientific parameters is thus subsumed into the legal analysis. This framing confirms the limited capability of the Judge to review scientific activity; that is, according to the function that judiciary performs in the legal system. This implicitly confirms the hybrid nature of the Commission as a scientific advisory body, which activity is assessed in relation to the legally relevant parameters. The pure scientific validity of the performed tasks is not an issue in itself; rather, the issue is the regulatory implications of such an activity; that is, the legal effects produced by the scientific activity.

The key legal rules for evaluating the legality of the activities performed by the Commission refer to protection of the integrity of life, goods, settlements, and the environment from the harm or the danger of harm related to the occurrence of natural and man-made disasters or other events that can entail high risks. In light of this goal, every action in the field of civil protection should be intended to mitigate the impact of these events in terms of harm and casualties.⁶¹ In light of the legal framework considered by the Judge, the Commission's meeting should have been intended to assess the risk of the earthquake – and not to predict its occurrence – on the basis of the knowledge at its disposal.

The Judge concluded that, in the pursuit of the prevention goal, the Commission was expected to conduct an *ex ante* assessment of the occurrence of a potential situation and the possible negative

⁵⁸ See L 225/1992.

⁵⁹ Art 2, lett s), D Lgs 81/2008. According to the Judge's reasoning, risk should be considered as a 'logic category aimed at defining a potential situation; and it involves a value judgment about the harmful consequences which can stem from not (always and not always accurately) predictable conditions'; see Tribunale dell'Aquila 380/2012, p 296 of the motivations.

⁶⁰ Tribunale dell'Aquila, 380/2012, pp 217-221 of the motivations.

⁶¹ According to the law, forecasting covers those activities aimed at identifying and analysing the causes of disasters, their risk, and the areas involved (art 3 (2), L 225/1992), whereas prevention concerns the activities aimed at mitigating harm and casualties of disasters on the basis of results of the forecasting activity (Art 3 (3), L 225/1992). In other words, these activities refer respectively to risk assessment and risk management.

effects of its occurrence.⁶² On this ground, preventive action could have been taken: that is, a number of measures meant to identify and limit those situations that could involve major harm. The Judge focused on the modalities by which *such* risk assessment should have been conducted; that is whether and to what extent the risk assessment performed by the Major Risks Commission had effectively matched the goals set by the law. Both procedural and substantive criteria assisted such review.

Criteria of judicial review

Within the outlined framework of the legal duties, the question under judicial review was whether the (individual members of the) Commission had considered with the necessary level of care all the data (of a historical, scientific, statistical, and environmental nature) at their disposal during the meeting aimed at assessing the seismic risk. The principles of reasonableness and accuracy in the performance of risk assessment assisted the review. On the substantive side, the Judge faulted the scientists mainly for not having *sufficiently* considered important variables, part of a risk assessment; namely the potential harm.⁶³ In addition to the correct assessment of existing risk maps, vulnerability is significant in the seismic risk assessment of the city of L'Aquila, since its architectural heritage (buildings from medieval times) is particularly exposed to seismic activity, and unsuitable for anti-seismic intervention, as documented by an earlier study conducted by one of the prosecuted scientists, Dr Barberi.⁶⁴

On the ground of an accurate risk assessment and of consequent correct information, it would have been possible not to prevent the earthquake from occurring, neither to predict the earthquake as a phenomenon, but to mitigate its impact and reduce losses and casualties.⁶⁵ However, the judgement is somewhat ambiguous here. On the one hand, various parts of the judgement emphasise that scientists were not expected to predict the occurrence of the earthquake and the Judge seems to adopt a deferential standard of review. On the other hand, some parts of the verdict engage in a more straight review of science suggesting that the scientists were superficial in assessing the probability of the earthquake. This may in fact be one of the weakest parts of the verdict in the application of substantive criteria of review. This ambiguity may be the result of the need to evaluate criminal liability beyond any reasonable doubt, but it can also be attributed to the Judge's confidence of his capability of understanding scientific evidence when evaluating some specific aspects of scientific/technical opinions.

Conversely, the procedural review is more straightforward. In fact, on the procedural side, the Judge assessed the modalities by which the meeting was held as evidence of the (in)accuracy of the risk

⁶² The judge further elaborates on this by distinguishing the prediction of harmful events from the process of risk assessment: 'risk assessment is the formulation of a judgment, a prognostic evaluation, relating to the occurrence of a potential situation and the potential harmful consequences stemming from an unforeseeable event, such as an earthquake' (*Ibid*, p 297 of the motivations).

⁶³ The Judge actually reconstructed the notion of seismic risk as the result of the interaction of three variables: seismic danger (ie, the probability that an earthquake with a certain intensity will occur in a particular area in a certain period of time, and it allows mapping of the risk); vulnerability of the goods and the population (ie, their fragility to harm); and exposure to the danger, which also includes the economic effects (as regards the value of life and goods that can be lost or damaged if the earthquake occurs); *Ibid*, p 314 of the motivations.

⁶⁴ The Barberi's Report is a study conducted on the building heritage of different Italian regions, previously delivered by an expert Commission composed of some of the defendants and chaired by one of them; according to this report, the ancient nature of the building heritage prevents any intervention to technically update it to new standards. See F Barberi et al, *Censimento di vulnerabilita' degli edifici pubblici strategici e speciali nelle regioni Abruzzo, Basilicata, Calabria, Campania, Molise, Puglia e Sicilia Orientale* (Ministero del Lavoro e della Previdenza Sociale, Dipartimento della Protezione Civile and Gruppo Nazionale per la Difesa dai Terremoti, III volumes, 1999).

⁶⁵ To clarify this, the Judge takes examples from other disasters; for instance, he distinguishes between fires and the risk of fires: the first one refers to the phenomenon as occurred, while the second one consists of the assessment of all the potential circumstances that could lead to fires and their predictable harm. *Ibid*, p 309 of the motivations.

assessment. The (lack of) input from the different experts, members of the specialised board, can be used to indirectly review the work of scientific committees. The procedure followed for assessing risk influences the findings of the assessment; therefore, as it happens in other domains where administrative procedures apply, it should have legal effects. The Major Risk Commission was composed of experts in different fields (e.g., some experts were knowledgeable in relation to the vulnerabilities of the territory, while others were experts in relation to seismic risk as such) and it should have worked as a collegial body on the basis of information being exchanged among the different experts. This meant that all the (scientific) indicators should have been analysed in detail by the single experts in a plenary discussion at the meeting (as in a perfect collegial body), so as to position every indicator in the concrete case at stake.⁶⁶

In the L'Aquila case, not all the specialised knowledge of the members was effectively shared. The March meeting of the Major Risk Commission lasted one hour (18.30-19.30), and participants signed the official minutes of the meeting only in the immediate aftermath of the disastrous earthquake, about a week after the meeting took place.⁶⁷ One hour for a meeting with seven scientists to discuss such complex issues allows little time for deliberation. This part of the judgement reveals that even simple procedural requirements may be crucial in determining responsibility of regulatory science. If the legal system has included different expertise within a particular regulatory scientific institution, the lack of consideration of some these experts may be used as a way to ascertain deficiencies in the conduct of the body.

Legal accountability and learning

One of the most criticised conducts of the Major Risks Commission is that it interacted directly with the general public – namely the population of L'Aquila – by releasing different types of information, and by holding a press conference after the March meeting. The Commission *communicated* the seismic risk, but it highly underestimated the role and nature of such activity, namely the exercise of a *de facto* authority. This considerably contributed to ascertaining gross negligence under Italian criminal law. The verdict made the Major Risks Commission officially responsible for the (causally linked) effects of its communication.

This significantly contributed to highlighting the legal importance of risk communication and to recognising its regulatory implications. Until the L'Aquila first instance verdict, the 'adverse' legal effects of risk communication have been underestimated in risk regulation. The legislative framework under which the Commission operated was not clear about scientists' duties in relation to risk communication, which could be considered to represent a further specialised task within the communication competences. The L'Aquila verdict can be seen as the first step towards the understanding of issues pertaining to risk communication in the Italian legal framework. By focusing on how the duty of care related to the tasks and responsibility allocated to the Commission, the Judge contributes to frame a relationship of legal accountability. Likewise, when *de facto* checking the accuracy of the risk assessment and the adequacy of the risk communication, the Judge defined criteria for framing the relationship between regulatory science and policy making.

As far as risk communication is concerned, the first instance verdict set some fundamental criteria for defining how not to perform such a task. Above all, the Judge held the need to clearly distinguish

⁶⁶ See Tribunale dell'Aquila 380/2012, pp 830-831 of the motivations.

⁶⁷ Another issue that emerged in the judicial review was that, according to one of the defendants, the meeting could not be considered an official one of the Major Risks Commission, because the minimum legal numbers of 10 scientist members had not been reached. However, during the entire history of the Commission, no meeting involving 10 members had ever taken place, arguably because the design of the Commission having a much lower number of experts for each category of risk than the minimum requirement.

scientific information from layman language.⁶⁸ When scientists communicate scientific data, they should take into account that the semantic of technical/scientific language does not necessarily match ordinary language: if the occurrence of an earthquake is considered 'normal', scientifically it means that the phenomenon is known and expected in that particular seismic region. However, in layman language it has a different nuance, meaning not-alarming and in the end not-dangerous.⁶⁹ Likewise, saying that a major earthquake is 'very unlikely' produces a (scientifically unintended) reassuring effect on the population.⁷⁰

If imprudent statements and misunderstandings had been avoided, scientists could have appropriately performed the communication of risks. By identifying some of the negative effects of poor risk communication, a first warning bell has sounded regarding the need for an effective risk communication strategy. According to cognitive science literature, 'evidence based risk communication guidelines' can help 'protect both the risk information recipient and the risk information provider'.⁷¹

If compared to the judicial scrutiny on risk assessment, the review of risk communication is mainly substantive and it shows a lower degree of deference. In order to understand the role of the scientists in this particular context, the Judge heavily relied on the expert witness of an Italian professor of cultural anthropology, Antonello Ciccozzi. Following prof Ciccozzi's technical opinion, the Judge based the legal reasoning on theories of cultural anthropology and psychology which consider that all human behaviour is partly determined by the available information. In this context, information produced by scientific authority is likely to influence behaviour.⁷² In the context of the L'Aquila earthquake, citizens needed to normalise the state of fear and uncertainty, and to this end the meeting of the Commission was organised in L'Aquila by the Head of the DCP with the aim of reassuring the population. Because of the need to reduce uncertainties and fears in situations of risk and uncertainty, people tend to believe experts and competent authorities. In addition, the more educated these people are, the more willing they are to trust competent authorities, as they share a 'cultural proximity'; thus, the closer the warning, the most persuasive it is.⁷³

According to the Judge, an *adequate* risk communication could have stimulated other competent authorities to take preventive safety measures – such as the arrangement of meeting points and safe areas of refuge, and the strengthening of first-aid services and the accommodation capacity of hospitals – as well as advising citizens to take individual safety measures. This different impact scenario of the risk communication could have disconnected the causal link in the allocation of the criminal liability. This means that the accountability framework sets the borders of responsibilities and safeguards against their incorrect allocation and performance. The L'Aquila case changed the perception of risk communication as a neutral activity and it unveiled the possible legal effects of such an activity. The legal system has been changed arguably because of what emerged from the L'Aquila trial. In 2011 a new regulation reforming the organisation and the functioning of the Major Risks Commission introduced a new provision concerning risk communication, which tries to address the issue that emerged in L'Aquila. When 'particular needs of communication' occur, the Commission can summarise its findings on a specific matter in a press communication that will be the sole official form of external representation of the Commission's opinion in place of a meeting's report.⁷⁴

⁶⁸ This part of the Judge's reasoning seems in line with the arguments discussed above by Sirota and Juanchich (above n 35)

⁶⁹ See Tribunale dell'Aquila 380/2012, pp 248-249 of the motivations.

⁷⁰ Ibid, pp 241 and 262-265 of the motivations.

⁷¹ See M Sirota and M Juanchich (n 35).

⁷² See Tribunale dell'Aquila 380/2012, pp 663-694 of the motivations.

⁷³ Ibid, pp 688-694 of the motivations.

⁷⁴ Art 3(8), DPCM 17 October 2011.

The general accountability framework, however, remains rather unspecified. National legislation on risk communication remains largely unregulated and this makes any attempt to identify *a priori* the legal effects of such a regulatory task very difficult, when not impossible. No directions or guidelines have been provided for the performance of such a specialised task. If the Commission has the capacity of communicating risks, it is essential that its members be aware of the possible consequences of communicating risk-related information, and, as a result, learn how to handle risk communication appropriately. The amending process, instead, stopped at a sheer formal and superficial point without addressing the very criticalities in risk communication and its effects for the correct functioning of the Commission. In fact, the Commission has been vested with the public authority of communicating risks to the public, and not only to the Head of the DCP. No criteria for structuring the relationship between the Major Risks Commission and the DCP have been provided. No procedures have been developed at any level for checking the work of the Major Risks Commission. Moreover, no rule has been introduced to (at least) legally protect the autonomy of the scientific evaluations from political pressure. This shows that no serious attempt was made to rebuild public trust in the National Service of Civil Protection and to effectively improving its functioning. At the same time, the L'Aquila case has brought to light the role of regulatory science and, arguably, it will affect the prospective behavior of the members of the Major Risk Commission. Thus overall, the first instance verdict can be seen as revealing the importance of setting a legal accountability framework for regulatory science.

Conclusions

Let us go back to the letter published in *Nature*, in which some scholars raised their concerns about the fact that, with the L'Aquila trial, 'Italy seems to have made scientists co-responsible for governing the country'.⁷⁵ Our analysis has shown that it was not the criminal trial in L'Aquila that made scientists co-responsible for governing the country; rather, the risk regulatory framework had already established a system of joint responsibility. It could be argued that the term 'responsibility' has different meanings and, accordingly, a brief reflection on the two connected meanings of the term is due. On the one hand, responsibility means duty, task; on the other hand, it means 'the state of being the person who caused something to happen' (Merriam-Webster dictionary). As discussed in this article, the scientists attending the meeting had certain tasks and duties within the civil protection system. In this sense, they *are* (legally) co-responsible for governing those risks. We can speculate that the signatories of the letter in *Nature* were mainly concerned about the second meaning of the term. However, it is worth noting that the root of the word 'responsible' is the Latin word *respondere* (to respond). If you have a certain duty within a governance system, you are also called to respond for your actions within the system. Interestingly, in the same letter, the concerned scholars also emphasise the importance of 'recognizing the democratic accountability of government as well as the *science* it enlists for policy-making'.⁷⁶

In this article, we have argued that the L'Aquila case is of particular interest because it draws attention to the accountability mechanisms – or lack thereof – of that 'enlisted science'. One of the major insights issuing from the L'Aquila verdict is that people changed their behaviours as a consequence of information released in the aftermath of the Major Risks Commission's meeting. More specifically, the information communicated after the meeting seemed to have resulted in the relaxation of precautionary measures that could otherwise have saved the lives of some of L'Aquila's inhabitants. This part of the verdict seems to corroborate the idea that regulatory scientists are also involved in risk management and, more generally, exercise some form of authority. The verdict shows that the boundaries between risk assessment, risk management, and risk communication are fluid, and it is

⁷⁵ See Aarden et al (n 2).

⁷⁶ *Ibid* (emphasis added).

important that scientists involved in the regulatory process gain more awareness not only of their own roles but also of the dynamic interactions between the aforementioned three phases.

Without any intention of passing judgement on questions related to criminal law, we have argued that this case shows that it is not only possible but also necessary to initiate a serious reflection on the accountability of regulatory science. In a world in which scientists are often given regulatory authority, it is surprising how little attention has been devoted to this question. The most recent development of the L'Aquila case – the acquittal of the scientists by the L'Aquila Court of Appeal – bears witness to the accountability gaps of the Italian legal systems.⁷⁷ As noted in this article, beside the criminal trial almost no other accountability mechanism was resorted to. If criminal liability by all accounts may appear too severe (and most likely counterproductive), other legal accountability mechanisms need to be devised.

⁷⁷ It is yet to be seen whether the Appeal verdict will become definitive, as it can be challenged before the Supreme Court of Cassazione on grounds of legality.

