New Technologies, the Precautionary Principle, and Public Participation

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The issue of scientific and technological innovation is not new for the legal arena. Ever since the industrial revolution, scientific progress has been so fast that the law has often been late in responding to new technological challenges. Indeed, as Weeramantry has pointed out, 'inventions are piling up at a rate which far outpaces the possibilities of legal control. The law is not ready with the appropriate armory of new concepts to challenge these new weapons of intrusion.'

This is particularly true for 'new technologies', the progress of which, especially in recent years, is faster and more difficult to regulate compared to 'traditional technologies'. In the context of the present contribution, the emphasis will be on legal responses to risks posed by new technologies. It is accepted however that new technologies may also bring benefits and pose new opportunities.

There is no widely accepted definition of 'new technologies'. In the relevant literature (not only that of the legal kind), new technologies seem to be addressed in two distinct ways. In a stricter sense, the expression only concerns technologies in the domains of communication and information. This definition is, we could say, a 'static' one, because it only covers certain categories of technologies. In a larger sense, the expression 'new technologies' is used as a synonym of 'high technology activities', encompassing technologies in the domains of biology, space, communications, computer, and nuclear activities. This definition relies on the novelty of the technological means at stake, meaning that a 'new technology' of today will no longer be 'new' in the future, and that, more generally, all technologies are 'new' when they are first introduced into society. The meaning of 'new' is thus subject to evolution and has to be continuously updated. It is this latter definition of 'new technologies' which is most commonly found in legal writings.

2 See further the chapter by Roger Brownsword in this volume.
Science makes action possible, namely in the form of new technologies, but often science is unable to predict the collateral effects of actions with sufficient certainty. Human creativity does not seem to have limits. As it has been said, 'nos pouvoirs excèdent notre savoir'. For international law, this predicament first appeared with respect to nuclear activities and then in the environmental area and the field of biotechnology. International law has to face contrasting values: on the one hand the interests of humanity and of future generations as served by environmental protection, respect for human rights, and sovereignty over natural resources; on the other hand, freedom of scientific research, free trade, and the protection of intellectual property rights. The International Court of Justice (ICJ) has pointed out this dialectic of values in the international legal order:

Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past, this was often done without consideration of the effects upon the environment. Owing to new scientific insights and to a growing awareness of the risks for mankind—for present and future generations—of pursuit of such interventions at an unconsidered and unabated pace, new norms and standards have been developed, set forth in a great number of instruments during the last two decades. Such new norms have to be taken into consideration, and such new standards given proper weight, not only when States contemplate new activities but also when continuing with activities begun in the past.

The risks posed by new technologies have caused a paradigm shift in the international legal order. Indeed, these risks require a new mode of both thinking and of action to prevent their realization and their potentially irreversible consequences. Traditional international law is familiar with the issue of risk (risk to international peace and security, risks in International Humanitarian Law, risk to human rights, etc) and has long since developed means of risk avoidance and prevention. However, this perception of risk as defined by the International Court of Justice is mostly based on a reactive approach. That is, it is dependent on the certainty of the imminent occurrence of the risks. For instance, efforts to prevent a threat to peace and security often occur when clear evidence of the threat is established, including the beginning of hostilities or the movement of troops.

The management of risks deriving from new technologies, however, requires a new approach based on uncertainty and future events. New legal tools, mechanisms, rules, and principles are thus needed to face the specific challenges posed by those risks. These innovative legal concepts go beyond the simple prevention or

3 Y. Lambert-Faivre, Droit du dommage corporel systèmes d'indemnisation (3ème édition, 2000), at 614.
reduction of present and well-known risks foreseen in traditional international law to encompass a new rationale, i.e. that of precaution.

The present contribution will focus, first, on the definition of the notion of precaution and its constitutive elements, and will analyse the manner in which the precautionary approach brings new concerns and new paradigms into the international legal order. Precaution’s interwoven links with public participation will then be developed in Part 2, particularly as they involve the notions of risk assessment, risk management, and risk communication. The chapter will conclude in Part 3 with remarks on the societal dimension of precaution.

1. Risks and International Law: The Virtues of Precaution

Precaution starts from the premise that the absence of scientific certainty should not be used as a pretext to postpone decisions if there is a risk of serious or irreversible damage to the environment or to public health. Precaution is a key concept in international sustainable development law and is increasingly penetrating the area of human rights and health. A commonly given definition of the precautionary principle/approach is the one contained in the 1992 Rio Declaration on Environment and Development. It reads as follows:

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

The Rio Declaration on Environment and Development played a pioneering role in the process of crystallizing the concept of precaution in international law. Precaution tends to defy standard or classical legal assumptions. It is in essence a meta-legal principle, allowing legal provisions to incorporate considerations beyond those resulting from strictly positive law. While these characteristics endow the precautionary principle with a certain originality, they also determine the complexity of its analysis.

A. Precaution and International Law

Law has long been a reflection of Cartesianism and positivism, dominant schools of thought of modern times. New challenges confronted by humanity as a whole

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6 In this chapter, the terms ‘the precautionary principle’, ‘the precautionary approach’, and ‘precaution’ will be used interchangeably.
and trepidation sparked by technological progress have led to a questioning of legal Cartesianism and of what has been described as ‘Euclidian law’. This revolution did not take place directly within the legal system, but resulted from the remodelling of both philosophical and scientific thought. On the philosophical level, ‘the heuristics of fear’, developed by Hans Jonas, pioneered the process of reflection on our interaction with the world, with science and with humanity. Major catastrophes (Chernobyl) and uncertainties (the consequences of climate change) have led to the definition and assessment of other parameters of state action in the international sphere. In this sense, precaution is a tool jockeying to be included in the new understanding of human relations to the environment in the international legal order. This order uses precaution as a tool to ‘juridicize’ these new concerns. International law cannot ignore precaution.

Precaution favours the emergence of new paradigms that contribute to the development of a global risks governance regime. These paradigms are those of uncertainty, interdependence, and anticipation. Precaution thus influences the philosophy of law in its entirety.

1. Precaution and the New Paradigms of International Law

(a) Regulating uncertainty
The precautionary approach developed following concerns over the regulation of uncertain ecological phenomena. Traditionally, international law has been based on the dogmas of Cartesian rationality. As a result, only those phenomena characterized by a certain scientific certainty were addressed by international regulation.

When the Vienna Convention for the Protection of the Ozone Layer was adopted in 1985, the extent and the nature of the human impact on the ozone layer were largely shrouded in uncertainty. In the same vein, scientific uncertainty was widely prevalent in 1992 when two of the key multilateral environmental agreements were opened for signature in Rio, namely the UN Framework Convention on Climate Change and the Convention on Biological Diversity.

12 See the Preamble of the 1992 United Nations Framework Convention on Climate Change: ‘Noting that there are many uncertainties in predictions of climate change, particularly with regard to the timing, magnitude and regional patterns thereof’, (1992) 31 ILM, at 851. See also the Preamble of the 1992 Convention on Biological Diversity: ‘Aware of the general lack of information and knowledge regarding biological diversity and of the urgent need to develop scientific, technical and institutional capacities to provide the basic understanding upon which to plan and implement appropriate measures’, (1992) 31 ILM, at 822.
One can also refer to the Cartagena Protocol on Biosafety which was adopted in 2000 (hereinafter the 'Cartagena Protocol') at a time of major scientific uncertainty regarding the risks of genetically modified organisms for the environment and public health—uncertainty which in fact persisted after the Cartagena Protocol’s entry into force in 2003.13

(b) International law and the challenge of interdependence

A precautionary approach emphasizes the interconnections and inter-sectoral aspects of the environmental problems to be regulated. It thus redefines the methods leading to the development of law at two levels. First, it excludes a compartmentalized approach towards regulation, acknowledging the intrinsic and extrinsic linkages among the phenomena to be controlled or managed. Lawmakers no longer limit themselves to the known impact of a human activity or of a new technology on certain elements of the environment. Rather, they also take into consideration the impact, even if uncertain, on other environmental components. For example, an effective and adequate regulation of the ozone layer cannot ignore desertification, climate change, and atmospheric pollution. These four elements are inherently linked. This new kind of complexity therefore calls, as its corollary, for a new and more comprehensive kind of legal approach. Indeed, the very concept of global environmental governance requires a holistic and systemic treatment of all its components.

Secondly, a precautionary approach also presumes a flexible and open-ended view of law. Traditionally, international law is based on a straight and focused form of legal reasoning that makes it difficult to consider emerging and interconnected issues. Precaution, on the other hand, as a technique of managing uncertainty is very different from any notion of a finite law. It is built upon a foundation that allows adjustment and openness. The procedural technique of developing a framework convention that is later complemented by the adoption of additional protocols addressing the progression of scientific knowledge facilitates this kind of 'legal openness'. The 1994 Protocol to the 1979 Convention on Long-range Transboundary Air Pollution regarding newly introduced reductions of sulphur emissions represents a typical example of this phenomenon.14 That this new reduction is essentially based on precaution is clear from the terms of the Protocol’s Preamble, which relevantly states ‘[r]esolved to take precautionary measures to anticipate, prevent or minimize emissions of air pollutants and mitigate their adverse effects’.

13 See the Preamble of the 2000 Cartagena Protocol on Biosafety to the Convention on Biological Diversity: 'Aware of the rapid expansion of modern biotechnology and the growing public concern over its potential adverse effects on biological diversity, taking also into account risks to human health', (2000) 39 ILM, at 1027.

(c) An anticipatory approach
By definition, precautionary measures attempt to control events that have not yet occurred and may never occur. Precaution focuses on the future and therefore constitutes a technique of legal anticipation with regard to global risks. For instance, the Preamble of the Convention on Biological Diversity carries an explicitly anticipatory message: 'Noting that it is vital to anticipate, prevent and attack the causes of significant reduction or loss of biological diversity at source' (emphasis added). Precaution rejects a curative legal approach. Given that it is not characterized by a curative logic, precaution differs in many aspects from the polluter pays principle which is closely linked to compensation for environmental damage. Furthermore, precaution does not depend simply on a cause and effect relationship. Precaution goes beyond the principle of prevention which ties action to scientific certitude. This need for anticipation is addressed in legal systems through the precautionary principle.

B. Precaution: A Means for Law to Address New Concerns
Precaution is a tool for introducing new values into the international legal system, which essentially lead to new modes of thought (1) and of action (2).

1. The 'Juridicization' of a New Mode of Thought: Complexity
The new thought method to which international law refers when it incorporates a precautionary approach is that of complexity, or, to quote Edgar Morin, that of 'complex thought'. What constitutes complexity? The idea of a complex and temporary order has replaced that of a determinism clear, simple, universal, and eternal. Considering precaution as 'the law of complexity' highlights two of its substantive character traits: uncertainty and globality. Uncertainty, because taking into account complexity comes precisely from the refusal of a simplistic approach. Precaution is therefore 'the law of uncertainty', hostile to the dogma of Cartesian rationality. International public action is called upon to create a new paradigm: the management of uncertainty.

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19 On the concept of scientific uncertainty, see infra.
Being the law of complexity, precaution is also the 'law of globality'. Indeed, complexity stresses the transversality and interconnection between phenomena, especially in the environmental field. An effective and efficient management of these phenomena requires a global approach. In this context, precaution manifests itself as a fitting legal technique to manage the interrelation and interaction between various phenomena.

Precaution as a legal technique presents itself as an appropriate and adequate path for the administration of common goods and spaces. The uncertainty of the potential consequences of a state's actions on the well-being of other societies requires the elaboration of global strategies for the management of these common spaces. In the environmental field, in which precaution finds its principal application, the concrete issues at stake in terms of international relations extend beyond the borders of states and regional groupings. Such is the case in relation to climate change, protection of biodiversity, deforestation processes, and use of shared natural resources, especially fresh water resources.

2. The 'Juridicization' of a New Mode of Action: Anticipation

In substance, precaution obeys a particular ratione tempori process. The legal temporality to which precaution refers is the future. In this, it is 'the law of anticipation'. The logic of precaution, centered essentially on the uncertainty of the effects of human activity, highlights the necessity to take into account the future and potential effects of this activity. Precaution anticipates in that it seeks to govern situations that have not yet arisen. Therefore it is not a body of law focused on the concept of reaction. Precaution as a legal technique therefore guarantees the right to anticipation in the international legal system. The dogmas of objectivism and realism have often led law in general and international law in particular to ignore a large portion of the legal temporality—the future—taking into account exclusively the past and the present.

As a law of anticipation, precaution is a fortiori a manifestation of 'the law of prospective'. It even adds a touch of originality by raising the dimension of uncertainty to the status of a fundamental element of consideration in the elaboration of any public or private prospective policy. As a result, the stages of thought and action in the precautionary approach are intimately linked. Indeed, it is difficult to conceive of anticipation without uncertainty, and uncertainty without anticipation. Similarly unlikely is the conception of uncertainty and anticipation without any reference to a global

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21 Gurvitch, 'La multiplicité des temps sociaux', in G. Gurvitch, La vocation actuelle de la sociologie, vol II, (1963) 325. According to this author, 'la vie sociale s'étale dans des temps multiples, toujours divergents, souvent contradictoires et dont l'unification relative, liée à une hiérarchisation souvent précaire, représente un problème pour toute société.'
approach. The uncertainty of the spatial extent of the analysed phenomena requires global anticipation—that is, not ignoring the potential implications of a phenomenon in other spaces, or those of one system on others. Precaution calls for the re-examination of the notion of spatial sovereignty as sketched by traditional international law, and puts emphasis on a need for a special ‘territorialization’ in a global context.

Precaution is not a volatile notion in international law. On the contrary, international law, in order to guarantee legal security and predictability, seeks to identify criteria permitting the durable establishment of the legal content of precaution.

C. The Notion of Precaution: Identifying the Criteria of Definition

Precaution has four fundamental criteria, which define it as well as justify *ratione materiae* its application in given situations. These criteria endow it with a particular structure, an original basis compared to other principles or approaches of international law. Three of these criteria (risk, damage, and scientific uncertainty) justify the application of precaution *a priori*, whereas the last criterion (capacities) intervenes *a posteriori* to objectively determine its applicability, permitting the passage from ‘application’ to ‘applicability’, from ‘desirability’ to ‘feasibility’.

1. The ‘Risk’ Criterion

(a) Meaning and content of the risk criterion

Risk is the very essence of precaution. Precaution’s *raison d’être* originates in law’s aspiration to assess and manage risk in our societies. Risk is a more or less foreseeable and contingent danger that can cause damage. It is therefore arbitrary in its essence. Volatility is its nature; its occurrence can be unforeseen, even unexpected. As long as there is any trace of doubt as to the occurrence of an event, there is risk. In an attempt to legally and precisely qualify the risks targeted by precaution, it is useful to recall the typology of risks compiled by Nicolas de Sadeleer, who was inspired by lessons drawn from German thought.

According to him, there are three main categories of risks:

- ‘Unacceptable’ or ‘definite’ risks, for which the causal link between the event and the damage is scientifically proven, even if doubt remains as to the

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time it will take for the damage to occur. These risks should be eliminated by the principle of prevention.

- 'Residual' risks, those inherent to normal human activity that must be tolerated (e.g., the risk implicit in driving a car or taking a plane). These risks, which 'rest on purely speculative considerations without any scientific foundation', do not need to be taken into account in the decision-making process. In order to avoid situations which would be absurd for human activity, residual risks have to be excluded from the precautionary principle's range of application.

- 'Uncertain' risks, whose existence has not been established by science, but cannot be dismissed. These must be addressed by the precautionary principle.

The legal terminology used in international instruments in relation to risks varies. In some instruments, references are made to 'threat'; elsewhere, however, references are made to the idea of 'potential' nuisance or danger.

(b) The components of a precautionary risk assessment

The main difficulty with the risk criterion lies in its assessment. Challenges such as quantifying the probability of occurrence of risk and qualifying the risk itself arise. International law does not provide definite answers, but international practice provides indications of what is, in objective terms, the evaluation of risk. The Cartagena Protocol for instance, provides for a risk assessment procedure in its Annex III. The objective of risk assessment under the Cartagena Protocol is to identify and evaluate the potential adverse effects of living modified organisms on the conservation and sustainable use of biological diversity in the likely potential receiving environment, taking also into account risks to human health. The Cartagena Protocol was a pioneer in formulating principles of risk assessment as well as integrating precaution into the assessment of risks posed by new technologies such as biotechnology:

3. Risk assessment should be carried out in a scientifically sound and transparent manner and can take into account expert advice of, and guidelines developed by, relevant international organizations.

4. Lack of scientific knowledge or scientific consensus should not necessarily be interpreted as indicating a particular level of risk, an absence of risk, or an acceptable risk.

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24 N. de Sadeleer, Environmental Principles: From Political Slogans to Legal Rules (2002), at 158.

25 As an example, it is interesting to point out that the WTO Appellate Body in the case EC – Measures Concerning Meat and Meat Products (Hormones) noted that the risk mentioned in Art 5, para 1 of the SPS Agreement was not only a 'risk ascertainable in a science laboratory', but also a 'risk in human societies as they actually exist, in other words, the actual potential for adverse effects on human health in the real world where people live and work and die', see infra. The Appellate Body thus affirmed that the scientific evidence which the European Communities referred to did not concern the type of hormone at stake; for this reason risk assessment was deemed insufficient. See the Report of the Appellate Body, paras 187 and 199–200, available at <http://www.wto.org>.
5. Risks associated with living modified organisms or products thereof, namely, processed materials that are of living modified organism origin, containing detectable novel combinations of replicable genetic material obtained through the use of modern biotechnology, should be considered in the context of the risks posed by the non-modified recipients or parental organisms in the likely potential receiving environment.

6. Risk assessment should be carried out on a case-by-case basis. The required information may vary in nature and level of detail from case to case, depending on the living modified organism concerned, its intended use and the likely potential receiving environment.²⁶

The Cartagena Protocol goes further by identifying a methodology for the risk assessment of risks deriving from modern biotechnology. Annex III of the Protocol emphasizes the importance of precaution by making clear that ‘The process of risk assessment may on the one hand give rise to a need for further information about specific subjects, which may be identified and requested during the assessment process, while on the other hand information on other subjects may not be relevant in some instances.’ Risk assessment is based on the following steps:

1) An identification of any novel genotypic and phenotypic characteristics associated with the living modified organism that may have adverse effects on biological diversity in the likely potential receiving environment, taking also into account risks to human health.

2) An evaluation of the likelihood of these adverse effects being realized, taking into account the level and kind of exposure of the likely potential receiving environment to the living modified organism.

3) An evaluation of the consequences should these adverse effects be realized.

4) An estimation of the overall risk posed by the living modified organism based on the evaluation of the likelihood and consequences of the identified adverse effects being realized.

5) A recommendation as to whether or not the risks are acceptable or manageable, including, where necessary, identification of strategies to manage these risks.

6) Where there is uncertainty regarding the level of risk, it may be addressed by requesting further information on the specific issues of concern or by implementing appropriate risk management strategies and/or monitoring the living modified organism in the receiving environment.²⁷ (emphasis added)

It is important to note that these steps do not constitute a risk assessment in itself. They are only ‘risk assessment techniques’ to refer to the terminology used in the

²⁷ Ibid.
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Agreement on Sanitary and Phytosanitary Measures (SPS Agreement). The Panel in the EC – Biotech case recalled, for instance, the distinction to be made between a ‘risk assessment per se and ‘risk assessment techniques’ taken into account in a process of risk assessment:

To the extent the European Communities is arguing that there is no requirement to assess 'risks', we disagree. By its own terms, Article 5.1 requires [WTO] Members to base their SPS measures on an appropriate assessment 'of the risks to human, animal or plant life or health.' The immediate context of Article 5.1 confirms this view. Article 5 is captioned ‘Assessment of Risk and Determination of the Appropriate Level of Sanitary or Phytosanitary Protection.’ Moreover, Articles 5.2 and 5.3 of the SPS Agreement specify relevant factors to be taken into account by Members in the assessment of risks and 'in assessing the risk to animal or plant life or health.' Finally, Article 5.7 of the SPS Agreement provides that in circumstances where relevant scientific evidence is insufficient and a Member has adopted a provisional SPS measure based on available pertinent information, it must seek to obtain the additional information necessary for a more objective assessment of 'risk'...As the European Communities points out, Article 5.1 provides that Members must base their SPS measures on an appropriate assessment of risks, ‘taking into account risk assessment techniques developed by relevant international organizations.’ In our view, the phrase ‘taking into account risk assessment techniques developed by relevant international organizations’ does not address the issue of whether risks are to be assessed, but rather how risks are to be assessed. This is clear from the reference to 'techniques' of risk assessment. Contrary to the European Communities, we therefore do not consider that the phrase in question supports the view that no assessment of risks is required. To the contrary, the phrase in question would, in our view, be unnecessary if there were no requirement to assess risks. (emphasis added)

The components of a precautionary risk assessment have been specifically analysed in a case brought before the Court of First Instance of the European Community, the Pfizer Animal Health v Council of the Europe Union case. Pfizer submitted that the contested European regulation should be annulled, since the European Community institutions had made errors in the assessment.

28 For a comparison of the provisions on risk assessment and precaution in the Cartagena Protocol on Biosafety and the Agreement on Sanitary and Phytosanitary Measures (SPS Agreement), see Oliva, 'The Cartagena Protocol on Biosafety and the Agreement on Sanitary and Phytosanitary Measures: What will Decisions Regarding GMOs have to be Based on?' (2002) 13 Int'l Legal Perspectives 22. The SPS Agreement is available at <http://www.wto.org>. See, for instance, Art 5.1 of the SPS Agreement: 'Members shall ensure that their sanitary or phytosanitary measures are based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organizations. See infra the notion of risk analysis under the Codex Alimentarius Procedural Manual.


and management of the risks to human health associated with the use of virginiamycin as a growth promoter, as well as in their application of the precautionary principle.

Let us recall that the Preamble to the contested regulation shows that the European Council, in adopting the measure, took the view that the use of virginiamycin as an additive in feedingsuffs involved a risk to human health and that, accordingly, it was necessary to withdraw the authorizations to use the product. Both parties to the dispute admitted that, at the time of the adoption of the contested regulation, neither the reality nor the seriousness of the risk had been scientifically proven. It was against that background that the Council relied on the precautionary principle as justification for adopting the regulation.

Pfizer did not dispute that, in principle, the Community institutions may take preventive measures if, following a risk assessment, it is found that the use of an antibiotic, such as virginiamycin, as a growth promoter in animals involves a risk of a transfer of antimicrobial resistance from animals to humans and, consequently, of a reduction in the effectiveness of certain medicinal products used in human medicine for the treatment of dangerous infections. However, Pfizer maintained that the Community institutions did not correctly assess that risk, and argued essentially that these institutions had made their decision for reasons of political expediency without a proper scientific basis. For Pfizer:

the Community institutions must show that the risk, although it has not actually become a reality, is nevertheless probable. The existence of a very remote risk should be allowed given the concrete positive elements arising from the use of the product concerned. In any event, the Community institutions cannot legitimately apply a test which Pfizer describes as a zero risk test. Such a test is inappropriate since it is impossible to satisfy. It amounts essentially to requiring probatio diabolica from the industry, something which is recognized as unlawful in all the legal systems of the Member States... It is never possible to prove conclusively that a chemical or pharmaceutical compound or anything created by modern technology represents a zero risk to public health now or that it will do so in the future. To apply such a test would quickly lead to the paralysis of technological development and innovation.

The Council of the European Union considered for its part that the contested regulation was adopted on the basis of an adequate assessment of the scientific knowledge available at the time of its adoption. The Council confirmed that any such measure withdrawing authorization cannot be based on a test described as zero risk. However, the fact that the competent authorities had, at a given time, considered that a particular additive meets the conditions for authorization and have therefore authorized it does not imply that the manufacturer is freed from

32 Pfizer Animal Health v Council of the Europe Union, supra note 30, para 130.
the onus of proving that its product continues to meet such conditions. In the view of the Council:

Scientific knowledge and the risks to human health associated with use of a particular product evolve. Consequently, when faced with new scientific evidence that the use of an additive poses a hazard to public health and that the hazard has reached alarming proportions since the additive was first authorized, the Community institutions are fully entitled to require the manufacturer in question to demonstrate that its product continues not to represent a risk to human health.33

The Court of First Instance, in a very interesting and detailed dictum, explained the purpose of a risk assessment in cases where the precautionary principle finds application:

It is appropriate to bear in mind that, as the Court of Justice and the Court of First Instance have held, where there is scientific uncertainty as to the existence or extent of risks to human health, the Community institutions may, by reason of the precautionary principle, take protective measures without having to wait until the reality and seriousness of those risks become fully apparent... It follows, first, that as a result of the precautionary principle, as enshrined in Article 130r(2) of the Treaty, the Community institutions were entitled to take a preventive measure regarding the use of virginiamycin as an additive in feedstuffs, even though, owing to existing scientific uncertainty, the reality and the seriousness of the risks to human health associated with that use were not yet fully apparent. A fortiori, the Community institutions were not required, for the purpose of taking preventive action, to wait for the adverse effects of the use of the product as a growth promoter to materialize... Thus, in a situation in which the precautionary principle is applied, which by definition coincides with a situation in which there is scientific uncertainty, a risk assessment cannot be required to provide the Community institutions with conclusive scientific evidence of the reality of the risk and the seriousness of the potential adverse effects were that risk to become a reality... However, it is also clear from the case-law that a preventive measure cannot properly be based on a purely hypothetical approach to the risk, founded on mere conjecture which has not been scientifically verified.34

And the Court of First Instance went on to conclude that:

The precautionary principle can therefore apply only in situations in which there is a risk, notably to human health, which, although it is not founded on mere hypotheses that have not been scientifically confirmed, has not yet been fully demonstrated. In such a situation, risk thus constitutes a function of the probability that use of a product or a procedure will adversely affect the interests safeguarded by the legal order. Hazard (danger) is, in this context, commonly used in a broader sense and describes any product or procedure capable of having an adverse effect on human health (see in that regard, at an international level, the provisional communication from the Codex Alimentarius Commission of the Food and Agriculture Organization of the United Nations and the World Health

33 Ibid, para 134.
34 Ibid, paras 139–43.
Consequently, in a case such as this, the purpose of a risk assessment is to assess the degree of probability of a certain product or procedure having adverse effects on human health and the seriousness of any such adverse effects.\(^{35}\)

2. The 'Damage' Criterion

Once the decision-maker has an idea of the likelihood of occurrence of the suspected risk, he will naturally reflect on the possibilities of shielding himself from it. Must this risk be reduced or even eliminated regardless of the importance or severity of damage it could provoke? Or on the contrary, is intervention required only if what is at stake is worth the effort? His attitude is obviously subject to variations according to the probability of occurrence and especially to the importance of damage.

The terminology used to denote damage in international instruments varies. Reference can be made directly to the concept of damage.\(^ {36}\) Some instruments refer to the concept of 'impact'.\(^ {37}\) In spite of these terminological variations, the formulation of precaution in international instruments embodies an original, if not special, concept of damage. The latter is usually bound to a threshold of severity, which limits the application of the precautionary principle. This threshold usually invokes concepts such as 'severity' and 'irreversibility'. The 'damage' criterion is an important element of the definition of precaution, even though it is intrinsically linked to the risk criterion.

3. The 'Scientific Uncertainty'Criterion

(a) Content and meaning of the criterion

Whenever precaution is formulated in an international instrument, the criterion of scientific uncertainty is bound to it. The element of uncertainty is a sine qua non condition to the application and even to the legitimacy of the precautionary principle.\(^ {38}\) Indeed, the latter differs from the principle of prevention precisely in its reference to the aforementioned element. The 'preventive model' is forced to depend constantly on science and its expertise, the only way to allow for a certain

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\(^{35}\) Ibid., paras 146–8.

\(^{36}\) See Principle 15 of the Rio Declaration on Environment and Development: ‘Where there are threats of serious or irreversible damage.’ The Rio Declaration is also available at <http://www.unep.org>. See also the United Nations Framework Convention on Climate Change: ‘Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures’ (available at <http://www.unfccc.int>).

\(^{37}\) See the Convention on the Protection and Use of Transboundary Watercourses and International Lakes: ‘The precautionary principle, by virtue of which action to avoid the potential transboundary impact of the release of hazardous substances shall not be postponed’ (available at <http://www.unece.org>).

objectivization of the risks taken. Yet if prevention’s strength is found in its reference to scientific knowledge, this also reveals its limitations. If risk is known, preventive measures can be taken in full knowledge of the situation. Prevention is only possible for known phenomena. It is difficult to prevent what is unfamiliar, and even more difficult to do so with the unknown.39

To denote scientific uncertainty, international instruments refer to ‘the absence of complete scientific certainty’,40 ‘the absence of absolute scientific certainty’,41 or even ‘uncertain, unreliable, or inadequate data’ and ‘the lack of adequate scientific data’.42 However, a precautionary measure must be anchored to a minimum level of knowledge, a basis of scientific data presenting a certain consistency.43

(b) Scientific uncertainty versus predictability in risk analysis: the case of the WTO

Risk and, more especially, uncertain risk constitute an important foundation of precaution. The application of precautionary measures needs to be applied to the whole procedure of risk analysis, which is based on the cumulative combination of risk assessment, risk management, and risk communication. Precaution can be implemented through these three distinct but often overlapping and interacting phases. However, in areas such as international trade law, the precautionary implementation of these concepts may be confronted by the issue of predictability.

Multilateral environmental agreements (MEAs) with potential trade implications such as the Cartagena Protocol on Biosafety or the Stockholm Convention on Persistent Organic Pollutants (POPs)44 enunciate rights and obligations dealing with trade. These agreements imply de jure and de facto that a party to these MEAs who is also a WTO member may be in a situation whereby it has to impose import restrictions regarding products which pose a scientifically uncertain risk for the environment and for public health. There might thus be a conflict between precautionary policies and measures and rules of the global trade regime, and especially of the WTO.

43 See for instance the Convention for the Protection of the Marine Environment of the North-East Atlantic, available at <http://ec.europa.eu/world/agreements>, according to which the precautionary principle should be applied when there are ‘reasonable grounds for concern that substances or energy introduced into the marine environment’ may cause hazards.
The WTO has built much of its credibility as the central arbiter and steward of the multilateral trade system on its claim of predictability. This has led to a quite specific understanding of the notion of risk in the trade community. The weight given to the concepts of ‘scientifically identified risk’ or ‘identifiable risk’ by the Panel in the Hormones case is illustrative of such a tendency.45 This being said, one must note that the Appellate Body has contextualized and elaborated on the term ‘scientifically identified risk’ used by the above-mentioned panel:

It is not clear in what sense the Panel uses the term ‘scientifically identified risk’. The Panel also frequently uses the term ‘identifiable risk’, and does not define this term either. The Panel might arguably have used the terms ‘scientifically identified risk’ and ‘identifiable risk’ simply to refer to an ascertainable risk: if a risk is not ascertainable, how does a Member ever know or demonstrate that it exists? In one part of its Reports, the Panel opposes a requirement of an ‘identifiable risk’ to the uncertainty that theoretically always remains since science can never provide absolute certainty that a given substance will not ever have adverse health effects. We agree with the Panel that this theoretical uncertainty is not the kind of risk which, under Article 5.1, is to be assessed. In another part of its Reports, however, the Panel appeared to be using the term ‘scientifically identified risk’ to prescribe implicitly that a certain magnitude or threshold level of risk be demonstrated in a risk assessment if an SPS measure based thereon is to be regarded as consistent with Article 5.1. To the extent that the Panel purported to require a risk assessment to establish a minimum magnitude of risk, we must note that imposition of such a quantitative requirement finds no basis in the SPS Agreement. A panel is authorized only to determine whether a given SPS measure is ‘based on’ a risk assessment. As will be elaborated below, this means that a panel has to determine whether an SPS measure is sufficiently supported or reasonably warranted by the risk assessment.46

The WTO Appellate Body has abstained so far from pronouncing itself on the legal status of the precautionary principle and has refused, as a result, to recognize its prevalence over rights and obligations contained in the WTO Agreements—and particularly the Agreement on Sanitary and Phytosanitary Measures. Nevertheless, it has considered it as a principle contained in the corpus juris in force within the WTO, for example in Article 5.7 of the SPS Agreement.47 As such, precaution appears as a right under the WTO SPS Agreement. Indeed, the Panel in the EC – Biotech case recognized that:

47 Article 5.7 reads as follows: ‘In cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information, including that from the relevant international organizations as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time.’ On this article, see Mbengue, supra note 15.
Article 5.7 should be characterized as a *right* and not an exception from a general obligation. The view that Article 5.7 is not an exception in the nature of an affirmative defence is also consistent with the statement by the Appellate Body in *Japan – Agricultural Products II* that 'Article 5.7 operates as a *qualified* exemption from the obligation under Article 2.2 not to maintain SPS measures without sufficient scientific evidence.' Had the Appellate Body been of the view that Article 5.7 operates as an exception under which an importing Member could justify an inconsistency with an applicable obligation, it would, in our view, have been more natural and appropriate to use the term 'exception' rather than the term 'exemption', as the term 'exemption' connotes freedom from, and hence inapplicability of, an obligation.48

Other elements militate in favour of an application of precaution in the treatment of risk by the WTO.49 The Panel in the *Asbestos* case admitted that it is not possible to require a level of absolute certainty from a Member who wishes to invoke Article XX of the GATT:

> to make the adoption of health measures concerning a definite risk depend upon establishing with certainty a risk… would have the effect of preventing any possibility of legislating in the field of public health.50

The interpretation of the scope of risk assessment by the WTO dispute settlement bodies has also given space to the acceptance of a precautionary treatment of risk in the WTO framework. The case *Australia – Measures Affecting Importation of Salmon* provided an opportunity for the Appellate Body to explain that 'the “risk” evaluated in a risk assessment must be an ascertainable risk… This does not mean, however, that a Member cannot determine its own appropriate level of protection to be “zero risk”.'51 Finally, the evaluation of risk on which a measure is based can include non-quantifiable data of a factual or qualitative nature and is not exclusively limited to purely quantitative scientific data. This interpretation was given in the *Hormones* case by the Appellate Body of the WTO which rejected the initial interpretation of the Panel, according to which the evaluation of risk would have to be quantitative and establish a minimum level of risk.52 These elements relating to the precautionary approach

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show that, despite the importance of predictability in the multilateral trading system, there is room for precautionary concerns.\textsuperscript{53}

This recognition of precautionary concerns, however, has so far had a limited impact—as can be seen from the evolution of WTO case law since the Hormones case. Indeed, the criterion of scientific uncertainty which is at the core of precaution does not \textit{per se} trigger the application of SPS Article 5.7. This has been shown particularly in the \textit{Japan - Apples} case in which the Appellate Body ruled that:

The application of Article 5.7 is triggered not by the existence of scientific uncertainty, but rather by the insufficiency of scientific evidence. The text of Article 5.7 is clear: it refers to ‘cases where relevant scientific evidence is insufficient’, not to ‘scientific uncertainty’. The two concepts are not interchangeable. Therefore, we are unable to endorse Japan’s approach of interpreting Article 5.7 through the prism of ‘scientific uncertainty’.\textsuperscript{54}

(emphasis added)

4. The 'Different Capacities' Criterion

The risk, damage, and scientific uncertainty criteria would \textit{a priori} justify the application of the precautionary principle. But a certain number of international instruments stipulate that measures of precaution apply \textit{a posteriori} according to the concerned states' capacities to deal with the problem. Acknowledging capacity permits one to relate the precautionary principle to a proportional approach in light of a state's economic, social, and technological means. Precautionary measures do not aim to paralyze human activity. A measure of rationality and reason must guide the application of precaution. It is obvious that states at different stages of development cannot be submitted to the same requirements. \textit{A fortiori}, precautionary measures can therefore be expected to vary from one state to another.

2. The Precautionary Principle and Public Participation

The precautionary principle does not stand alone, but is interwoven with other international law norms and principles. This is the case in regard to the principle of public participation. The link between public participation and the


\textsuperscript{54} Japan - Measures Affecting the Importation of Apples, Report of the Appellate Body, 26 November 2004, WT/DS245/AB/R, para 184. However, some commentators consider that, while uncertainty does not in itself trigger Art 5.7, it constitutes an essential element in determining whether or not the quality of the scientific evidence is sufficient for an adequate assessment of risks under the SPS Agreement. See eg Center for International Environmental Law \textit{et al}, \textit{Amicus Brief to the EC - Biotech Case}, see \textit{supra} note 29, June 2004. For the text of Art 5.7 of the SPS Agreement see \textit{supra} note 47.
The precautionary principle is justified by the fact that the determination of a tolerable risk level generally requires the involvement of the public in one way or another. The principle of public participation is stated in Principle 10 of the Rio Declaration on Environment and Development:

Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

This principle benefits from the dynamism implicit in the precautionary principle. The management of the uncertainty linked to human activity must not become solely the prerogative of public decision-makers. The precautionary principle upsets traditional decision-making processes by requiring increased transparency. Precaution considered as the symbiosis of technical, scientific, social, economic, cultural, political, and legal norms involves a plurality of agents. To do so, the implementation of the precautionary principle must give rise to an effective and efficient application of the principle of public participation. The state cannot be the only agent responsible for the evaluation of whether precaution should be applied in a particular situation. Scientists, companies, NGOs, local populations, and other concerned agents must participate in the decision-making process. In addition, adequate information as a corollary to participation guarantees a transparent decision-making process. As said by Marie-Angèle Hermite, the precautionary principle is the bearer of 'a subversive capacity for the whole of the legal order and leads the way to democratic renewal'.

A. Access to Information, Public Participation, and the Notion of Risk in the Context of the Cartagena Protocol on Biosafety and of the Codex Alimentarius

As emphasized earlier, the precautionary principle has an impact on the way public decisions are made. Another point to be highlighted is that the precautionary principle does not dictate a particular outcome and requires an ongoing debate between science and politics. The notion of risk analysis encapsulates the

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evolutive interaction between science and politics. There is a requirement of a constant re-evaluation of the risk, which means that precautionary measures should constantly be refined.

The outcome of a risk analysis should be the choice of an acceptable level of risk for a specific community. This choice of an acceptable level of risk requires a social debate. Such an understanding of the values underpinning a risk analysis process is reflected *en filigrane* in the dictum of the Appellate Body in the *Hormones* case:

'a *scientific* process aimed at establishing the *scientific* basis for the sanitary measure a Member intends to take.' To the extent that the Panel intended to refer to a process characterized by systematic, disciplined and objective enquiry and analysis, that is, a mode of studying and sorting out our facts and opinions, the Panel’s statement is unexceptionable. However, to the extent that the Panel purports to exclude from the scope of a risk assessment in the sense of Article 5.1 [of the SPS Agreement], all matters not susceptible of quantitative analysis by the empirical or experimental laboratory methods commonly associated with the physical sciences, we believe that the Panel is in error. Some of the kinds of factors listed in Article 5.2 [of the SPS Agreement] such as 'relevant processes and production methods' and 'relevant inspection, sampling and testing methods' are not necessarily or wholly susceptible of investigation according to laboratory methods of, for example, biochemistry or pharmacology. Furthermore, there is nothing to indicate that the listing of factors that may be taken into account in a risk assessment of Article 5.2 was intended to be a closed list. It is essential to bear in mind that the risk that is to be evaluated in a risk assessment under Article 5.1 is not only risk ascertainable in a science laboratory operating under strictly controlled conditions, but also risk in human societies as they actually exist, in other words, the actual potential for adverse effects on human health in the real world where people live and work and die.  

There are different ways of stimulating a public debate; there are no prefixed rules on this matter. However, what can be stated is that access to information and participation in the relevant decision-making processes are two important pillars for a meaningful social debate to take place and have been identified as such under international law. Their satisfaction relates to the legitimacy of a decision-making process and its sound implementation.

The precautionary principle does not prescribe a totally restrictive approach, nor does it allow for a totally permissive approach to the regulation of new technologies. It requires an approach somewhere in between: tempering the permissive approach through the taking into account of risks which are uncertain. This permits a sound decision to be made based on adequate risk assessment.

Political entities are responsible for making adequate decisions in terms of risk assessment and risk management, as was clearly recognized by the Appellate Body in the *Hormones* case:

We do not believe that a risk assessment has to come to a monolithic conclusion that coincides with the scientific conclusion or view implicit in the SPS measure. The risk

assessment could set out both the prevailing view representing the ‘mainstream’ of scientific opinion, as well as the opinions of scientists taking a divergent view. Article 5.1 does not require that the risk assessment must necessarily embody only the view of a majority of the relevant scientific community. In some cases, the very existence of divergent views presented by qualified scientists who have investigated the particular issue at hand may indicate a state of scientific uncertainty. Sometimes the divergence may indicate a roughly equal balance of scientific opinion, which may itself be a form of scientific uncertainty. In most cases, responsible and representative governments tend to base their legislative and administrative measures on ‘mainstream’ scientific opinion. In other cases, equally responsible and representative governments may act in good faith on the basis of what, at a given time, may be a divergent opinion coming from qualified and respected sources. By itself, this does not necessarily signal the absence of a reasonable relationship between the SPS measure and the risk assessment, especially where the risk involved is life-threatening in character and is perceived to constitute a clear and imminent threat to public health and safety. Determination of the presence or absence of that relationship can only be done on a case-to-case basis, after account is taken of all considerations rationally bearing upon the issue of potential adverse health effects.\(^59\)

The public should be able to express its viewpoint at both the risk assessment and risk management stages. This is foreseen through the concept of risk communication, a crucial tool for providing information about risks. In this regard, it is noteworthy that the Appellate Body in the Asbestos case implicitly acknowledged the role of the viewpoint of the consumers:

We consider it likely that the presence of a known carcinogen in one of the products would have an influence on consumers’ tastes and habits regarding that product. We believe this to be true irrespective of whether the consumer of the cement-based products is a commercial party, such as a construction company, or is an individual, for instance, a do-it-yourself (DIY) enthusiast or someone who owns or lives or works in a building. This influence may well vary, but the possibility of such an influence should not be overlooked by a panel when considering the ‘likeness’ of products containing chrysotile asbestos—... We consider it likely that the presence of a known carcinogen in one of the products will have an influence on consumers’ tastes and habits regarding that product. It may be, for instance, that, although cement-based products containing chrysotile asbestos fibres are capable of performing the same functions as other cement-based products, consumers are, to a greater or lesser extent, not willing to use products containing chrysotile asbestos fibres because of the health risks associated with them.\(^60\) (emphasis added)

It is also important to note the way the concepts of risk assessment, risk management, and risk communication have found a place within the context of the Cartagena Protocol on Biosafety. As noted earlier, this instrument is a good example of the operationalization of the precautionary principle, specifically in the area of biotechnology. The Protocol deals with the exchanges of genetically

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\(^{59}\) *Ibid*, para 194.

modified organisms (GMOs), considered as products that pose certain potential risks. It establishes strict procedures aimed at regulating the international trade of GMOs. Annex III of the said instrument provides for an assessment of the scientific uncertainties with respect to a GMO product.61

The Protocol contains provisions on access to information. Article 20 provides for an ‘Advance Informed Agreement’ (AIA) procedure. The most rigorous procedures are reserved for GMOs that are to be introduced intentionally into the environment. These include GMOs that are destined to grow and that have the potential to pass their modified genes on to succeeding generations. Under the AIA procedure, the exporter starts by giving the government of the importing country detailed written information, including a description of the organism, in advance of the shipment. The competent national authorities of the importing country acknowledge receipt of this information within 90 days and then explicitly authorize the shipment within 270 days or state their reasons for rejecting it.

The AIA procedure enables recipient countries to assess risks that may be associated with a GMO before agreeing to import it. The AIA procedure does not apply to GMOs in transit through a country, GMOs destined for contained use (in a scientific laboratory for example), or to GMOs to be directly used as food or animal feed or for processing. A country may, however, under its domestic regulatory framework, and consistently with the objective of the Protocol, decide to subject such GMOs to risk assessment and other requirements.

Article 21, paragraph 1 deals with confidential information and provides that ‘the Party of import shall permit the notifier to identify information in the context of an AIA procedure submitted under the procedures of this Protocol or required by the Party of import as part of the advance informed agreement procedure of the Protocol that is to be treated as confidential. Justification shall be given in such cases upon request.’ This means that the recipient country may, if a justification exists, keep certain information about GMOs confidential. This means a contrario that there is information which is not confidential.

Article 23 of the Protocol deals specifically with the issue of public awareness and participation, encouraging states to involve non-state actors in national decisions on GMOs. It calls for cooperation on promoting public awareness of safe transfer, handling, and use of GMOs. It also underlines the need for education, thus contributing to transparency and informed decision-making.

Article 26 deals with socio-economic considerations. Not only should the Parties to the Protocol consult the public, in accordance to Article 23, but they may take into account ‘socio-economic considerations arising from the impact of living modified organisms on the conservation and sustainable use of biological

61 See supra note 13.
diversity, especially with regard to the value of biological diversity to indigenous and local communities. Moreover, Article 26, para 2 encourages the Parties to cooperate on research and information exchange on any socio-economic impacts of living modified organisms, especially on indigenous and local communities.

Another instrument which clarifies the notion of risk analysis is the Codex Alimentarius. The Codex Alimentarius Procedural Manual provides for an understanding of what is meant by risk analysis or risk regulation. To this end, three distinct processes are envisaged: (1) risk assessment, concerning the scientific understanding of the potential risk; (2) risk management, regarding the taking into consideration of the various alternatives for regulators and policymakers in order to reduce or eliminate the risk; and (3) risk communication, dealing with the exchange of information between the most important stakeholders. The Manual defines each of the components of a risk analysis:

**Risk Assessment:** A scientifically based process consisting of the following steps: (i) hazard identification, (ii) hazard characterization, (iii) exposure assessment, and (iv) risk characterization.

**Risk Management:** The process, distinct from risk assessment, of weighing policy alternatives, in consultation with all interested parties, considering risk assessment and other factors relevant for the health protection of consumers and for the promotion of fair trade practices, and, if needed, selecting appropriate prevention and control options.

**Risk Communication:** The interactive exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions, among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions.

The notion of risk analysis includes inter alia uses, cost/benefit analysis, appropriateness of the measure, proportionality, preventive measures to avoid the uncertain risk, and risk communication covering interactive exchanges among the most important stakeholders. These processes are not sequential, but rather iterative and interdependent and have been construed to require adoption in a mutually supportive way. At the level of risk management, the Procedural Manual refers to the notion of ‘other legitimate factors relevant for the health protection of consumers and for the promotion of fair practices in food trade.’ This leaves room for the elaboration of international standards and guidelines reflecting those ‘other legitimate factors’. The

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62 The text of the Codex Alimentarius is available at <http://www.codexalimentarius.net>.
65 Ibid.
Codex Alimentarius Commission has developed 'Criteria for the Consideration of the Other Factors':

(i) when health and safety matters are concerned, the Statements of Principle Concerning the Role of Science and the Statements of Principle Relating to the Role of Food Safety Risk Assessment should be followed;

(ii) other legitimate factors relevant for health protection and fair trade practices may be identified in the risk management process, and risk managers should indicate how these factors affect the selection of risk management options and the development of standards, guidelines and related texts;

(iii) consideration of other factors should not affect the scientific basis of risk analysis; in this process, the separation between risk assessment and risk management should be respected, in order to ensure the scientific integrity of the risk assessment;

(iv) it should be recognized that some legitimate concerns of governments when establishing their national legislation are not generally applicable or relevant world-wide;

(v) only those other factors which can be accepted on a world-wide basis, or on a regional basis in the case of regional standards and related texts, should be taken into account in the framework of Codex;

(vi) the consideration of specific other factors in the development of risk management recommendations of the Codex Alimentarius Commission and its subsidiary bodies should be clearly documented, including the rationale for their integration, on a case-by-case basis;

(vii) the feasibility of risk management options due to the nature and particular constraints of the production or processing methods, transport and storage, especially in developing countries, may be considered; concerns related to economic interests and trade issues in general should be substantiated by quantifiable data;

(viii) the integration of other legitimate factors in risk management should not create unjustified barriers to trade; particular attention should be given to the impact on developing countries of the inclusion of such other factors.66

The concept of risk analysis, and in particular risk communication, requires further refinement. Two of its main facets are the right to access to information and the right to participate in the relevant decision-making processes as provided for by the Aarhus Convention. This Convention is analysed in the following section.

B. The Aarhus Convention and Genetically Modified Organisms (GMOs)

The 1998 Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters67 (hereinafter the 'Aarhus Convention') covers not only certain, but also uncertain risks

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deriving from human activities and the use of technologies in the environmental area. The Aarhus Convention was adopted under the auspices of the United Nations Economic Commission for Europe, which means that its membership is significantly more limited than the previous instruments mentioned. That said, the links established between public participation and GMOs are important to assess, as they reveal some of the social contours of the precautionary principle.

1. The Pillars of the Aarhus Convention

The main goal of the Aarhus Convention, as enunciated in Article 1, is 'to contribute to the protection of the right of every person of present and future generations to live in an environment adequate to his or her health and well-being.' For this purpose, the Convention enunciates three substantive pillars: (1) the right of access to environmental information; (2) the right to public participation in environmental decision-making; and (3) the creation of administrative and judicial mechanisms to restore environmental damage. In the context of the present contribution only the first two pillars will be dealt with.

The first pillar—the right of access to information—is a fundamental element of a democratic society. The right of access to information finds its expression in Article 4 of the Convention. Notably, environmental information may be requested from governmental entities without necessarily demonstrating the existence of an 'interest'. What renders the Aarhus Convention particularly interesting (and acclaimed by a broad range of NGOs) is that the definitions of both 'environmental information' and 'governmental entities' in the Convention are broader than most national standards. The Convention, however, provides also for a certain number of exceptions to the access to information regime. In particular, Member States have the discretionary power to refuse to disclose requested information, whenever the disclosure 'would adversely affect', in the state's view, interests covered by the exemptions. The exemptions are rather broad, including international relations, intellectual property rights, and the confidentiality of industrial and commercial interests.

The second pillar of the Convention permits the public to participate in governmental decision-making processes concerning the issuance of permits for activities likely to have an impact on the environment (Article 6). The dynamic of Article 6 imposes upon the Parties the obligation to inform their citizens early in the decision-making process of any initiative falling under the list of activities contained in Annex I of the Convention. Furthermore, the public has the right,

69 Art 4, para 1 of the Convention.  70 See Art 2, para 3 of the Convention.
in accordance with Article 6, para 7, to submit comments, information, analysis, or opinions considered as relevant for the concerned decision-making process.\textsuperscript{72}

2. The Special Status of GMOs in the Context of the Aarhus Convention

The issue of GMOs has received specific treatment in the context of the Aarhus Convention. Negotiations were highly charged with respect to this matter. Article 6, para 11 of the Convention states that '[e]ach Party shall, within the framework of its national law, apply, to the extent feasible and appropriate, provisions of this article to decisions on whether to permit the deliberate release of genetically modified organisms into the environment.' For a number of NGOs, this provision was considered too weak due to its flexible language and they thus called for stronger mechanisms to guarantee access to information and public participation on this matter. The outcome took the form of an amendment to the Aarhus Convention which was adopted in 2005. It has not yet entered into force. It reads as follows:

For the existing text of Article 6, paragraph 11, substitute:

11. Without prejudice to article 3, paragraph 5, the provisions of this article shall not apply to decisions on whether to permit the deliberate release into the environment and placing on the market of genetically modified organisms.

After article 6, insert a new article reading:

Article 6 bis

Public Participation in Decisions on the Deliberate Release into the Environment and Placing on the Market of Genetically Modified Organisms

1. In accordance with the modalities laid down in annex I bis, each Party shall provide for early and effective information and public participation prior to making decisions on whether to permit the deliberate release into the environment and placing on the market of genetically modified organisms.

2. The requirements made by Parties in accordance with the provisions of paragraph 1 of this article should be complementary and mutually supportive to the provisions of their national biosafety framework, consistent with the objectives of the Cartagena Protocol on Biosafety.\textsuperscript{73}

The contours of the access to information and public participation pillars with respect to GMOs have thus been specified and have given rise to a specific regime whereby, in comparison to other new technologies, more information and public participation are required. Given that GMOs have been dealt with through the Cartagena Protocol in a way that acknowledges scientific uncertainties and the


\textsuperscript{73} The text of the amendment is available at <http://www.unece.org/env/pp/>.
precautionary principle, the question that can be posed is whether the precautionary principle calls for more stringent measures with respect to access to information and public participation. Another question, of course, is whether other new technologies deserve a similar regime.

C. Practice in Litigation Fora

It is interesting to note that inter-state arbitration and investment arbitration cases have shed light on the contours of the right to information and the right to public participation with respect to other new technologies. Although the Aarhus Convention was not directly relevant in these cases, some of their features inform the concepts applied, including those of access to information and the right to public participation with respect to new technologies.

The issue of access to information by states with regard to new technologies has also become crucial in inter-state relationships. Two recent disputes between Ireland and the United Kingdom—Access to Information under Article 9 of the OSPAR Convention and Mox Plant—are perfect illustrations of this trend. The Mox Plant is designed for reprocessing and making mixed oxide (MOX) fuel from plutonium and uranium oxides. MOX technology, if not controlled, may give rise to risks of releases of radioactive materials, including in a liquid or gaseous form which would pose a significant threat to the environment.

In the Mox Plant case, Ireland argued that the United Kingdom’s failure to consult and cooperate fully and effectively with Ireland constituted irreparable prejudice to Ireland’s claimed right to such consultation and cooperation. Ireland alleged that the United Kingdom had failed to provide, on appropriate terms, with information relating to the operation of the Mox plant and of related facilities and of shipments to the plant, and generally to consult with Ireland on an intergovernmental basis, within the framework of Article 123 of the Convention [on the Law of the Sea], as a coriparian of the Irish Sea. It was in this vein that the International Tribunal for the Law of the Sea (ITLOS) ordered Ireland and the United Kingdom to cooperate and to enter into consultations in order to exchange further information with regard to possible consequences for the Irish Sea arising out of the commissioning of the Mox plant.

74 In the Access to Information under Article 9 of the OSPAR Convention case, Ireland relied on the Aarhus Convention but the Tribunal refused to apply it. See Permanent Court of Arbitration, Dispute concerning Access to Information under Article 9 of the OSPAR Convention, Final Award, 2 July 2003, para 104.
75 Ibid.
The importance of public participation in the management of environmental and sanitary risks deriving from technologies was also at stake in the Methanex case.\footnote{In the Matter of an International Arbitration under Chapter 11 of the NAFTA and the UNCITRAL Arbitration Rules between Methanex Corporation (Claimant/Investor) and United States of America (Respondent/NAFTA Party), Final Award of the Tribunal on Jurisdiction and Merits, 3 August 2003, available at <http://www.state.gov/documents/organization/51052.pdf> (last accessed 11 December 2007).} This case was an investment dispute between Canada-based Methanex Corporation and the United States, based on the provisions in the North American Free Trade Agreement’s (NAFTA) Chapter 11 on investment. Methanex is a major producer of methanol, a key component in MTBE (methyl tertiary butyl ether), which is used to increase oxygen content and act as an octane enhancer in unleaded gasoline. The company launched an international arbitration against the United States in response to a March 1999 order by the State of California to ban the use of MTBE by the end of 2002. California argued that banning MTBE was necessary because the additive was contaminating drinking water supplies, and was therefore posing a significant risk to human health and safety and the environment. Methanex argued in its original submission that the ineffective regulation and non-enforcement of domestic environmental laws, including the US Clean Water Act, were responsible for the presence of MTBE in California water supplies. The company argued that the planned ban was tantamount to an expropriation of the company’s investment.

On 9 August 2005, the Methanex Tribunal established under UNCITRAL Arbitration Rules issued an award dismissing all claims against the United States. One reason for the Tribunal’s dismissal of Methanex’s claims was based on the scientific evidence produced by a Report of the University of California (hereinafter the ‘UC Report’). In its Award, the Tribunal recalled that public hearings on the UC Report were held. At these hearings, the authors of the UC Report presented their findings, and government officials and members of the public (including MTBE and methanol producers) had an opportunity to ask questions and present oral testimony. The Tribunal pointed out that those testifying, amongst others, included persons affected by MTBE water contamination, as well as individuals associated with the chemical and oil industries, and considered that the testimony received at these public hearings indicated broad-based support for the finding by the University of California that MTBE usage in gasoline constituted a serious threat to California’s drinking water, and that a ban on the use of MTBE in California RFG was warranted. Of the 109 persons who testified, 69 were in favour of banning, 23 were against, and 17 testified on other issues.\footnote{Ibid, paras 17–18.}

Furthermore, the Tribunal noted that the 1999 Executive Order which prohibited the use of MTBE was stated as follows: ‘[t]he findings and recommendations of the U.C. report, public testimony and regulatory agencies are that, while MTBE has provided California with clean air benefits, because of leaking...'}
underground fuel storage tanks MTBE poses an environmental threat to groundwater and drinking water.\(^{80}\) In light of these elements, the Tribunal stated:

Having considered all the expert evidence adduced in these proceedings by both Disputing Parties, the Tribunal accepts the UC Report as reflecting a serious, objective and scientific approach to a complex problem in California. Whilst it is possible for other scientists and researchers to disagree in good faith with certain of its methodologies, analyses and conclusions, the fact of such disagreement, even if correct, does not warrant this Tribunal in treating the UC Report as part of a political sham by California. In particular, the UC Report was subjected at the time to public hearings, testimony and peer review; and its emergence as a serious scientific work from such an open and informed debate is the best evidence that it was not the product of a political sham engineered by California, leading subsequently to the two measures impugned by Methanex in these arbitration proceedings... It is convenient here to summarise the principal findings of fact which the Tribunal has made in regard to the scientific issues relating to MTBE: (1) The California ban on the oxygenate MTBE began as a policy decision of the California Senate which, as expressed in the California Bill, was contingent on the scientific findings of the UC Report and which was to be implemented by California in the light of its public hearings, testimony and peer review.\(^{81}\) (emphasis added)

The Tribunal added:

Legislation in democratic systems involves, by its nature, participation by a wide spectrum of private individuals and interest groups in addition to the members of the legislature and the executive, insofar as its endorsement is also necessary for a bill to become law. While there may be circumstances in which facts would support an inference that one 'invisible hand' was lurking behind and controlling a seemingly democratic process which had been elaborately contrived to conceal its machinations, it is clear beyond peradventure that the facts in the record do not warrant such an inference here.\(^{82}\)

Finally, it should be noted that the development of the right of access to information and the right to public participation has given rise to the emergence of new social and legal concepts in the field of the management of risks. One of these concepts is 'community pressure' which was clearly recognized in the Tecmed case, by an ICSID Tribunal established under the aegis of the Convention on the Settlement of Investment Disputes between States and Nationals of other States.\(^{83}\)

The authorities of the Municipality of Hermosillo were the direct target of 'community pressure'. The Municipality was one of INE's interlocutors at the time of consideration of the Permit's renewal. In view of the pressure that questioned the Municipality's grant of the permit to use the land where the Landfill was operated, the Municipality rendered an opinion on March 31, 1998, which explained that at the time of granting such permit the current legal provisions were not applicable and that those provisions came into force subsequently, establishing a minimum distance between landfills and urban centers which

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\(^{80}\) *Ibid*, para 18.  
\(^{82}\) *Ibid*, para 46.  
\(^{83}\) 575 UNTS 159, adopted 18 March 1965, entered into force 14 October 1966 (also known as the 'ICSID Convention' or the 'Washington Convention').
the Landfill did not comply with. However, the Municipality expressed its agreement with the community about the need to relocate Cytrar's hazardous waste landfill operation to a different site and its support to conduct an audit of operations to determine whether the Landfill's operation entailed any risks. That same day, the Health Commission of the Municipality rendered an opinion confirming that, although Cytrar's operation at the Las Viboras site met the legal requirements for functioning and there were no legal, ethical or logical arguments to seek the closing of the Landfill, all necessary efforts should be made to relocate Cytrar's operations.84 (emphasis added)

D. The Issue of Democratic Governance of a Society Facing New Technologies and their Use

Democracy is essential for allowing free scientific and technological progress. However, if it is true that science and democracy often complement each other, it is also true that science can escape the traditional checks and balances of democratic governance, by virtue of both its complexity and the lack of accountability mechanisms over the scientific community.

The restraints imposed by democratic governments on any form of power capable of challenging the state's institutions are of vital importance in order to limit the dangers of uncontrolled technological growth. For the first time in its history, humanity possesses today scientific and technological means powerful enough to lead to its destruction. This is true not only by reference to nuclear weapons and other new military technologies, but also in the field of environmental pollution, deforestation, and desertification, where new means of production increase the degree of exploitation of the world environment. This is why it has been said that 'we must decide first what society wants and needs—then tailor our technology to help where it can',85 in order to avoid the risk of being ruled by technology.86

The numerous uncertainties surrounding virtually all new technological activities constitute a threat to modern societies that can be faced through the recourse to a series of measures such as the accountability of science to the public and the obligation to reveal relevant information.87 This also raises the issue of which type

84 Técnicas Medioambientales Termed, SA v United Mexican States (Case No ARB(AF)/00/2), Award of May 29, 2003, para 109.
86 See further the chapter by Roger Brownsword in this volume.
87 This requirement has to be further specified in the human rights field. In the case Guerra v Italy (1998), adjudicated by the European Court of Human Rights, the applicants lived approximately one kilometre from a 'high risk chemicals factory' which produced fertilizers and other chemicals, when a series of accidents occurred. The Court stated that these environmental aspects adversely affected the private and family life of the applicant, thus violating Art 8 of the European Convention on Human Rights. The Court however did not state that there was a violation of Art 10, providing inter alia for a right to receive information without interference by the public authorities. European Court of Human Rights, Guerra and others v Italy, Judgment of 19 February 1998, Reports 1998-I, Case No 116/1996/735/932. The Court restated an opinion already expressed in Lopes Ostra v Spain, Judgment of 9 December 1994, Reports 1994, Case No 41/1993/436/51520.
of democratic principles should be promoted, i.e., representative democracy and/or participatory democracy controlled by the people's representatives. The challenge is not to be underestimated: new technologies are often extremely complex, and this can constitute a serious obstacle if they have to be placed within the reach of legislators only.88 Experts are gaining power but should not be left as the only masters of the rules of the game. This relates to the balance to be achieved between risk assessment and risk management, as explained by the Court of First Instance of the European Community in the above-mentioned Pfizer case:

A full risk assessment may require long and detailed scientific research. The case-law... shows that unless the precautionary principle is to be rendered nugatory, the fact that it is impossible to carry out a full scientific risk assessment does not prevent the competent public authority from taking preventive measures, at very short notice if necessary, when such measures appear essential given the level of risk to human health which the authority has deemed unacceptable for society. In such a situation, the competent public authority must therefore weigh up its obligations and decide either to wait until the results of more detailed scientific research become available or to act on the basis of the scientific information available. Where measures for the protection of human health are concerned, the outcome of that balancing exercise will depend, account being taken of the particular circumstances of each individual case, on the level of risk which the authority deems unacceptable for society. So, where experts carry out a scientific risk assessment, the competent public authority must be given sufficiently reliable and cogent information to allow it to understand the ramifications of the scientific question raised and decide upon a policy in full knowledge of the facts. Consequently, if it is not to adopt arbitrary measures, which cannot in any circumstances be rendered legitimate by the precautionary principle, the competent public authority must ensure that any measures that it takes, even preventive measures, are based on as thorough a scientific risk assessment as possible, account being taken of the particular circumstances of the case at issue. Notwithstanding the existing scientific uncertainty, the scientific risk assessment must enable the competent public authority to ascertain, on the basis of the best available scientific data and the most recent results of international research, whether matters have gone beyond the level of risk that it deems acceptable for society. That is the basis on which the authority must decide whether preventive measures are called for. Furthermore, a scientific risk assessment must also enable the competent authority to decide, in relation to risk management, which measures appear to it to be appropriate and necessary to prevent the risk from materialising.89

3. Concluding Remarks: Understanding Precaution through its Societal Dimension

'To be or not to be.' As is the case for any new regulative legal instrument, precaution is confronted with this existential query. In terms of positive law, courts and

88 Weeramantry, supra note 1, at 26–32.
89 Pfizer Animal Health v Council of the Europe Union, supra note 30, paras 160–3.
tribunals have thus far been reluctant to raise precaution in explicit terms to the rank of a principle of customary international law. As an example, the WTO Panel in the EC – Biotech case stated:

It appears to us from the Parties’ arguments and other available materials that the legal debate over whether the precautionary principle constitutes a recognized principle of general or customary international law is still ongoing. Notably, there has, to date, been no authoritative decision by an international court or tribunal which recognizes the precautionary principle as a principle of general or customary international law. It is correct that provisions explicitly or implicitly applying the precautionary principle have been incorporated into numerous international conventions and declarations, although, for the most part, they are environmental conventions and declarations. Also, the principle has been referred to and applied by States at the domestic level, again mostly in domestic environmental law. On the other hand, there remain questions regarding the precise definition and content of the precautionary principle… Since the legal status of the precautionary principle remains unsettled, like the Appellate Body before us, we consider that prudence suggests that we not attempt to resolve this complex issue, particularly if it is not necessary to do so. Our analysis below makes clear that for the purposes of disposing of the legal claims before us, we need not take a position on whether or not the precautionary principle is a recognized principle of general or customary international law. Therefore, we refrain from expressing a view on this issue.90

Another test for the precautionary principle’s viability in the international legal order is related to its intrinsic and extrinsic aptitude to play its role. Intrinsically, it must play its role as an original and singular legal technique if it is not to be overtaken by other legal techniques. Extrinsically, the precautionary principle must be able to live up to its societal dimension. If not, it risks being stripped of all normative legitimacy.

The precautionary principle triggers new reflection on the ‘social contract’. It proves that all attempts at social constructivism (that is, management of society according to a final and preordained plan) are destined to failure, or at least to serious questioning. Precaution brings with it a new trend: that of complexity, and therefore the questioning of all absolute assumptions which have long been the foundation of modern society. It takes place within a post-modern context, and is the bearer of several disturbances in the legal order.

The first is the remodelling of the interaction between law and science. The relativity of Cartesian dogma due to the appearance of new problems and challenges for the whole of humanity leads to a new mode of handling scientific expertise by law. Indirectly, it also leads to a rebalancing of the interaction between legal politics and science. Precaution speaks of a bond profoundly upset: science would be sought for the suspicions and doubts it raises rather than for the knowledge it offers.91 This is not a dilution of science, but a repositioning.

90 EC – Biotech case, supra note 29, paras 7.88–7.89.
Indeed, the precautionary principle will create another mode of interaction between normative processes and scientific expertise. The latter favours a new approach to law tending towards normative processes which are consolidated and renewed by the results obtained through scientific expertise held on an ongoing basis. This expertise calls for a constant adaptation of decision-making processes. This can be done through the adoption of protocols and amendments to existing instruments.92

The second is the remodelling of the law/economics interaction, linked to the cost which precaution could entail for a particular society. Precautionary measures can initiate a social psychosis which would kill initiative and innovation. Societies cannot allow such vagaries. To re-equilibrate the interaction between law and economy, the precautionary principle must be considered as a substantive element of 'sustainable development'. In this perspective its objective is not to halt economic activity, but to emphasize the necessity of integrating today's requirements in terms of environmental protection. As an element of sustainable development, the precautionary principle must strive for a 'durable better-being of humanity'93 in all its interpretations, not just its economic interpretation. Thereby, the precautionary principle can be the guarantor of activities which are 'economically viable, socially equitable and ecologically sustainable.'94

The precautionary principle also requires that one rethink the interaction between law and effectiveness. In other words, one must redefine effective mechanisms to implement and underwrite this new body of law, whose essence is 'soft'. The aim is to avoid veering into the arbitrary or excessive use of discretionary power in the application of the principle. Courts and tribunals are therefore asked to play a fundamental role in determining or instituting the contours of the precautionary principle. The objectivization of the elements of this principle must depend on a body which will arbitrate between the contradictory interests of society's different agents. Through this objectivization, the precautionary principle will permanently deserve its right of citizenship in international law.

Finally, the precautionary principle is an example of a particular interaction between national and international law. There is a 'contamination' of the

92. Ibid, at 198. N. de Sadeleer says: 'At first glance the precautionary principle seems to occupy a paradoxical position at the interface between science and normative decision-making. On one hand, it would reaffirm the primacy of political decision-making in determining the contents and timing of preventive measures, thereby limiting the role of scientists. On the other hand, although arising from a lack of scientific information, precaution calls for ever increasing scientific knowledge, thus serving to reinforce the power of experts and consequently the dependence of decision-makers on science. Scientific expertise, initially rejected as insufficient, would thereafter be sought to balance the scope of anticipatory measures.' (Environmental Principles, supra note 23, at 200–1).


94. Ibid, at 27.
domestic sphere by the international sphere expressed by a 'phenomenon of favorable emulation between international and national dimensions.'

95 The crises of contaminated blood and mad cow disease which erupted in European countries proved the precautionary principle's applicability in the international sphere, and required greater cooperation between states. But they also demonstrated its applicability in the domestic sphere,96 and confronted decision-makers with public opinion, which is increasingly exacting as to the measures that should be taken to manage the threats and risks of today.


96 See eg 'Conseil d'Etat, 28 juillet 2000, Association Force Ouvrière Consommateurs et autres, no 212115', in (2001–02) 86 Droit de l'environnement 46. See also Tribunal de Grande Instance d’Orléans, Jugement correctionnel sur les faucheurs d'OGM, 9 décembre 2005, in Ecole Nationale de la Magistrature, Dossier documentaire « justice, environnement, développement durable, risques industriels » (2006) 55; Supreme Court of India, Godavarman Thirumalpad v Union of India, 2002 (10 SCC 606)—the European Communities referred to this judgment of the Supreme Court of India in European Communities – Measures Affecting the Approval and Marketing of Biotech Products, supra note 29, para 7.79: 'the European Communities noted that the precautionary principle is one of the "salutary principles which govern the law of the environment" in India and has been applied by the Indian Supreme Court.'