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# Narrative of certitude for uncertainty normalisation regarding biotechnology in international organisations

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Narrative theory has gained prominence especially as a companion to social construction of reality (Fisher, 1987; Berger & Luckmann, 1965; Huegens, 2002). In matters of regulation and normalization, narratives socially and culturally construct relevant contingencies, uncertainties, values, and decision. Here, decision dynamics pit risk generators, bearers, bearers' advocates, arbiters, researchers and informers as advocates and counter advocates (Palmlund, 2009). the decision-relevant narrative components (actors, themes, scenes, plots and scripts) are ripe with normative implications since competing narratives create worldviews that prescribe means for making sense of experience and resolving conflicts (Heath, 1994). As will be discussed in this paper, competing narratives of risk assessment and the distribution of harms and benefits offer vital insights to conflicts concerning the efficacy and safety of biotechnology applications as social drama. the tensions of this drama arise from battles over how safe is safe enough (Fischhoff, Slovic, lichtenstein, read & Combs, 1978), and how fair is safe enough (rayner & Cantor, 1987). one set of norms prescribe and guide the functions and structures of conflict resolution: how advocates of competing perspectives engage to resolve conflict through decision-making infrastructures. A second cluster of norms centers on the logics of risk-centric decisions: the gathering and vetting of evidence, the application of premises, and the evaluation of solutions, whether more aggressive or cautious in the face of uncertainties. risks attached to genetically modified organisms (GMOs) are such that sense-making capacities based on uncontested and ample facts are scarce; scientific evidences and political interpretations that construct norms can contradict each other. In the conflict process, broad scientific and policy communities (« sound science » and « precautionary » advocates) compete to normalize this uncertainty by imbricating knowledge in larger cultural plots (Douglas, 1992). international GMO regulation principles in the course of the GMO controversy, two main norms have emerged at the international level, both of which encapsulate and are constructed by narratives of certitudes. one is enacted by sound

science proponents who approach risk analysis and decisions from the standpoint of a high-order scientific rationality; the principle of substantial equivalence (SEP) required at least to be sufficiently convincing to industry lies on a life norm that formulate no difference between conventional and modified organisms. This is contested by one that emerged from deliberative civil society arenas which emphasizes uncertainties in the nature and health-environmental impacts of GMOs: the precautionary principle (PP). in order to describe and analyse these phenomena, we propose that narratives are salient human communication norms. applying this approach to risk policy narratives competing to weigh international agri-food trade norms, this paper examines the main competitive narratives and vocabularies endorsed by proponents and critics of GMOs during the dispute that engaged the United States and the european Union over genetically modified organisms GMOs within the World Trade organization WTO and the United Nation Convention on Biological Diversity's Biosafety Protocol (Un CBD BSP) from 2001 to 2007. Science-based norms, in this way, are to be analysed as technological norms: as both processes and outcomes (Perriault & Vaguer, 2011). their capacity to create intercomprehension is challenged by members of individualist and egalitarian organisation (Tansey & O'Riordan, 1999). Profit cements individualist organisations while membership to egalitarian groups is voluntary and therefore fragile: such groups "will select and emphasize dangers based on the need to maintain membership. the logic of the argument is that the greater the danger, the greater the binding force it creates amongst the members" (p. 77). Both international organizations have each endorsed one of the narratives described, and decision heuristics that can foster scientific norms' complementarities over contradictions do not emerge. neither is inherently best but the principles of deliberative democracy serves society by forcing the public vetting a specific scientific community to the forefront of cultural interpretation of risk: the goal is to determine how and if these processes serve political outcomes in ways that constitutes evidence of a fully functioning society (Heath, 2006).

Les théories du récit se sont affirmées, notamment aux côtés de celles de la construction sociale de la réalité (Fisher, 1987; Berger & Luckmann, 1965; Huggens, 2002). En matière de régulation et de normalisation, les récits participent de la construction sociale et culturelle des contingences, incertitude, valeurs et décisions qui caractérisent celles-ci. Ici, les dynamiques de décision campent et font se mesurer les producteurs et les porteurs de risques, les arbitres et chercheurs en tant que partisans et opposants (Palmlund, 2009). Les éléments narratifs de la décision (acteurs, thèmes, scènes, intrigue, scénario) sont pétriés d'implications normatives étant donné que les récits rivaux construisent des représentations du monde prescriptives des manières de faire sens du vécu et de résoudre les conflits (Heath, 1994). Comme discuté dans ce texte, les récits entrant en compétition dans le cadre de l'évaluation et la qualification du risque ainsi que la distribution des dommages et bénéfices offrent une perspicacité unique sur les conflits portant sur l'efficacité et la sécurité des applications issues des biotechnologies compris comme fiction sociale. Les tensions de cette fiction émergent des batailles portant sur "how safe is safe enough" (Fischhoff, Slovic, Lichtenstein, Read & Combs, 1978), et "how fair is safe enough" (Rayner & Cantor, 1987). Un ensemble de normes précrivent et guident les fonctions et structures de résolution de conflit : de quelle manière les partisans des représentations et récits qui entrent en compétition se livrent dans le règlement de conflit dans le cadre d'infrastructures de prise de décision. Un second ensemble de normes concernent les logiques des décisions sur le risque: le rassemblement, le contrôle et les accords sur les preuves technoscientifiques, l'application des raisonnements de fond, et l'évaluation des solutions, soient-elles agressives ou prudentes face aux incertitudes identifiées. Les risques attachés aux organismes génétiquement modifiés (OGM) sont tels que les capacités sociales et culturelles, mais aussi politiques et organisationnelles de faire sens sur la base de faits incontestables sont une ressource rare. Dans ce processus de conflit, de larges communautés scientifiques et réglementaires (partisans de la science dite "robuste" et de celle dite "précautionneuse") rivalisent dans l'objectif de normaliser les incertitudes, en intégrant les connaissances scientifiques dans une plus large intrigue qu'est la culture (Douglas, 1992). Les principes internationaux de régulation du risque OGM. Dans le cours de la controverse OGM, deux grandes normes ont émergé dans l'espace réglementaire international, tous deux construits et renfermant des récits de certitude. L'un est endossé par les partisans de la science dite "robuste" qui fondent leur raisonnement sur la primauté de la rationalité scientifique; le principe dit "d'équi-

valence en substance" (PES) est forte sur l'industrie en tant qu'il est fondé sur une norme du vivant qui ne reconnaît pas de différence entre les organismes génétiquement modifiés et les conventionnels. Celui-ci est contesté par un autre construit par des arènes délibératives où la présence de la société civile est forte et la reconnaissance d'incertitudes quant à la nature et les effets des OGM est affirmée: le principe de précaution (PP). Dans l'objectif de décrire et analyser ces phénomènes de construction, de rivalité et d'opposition, nous proposons le récit comme étant une norme de la communication humaine entendue comme mise en sens de l'expérience et construction d'intercompréhension. Appliquant cette approche sur les récits et vocabulaires réglementaires du risque qui entrent en rivalité pour influencer les normes de commerce agroalimentaires, cet article examine les principales lignes de discours endossées par les partisans et opposants des biotechnologies au sein de l'organisation mondiale du commerce (OMC) et le protocole de biosécurité de la Convention des Nations unies pour la biodiversité (PNUD CBD NU) de 2001 à 2007. La normalisation à caractère scientifique, dans ce sens, est à interroger comme les normes technologiques, comme à la fois processus et résultat (Perriault & Vaguer, 2011). Les capacités d'intercompréhension sont grevées par les membres d'organisations individualistes et égalitaires notamment (Tansey & O'Riordan, 1999). L'idée de profit cimenter l'appartenance aux organisations individualistes, lorsque celle-ci est volontaire et donc fragile dans les organisations égalitaires: ces groupes "sélectionneront et insisteront sur des dangers sur la base des besoins du maintien de l'appartenance. La logique de l'argument consiste à dire que plus élevé est le danger, plus forte s'en trouvent les liens entre les membres" (p. 77). Les deux organisations internationales impliquées au premier chef construisent, endossent et maintiennent chacune des récits, principes, normes et logiques de décision qui ne permettent pas l'émergence de complémentarités entre normes réglementaires à caractère scientifique. Aucune heuristique de décision n'est en substance meilleure que l'autre, mais les fondements de la démocratie délibérative servent la société en poussant les communautés scientifiques au contrôle et jugement public: l'objectif est de déterminer comment et si ces processus servent les conséquences politiques d'une manière qui constitue des évidences d'une société fonctionnant pleinement (Heath, 2006).

## Narrative of certitude for uncertainty normalisation of biotechnology in international organisations.

### Overview

Risk taking and risk avoidance are timeless aspects of the human condition. They arise from humans' overriding need to feel safe. Connections between contemporary technological risks, and premodern conceptions of danger, pollution and taboo (understood as produced by a dialectic of forbidden and sacred symbolic grounds) have been thoroughly investigated by cultural theorists, after the seminal work of Mary Douglas, to bring to light that risks are selected by societies, endorsed by institutions, to maintain or challenge the dominant polity. Also, uncertainty appear intolerable to humans and sense-making, as both cognition and language, underpins their collective organization in the face of risks. A case can be made that, for these reasons, considerations of risk and safety (ranging from science to religion and philosophy, for instance) are elemental to thought, discourse and culture. Also, connected by nature to culturally-bound moral prescriptions (be they religious or secular), regulation norms regarding activities or products qualified as risks in a plural, globalized society are sensitive to radicalisation and conflicts. "Society is a complex of collectivities engaged in variously constructive dialogue and power resource distribution through meeting socially constructed and shared norm-based expectations whereby individuals seek to make enlightened choices in the face of risk, uncertainty, and reward/cost ambiguity." (Heath 2006, p. 96).

As a paradigmatic instance, emergent technologies involving life sciences and engineering have opened contemporary risk controversies. One of the most high-profile risk regulation conflict started in the 1990's, with the developpement of recombinant DNA technological applications to crop production. The technology allows to modify expressed traits of an organisms by integrating selected exogeneous genes (called transgenes) into its genome. This change in ways crop and food (highly cultural and symbolic grounds) are produced has been plotted by some in continuity with previous crop improvement technics (cross-breeding notably) and by others in rupture with them. Supporting the rupture plot option, questions regarding risks of genetic pollution (transgenes "flying" from GM crops to conventional crops and plants, thereby "contaminating" them in the sens of allowing potential and uncontrolled genetic mutations on these non-target species) emerged. This plot competes against the continuity ones which hold Progress as a cardinal value to conduct human collective action toward uncertainty reduction and safety. Normalization processes of living organisms were engaged to define what a GMO is and in that regard how its production, cultivation and trade are to be regulated. National, regional and international organisations with missions as various as the conflicts making the controversy have participated, according to a plurality of approaches, from literal translation and imposition of sound science precepts into policy to deliberative attempts.

GMO risk assessment necessarily positions "sound science" in terms of cultural interpretation and individual perceptions that affect the vagaries of risk tolerance. Cultural norms, infrastructures, dialogue, discourse, and decision making are key windows through which risk management and communication can be studied. Roles, policies, plans, and norms are created and enacted in the face of uncertainty, risk, and safety. Armies may be created to defend people—abate the risk of being successfully attacked, for instance. Moats can be dug. Armies can be put into offense as a means of pushing enemies back or away. They may be deployed in defense. Medical science can take risks, such as inoculation and challenging surgery, to reduce the risk of disease or physical harm—even death. And, roles such as emergency responders are created as a means of collectively managing risk. Guidelines of safe living are promulgated through risk communication campaigns. In these ways, broadly highlighted, the topic of risk, risk management, and risk communication become important for the consideration and investigation of communication scholars.

As part of that discussion, narrative theory has gained prominence especially as a companion to social construction of reality (Fisher, 1987; Berger & Luckmann, 1965; Huegens, 2002) as a logic of risk management decision making. As the social construction of risk analysis and relevant decisions, narratives socially and culturally construct contingencies, uncertainties, values, and decision norms relevant to risk regulation and normalization. In such matters, decision dynamics pit risk generators (biotech firms, biotech researchers), bearers (the world population and its natural environment), bearers' advocates, arbiters and regulators, researchers and informers as advocates and counter advocates (Palmlund, 2009). The decision-relevant narrative components (actors, themes, scenes, plots and scripts) are ripe with normative implications since competing narratives create worldviews that prescribe means for making sense of experience and resolving conflicts (Heath, 1994). As will be discussed in this paper, competing narratives of risk assessment, problem solution, and the distribution of harms and rewards offer vital insights to conflict and resolution concerning the efficacy and safety of biotechnology as social drama. The tensions of this drama arise from battles over how safe is safe enough (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978), and how fair is safe enough (Rayner & Cantor, 1987). In such matters, narrative theory offers a rich approach as it necessarily casts decisions into the future, one fraught with uncertainty and contests over harm and benefit.

The social construction of risk decision making centers on the normative balance of risk reward/benefit and harm. This dialectic cuts many ways. One set of norms prescribe and guide the functions and structures of conflict resolution; how advocates of competing perspectives engage to resolve conflict through decision-making infrastructures. A second cluster of norms centers on the logics of risk-centric decisions: the gathering and vetting of evidence, the application of premises, and the evaluation of solutions, whether more aggressive or cautious in the face of uncertainties.

In such decision making, harm, such as the uncertainty of food supplies and malnutrition, can be a motivator for the development of the technology. Risk technologies can pose harms, as well as benefits. For this reason, the narratives that drive and guide risk decision making navigate the difficult balance of assessing risk problems and solutions, as well as the attendant benefit and harm. It asks broadly who benefits and suffers harm, who and what abates the harm, and who and what benefits and suffers

from such abatement. In such matters, a clearly defined decision matrix is often not possible, which leads to risk-based conflict centered on uncertainties.

Risks attached to GMOs are such that sense-making capacities based on uncontested and ample facts are scarce; scientific evidence and political interpretations that construct norms can contradict each other. In the conflict process, and broad scientific and policy communities (« sound science » and « precautionary » advocates) compete to normalize this uncertainty in continuity or in rupture by imbricating science and scientific knowledge in larger cultural plots (Douglas, 1992). In the conflict process, two scientific and policy communities (broadly identified as « sound science » and « precautionary » advocates) compete to normalize this uncertainty by respectively attenuating or exacerbating it: uncertainties pertaining to public and environmental health costs and benefits of biotechnological applications to crop production integrate either “continuity” or “rupture” scripts, as we advanced above. In such battles, sound science, especially when it is employed by industry to its advantage, collides with alternative life science epistemologies as well as cultural norms relevant to how decisions are made and the nature of a culturally appropriate decision.

In such discourse, two main norms have emerged, both of which encapsulate and are constructed by narratives of certitudes. One is enacted by sound science proponents who approach risk analysis and decisions from the standpoint of a high-order scientific rationality; required at least to be sufficiently convincing to industry, such narratives relevant to the GMO battle see no difference between conventional and modified organisms: the substantial equivalence principle (SEP). This narrative of normative certitude is contested by one that emerged from deliberative civil society arenas—the context, purpose, and discursive content of risk governance. It emphasizes uncertainties in the consequences of genetic modification, the precautionary principle (PP). Technological norms, in this way, are relevant to processes and outcomes (Perriault & Vaguer, 2011).

In order to understand, evaluative, and improve these phenomena, we propose that narratives are salient human communication norms. These norms can be subdivided, at least, into discursive process norms (how discourse progresses and changes over time through voices of statement and counter statement), decision making norms (how normative priorities and decision protocols lead to or away from specific decisions and policies), and infrastructural norms that become embedded into roles shaped and enacted by each risk society.

Such norms can be unpacked through if-then logics in the contest of scientific issue-based public policy battles that test which storyline leads to choices and actions that are most appropriate based on desirable risk/reward/benefit/loss formulations. The voices that engage in the risk dialogue test through advocacy and counter advocacy matters such as how well a risk is understood, how well some technology for instance might reduce that risk, and whether that technology increases or decreases the likelihood of one or more risks, including additional and ancillary or concomitant ones.

Also, such dialogue focuses on whether the risk problematics change once the technology is introduced. Does it increase some risks? Does it reduce some risks? Does it affect the magnitude of risk occurrence? Does it change who or what are the risk bearers? Questions such as these take on a social construction, narrative based, as norms of decision making are applied and norms of action/inaction are forged.

Applying this approach to risk policy narratives competing to weigh international agri-food trade norms, this paper examines the headline competitive narratives and vocabularies endorsed by proponents and critics of GMOs during the dispute that engaged the United States (US) and the European Union (UE) over genetically modified organisms GMOs within the World Trade organization (WTO) and the United Nation Convention on Biological Diversity's Biosafety Protocol (UN CBD BSP) from 2001 to 2007. It suggests a narrative solution to this contest to foster the coexistence of new product development and public-environmental health norms.

## Theoretical Rationale for Study

This study builds on the foundational principle that risk is narratively and normatively constructed (Russell & Babrow, 2011, see especially p. 249). Normatively, business activity, regulatory policy, and NGO strategy are collaborating, corroborating, and conflicting narratives of risk management and communication. The central narrative of risk sees the future as being fraught with uncertainty; for that reason sense making is troublesome as is the battle to determine whether policies and actions lead to or away from a desirable future.

The logic of deliberative democracy theory postulates that private sector organizations cannot think narrowly in terms of business norms but must assume that the norms of business can be, often are, highly political (Palazzo & Scherer, 2006; Scherer & Palazzo, 2007; Lenoble & Maesschalck, 2009). Even sound science can never be presumed to be aethical and apolitical. In such matters, normative contests are both science based and information rich, as well as socially and culturally oriented (Douglas, 1992; Douglas & Wildavsky, 1982; Beck, 1992).

Focusing on this broad theme, (Babrow, 2007) observed that uncertainties plague efforts to craft livable and desirable narratives needed to give order, and safety, to our lives. Reflecting on Kenneth Burke's narrative theory, Carter (1996) reflected that humans have two ways of ordering experience: classification and narration. Whereas one distinguishes stable and autonomous categories, the other defines each item in relation with its function and connection with others conceptualized in a time frame in order to escalate into a moral imperative—a norm.

Both schemas have ways of coping with uncertainties they cannot evacuate: one makes classifications cutting right across them, the other one bridges over uncertainty between stable narrational elements using incongruity, humor, drama, etc., which become « mere passing notes » (Carter, 1996, p. 41) in a larger arpeggio. Paul Ricoeur's (1984) insights on the nature of narrations as specific configurations of events when combined with Carter's work enables communication analysts to identify the symbolic architectures of experience ordering precautions against sound science: (1) how scientific uncertainties are imbricated in larger



plots as “mere passing notes” in the history of human and technological progress, or as a rupture that justify a radical change in the ways knowledges and society is produced; (2) how risk narratives culminate into mutually exclusive moral imperatives, despite deliberative attempts.

On this second consideration, narratives are a handmaiden to rhetoric in moral public debates (Fisher, 1987). Ricoeur’s (1984) configurations would rely on principles of internal coherence and fidelity with other experiences in order to be persuasive—shape evaluations and guide actions. The present theoretical construct is therefore a case for a value-laden perspective on norms, that are not indifferent to sound science by contextualize it normatively.

## Case Study

The case study presumes that norms guide business and industry decision making and that these norms have a narrative characteristic. That means that the norms framed in narrative form project decisions into a past and a future. For this reason, the controversy over the decision norms that drive agro-food business decisions may conflict with those of environmental NGO’s in crucial ways. The assumption, therefore, is that the resolution of the conflict required one of several options. One is that the industry and NGOs’ come to adopt the same risk assessment norms; as such it is likely that the controversy ends if either of the norms prevails, perhaps by being accepted by the party that has pressed the controversy. In that case, the industry might abandon its business plan for lack of sound scientific evidence of safety, or inability to allay the NGO’s concern. Or, the NGO may learn through the controversy that its alarm is not warranted. Notably, whereas early scientific warning regarding GMO impacts echoed among several European Union countries as soon as 1996, leading to NGOs to weigh substantially on public policy and grounding the *de facto* moratorium on GM crops imports in 1998 until 2006, but impeding most scientific and agricultural uses of transgenesis until today and leading firms to withdraw from the continent (recently BASF, for instance), the American organisations, such as the Food and Drug Administration, did not feel interferences from the NGO’s and regulated according to a “sound science” normative prescription defining GMOs as equivalent to any other conventional organism-- the substantial equivalence norm. As such, another normative option is that through public policy decisions, some authority decides for the combatants which norm should prevail; such decision processes, if it can delay it, is nonetheless fuel to the controversy, if it is deeply felt. The fact that the WTO was held competent by the United States to decide which norm, of the precautionary and the equivalence ones, should be used to arbitrate the conflict born from the European moratorium, demonstrated to the US motivation to plot the biotech issue as primarily a trade one. The equivalence norm and trade liberalization hold Progress as a common value to increase safety; the choice of the WTO is underpinned by the narrative of a former chaotic world orders and peace keeping missions of post-world war international institutions, combined with the “feeding the world” (quantitative food safety) narrative. Fuel to the controversy, as it constituted a attempt to disqualify public health and environmental plots. Moreover, the equivalence norm was chosen by the WTO dispute resolution organ, as an undisputable precept dictated by sound science scientific experts. At last, a third option is that the controversy leads to a decision that aligns interests through a norm that satisfies the industries business plan and does not meet unshakable resistance on the part of the NGO. At the international level, fostering complementarity between the two norms (the equivalence one at the WTO and the precautionary one at the UN BSP) would require building bridges between the competitive narratives of pro-business trade liberalization and quantitative food safety on one hand, and of world ecological protection and qualitative food safety on the other: shared plots and vocabularies that for the moment do not exist.

Narratively, businesses are motivated by rewarding outcomes, and for that reason use the case of GMO science to design seeds and market them in a way that produces sufficient reward to justify the plan. The basic free market norm is that if business solves important problems and wisely manages risks it is rewarded by monetary success and operating status in the communities that warrant its existence. As is the case, especially in the development of a new agri-business technology, the goal must be profit, whether that is the only means or not. In fact, other goals may be developed or even co-opted that ultimately justify the profit goal, but the profit goal is never absent by the very norm of the free market.

That outcome norm gives sound science the motive, perhaps even corrupting, to understand, design, and evaluate technologies in a favorable way, the paradox of the positive. Driven to succeed, science bends reality to the whim and will of industry in an effort to gain advantage by solving problems—or at least appear to do so—in ways that earn profit. Simply, in such narratives, the fear is that the lure of profit can corrupt sound science to deliver biased decisions and recommendations. These are role/discipline and organizational centric.

The narrative of business in such cases is success through science to produce profits justified by the taking of manageable/acceptable risks to solve problems that lead to lowered harms, such as the risk of starvation in countries that need more abundant crops and agriculture production that is drought resistant. Such decisions are not indifferent to caution, but biased to assume that risks are manageable or produce rewards greater than risk. That logic is not unique to business, but includes the topic of war used to introduce this paper. It extends to other risks as well, but seen contemporarily, it is set in what Beck (1992) called the risk society.

The counter narrative approaches such decisions with a bias toward the norm of caution, squarely based on the presumed failure of the logics and biases of industry. Instead of preferring a bias to err on the side of business success, critics of biotechnology reason that a full assessment of risk must be cultural, societal, and long-term. To that end, they are willing to err on the side of caution.

In normalization issues, on the more controversial ones, two broad ways to lay out the basis for risk governance have chronically emerged: quantitative (or statistical) and qualitative (Desrosières, 2000). This distinction is not unrelated to the nature of the organizations endorsing them, nor are they a binary as can be supposed. GMO regulation does not make an exception to the trend with the SEP at the WTO and the PP at the UN CBD BSP: respectively, the quantitative norm is endorsed by a top-bottom decision-making organization relying on « sound science » expertise, while the qualitative norm is endorsed by an organization that fosters larger membership and collaborative decision-making, predicated on precautionary science.

Advocates for the development and marketing of GMOs, whose voices are loudest at the WTO, argue that the burden on the risk

bearers (those would be affected if GMOs do not produce more abundant and nutritious harvest or create adverse side-effects) is acceptable and the business gains (profit, reputation, and reinforcement for the bias toward any or all technologies) are within a tolerable risk benefit-harm ratio.

For instance, the GMO industry narrative champions citizens' food access or choices that can be increased by cultivators' use of modified seeds and crops that are resistant to drought, cold, heat, insects or infestations. The pro-biotechnology narrative reasons that sound science-based norms can and will be followed for they induce desirable benefits with acceptable losses framed in a happily-ever-after conclusion to the biotechnology story. That narrative rests primarily on the norms of credibility and skills of « sound science » experts working with marketing teams to prepare biotechnologies to migrate from the private laboratories to public realms.

Critics offer counter-narratives that reason to a different conclusion: scientific data and reasoning are insufficient and may inadequately underestimate currently unknown outcomes including potential harms that vastly outweigh and even offset the potential gains. One of the key narrative themes in this discourse is the corrupting influence of profit which can short-circuit precautionary science because of the efforts to use sound science to bias how physical and cultural reality is bent to the will of profitability as power dynamics (Heath, Motion & Leitch, 2010).

Advocates whose discourse rests on the precautionary principle reason with a bias favoring various degrees of zero risk (Maguire & Ellis, 2009). These voices claim that in the absence of scientific certainties over the absence of risks (or in favor of known risks as tolerable in light of gains), any risk decision should be cautious. Public and environmental health conflicts over GMOs result from competing risk narratives. As such, the discourse is fraught with “language” barriers that can be featured as though regulators are from Mars and activists are from Venus (Proutheau & Heath, 2009). Perhaps additional planets need to be added to this dialectic. Further to this theme, it is wise to acknowledge the precaution advanced by Kenneth Burke (1934) who warned: “If language is the fundamental instrument of human cooperation, and if there is an ‘organic flaw’ in the nature of language, we may well expect to find this organic flaw revealing itself through the texture of society” (p. 330).

The challenge facing institutions such as the WTO and the UN CBD is to find a critical risk narrative that collaboratively frames a shared objective that results from and leads to a shared vocabulary of uncertainty management. Such collaboration is challenged by both corporations and members of egalitarian groups intolerant of encroachment by other normative rationalities. Profit cements individualist organizations while membership in egalitarian groups is voluntary and therefore fragile: such groups “will select and emphasize dangers based on the need to maintain membership. The logic of the argument is that the greater the danger, the greater the binding force it creates amongst the members” (Tansey & O’Riordan, 1999, p. 77). Thus, the normative motive for industry is to craft a successful business plan, one that perhaps rests upon altruistic development of agricultural products to lower the risk that certain peoples suffer from starvation and malnutrition—clearly humanitarian ends justifying a business plan.

This logic explains why such groups select low probability-high magnitude catastrophes (such as nuclear power or transboundary genetic pollution) to readily and dramatically frame the ills of industrial society. Both involved international organizations have each endorsed one of the narratives described, and decision-making norms that can foster scientific norms’ complementarities over contradictions do not emerge. When narratives become stereotypical, mutual scapegoating is looming (Carter, 1996) and norms instead of being embraced as a collaborative pathway to consensus become routes to mutual exclusions.

## Prospectus of study

The analysis in this paper reasons that advocates for and against biotechnology hamper societal advance as long as their engagement merely negates or stalemates one another.

For that reason the paper examines potential decision making narratives. Such analysis addresses the mix of means and ends. Business invites rejection of its business plan when it adopts a product development and marketing plan (ROI) which it then needs to justify by developing means to solve a socially responsible goal: “save people from starvation.” The normative argument in such case might be, even though science cannot assure safety in regard to GMOs, that risk is worth taking if it leads to increased crop production which in turn reduces malnutrition and starvation. Such normative appeals can corrupt business legitimacy by reasoning that ROI benefits to justify the risks associated with the product and that one risk is posed against another in a kind of Sophie’s choice.

The contrasting narrative of government and NGO’s focuses on outcomes and asks whether the means (products and product development) lead to desirable or undesirable outcomes while reducing risk sufficiently. NGO’s want to “save society” by precaution, making sure that scientific misjudgment rests on sufficient certitude that it does not lead to unforeseen harms. For this reason, NGOs often question whether the risk associated with outcomes (safety) justifies the means—or the means justifies the outcome.

Narrative options seem to be essential for the norms of decision making requisite for social acceptable risk management. In such matters, the compelling norm is “do no harm.” A normative variation on this, framed in the battle over the precautionary principle, is to be willing to risk manageable negative consequences in the face of solving a problem. That logic, for instance, drives the development of open-heart surgery and chemotherapy.

Given these complex decision options, several norms are worth unpacking and holding up for inspection. One plan for the solution of difficult and even intractable risk decisions is to understand and weigh the relevant operant decision norms.

- Decision option: The private sector favors narratives of normative change to support business activities based on its assessment of acceptable risk/benefit ratio analysis.
- Decision option: Activists create narratives to oppose normative change based on precautionary risk/benefit ratio analysis calling for sufficient certitude that they can appreciate that in the creation of a business plan justified by planned risk management that the plan produces no harm.

- To solve such conflict, collaborative narratives must be developed and applied in collaboration and within the logic of risk society:
- Private and public sectors must agree on desirable normative outcomes relevant to risk/benefit ratios.
  - Private and public sectors must agree on the normatively best assessment of science and precaution to achieve or modify desirable normative outcomes of risk/benefit ratios.
  - Private sector organizations must justify their business plans within a complex balance that justifies risk of technology by solving a human risk, such a food shortage. In such plans, however, industry is required to demonstrate efficacy as well as, within agreeable norms of certitude, that the end risk reduction can be achieved and that the risk/cost ratio does not demand cautionary application of the principles of how safe is safe, and how fair is safe.

The norms relevant to such controversies can be assigned issue specific. Among the various issues, these stand out :

- Sound science knowledge of biological processes. How well as the technological changes and the resultant biological processes understood to achieve acceptable insights into the risk/harm/benefit ratio?
- How well controlled through industrial process and public policy regulation is the allowable GMO content in the food chain?
- How well do seed sales and harvesting protocols, as well as testing and labeling, achieve certitude that unallowable product content by type and amount does not corrupt the food chain?
- How sufficient is regulatory oversight so that the interests of risk society are not compromised by faulty business plans and less than sound science?
- How well are the proposed benefits of GMO monitored so that careful, collaborative, and consensual decisions continue to be made over time?

Through the development and application of risk management and communication decision norms, society “can have its cake and eat it too.” That narrative principle, however, is not a blind rationale, but the key norm central to deliberative democracy. In such matters, industry prefers to apply the norm that science is sufficient and the outcome is compelling to take manageable risks to solve risks. Applying the logic of how safe is safe and how fair is safe, NGOs challenge such narratives by scrutinizing whether desirable outcomes are achieved, whether they are employed to mask lack of sufficient science and profit motives, and whether new and threatening risks occur which change the entire decision plan.

## Conclusion

In such conflicts no decision heuristic is inherently best but the principles of deliberative democracy serve society by forcing the public vetting by relevant and specific scientific communities and policy decision makers who are at the forefront of cultural interpretation of risk: the goal is to determine how and if change serves political outcomes in ways that constitutes evidence that business plans foster as well as result from fully functioning societies (Heath, 2006). The narrative theme that runs through the GMO battles offers two plot options. One rests on the assumption that ultimately society must bend to support profit incentives and business plans driven by self-interested sound science. Or, a second features the assumption that sound science and effective business plans must serve society.

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