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Anticipatory Ethics and Governance [AEG]: a Jurisprudential approach

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Nanotechnology (NT) - the deliberate and purposeful design production use andmanipulation of nanomaterials encompasses disciplines including but not limited to chemistry, physics, material sciences, engineering, information technology, biotechnologies. While there is significant uncertainty in relation to the possible risks of the consequences of NT, there is significant certainty that NT offers indisputable convenience and efficiencies in the context of consumer products; it offers enormous potential benefits in environmental remediation and in the rapidly evolving field of "nanomedicine" – in the areas of diagnostics, targeted drug delivery systems and disease monitoring. In this context it can make a valuable contribution to quality of life and well- being, particularly in developing countries (with an estimated population of 6-7 billion people) in relation to which close correlation between NT applications and six of the eight UNs millennium development goals has shown the capacity of NT to contribute to serious health, environmental and social issues.However, on the risk side, concerns have been raised in relation to the unknown risks of the potential hazard and harm to human health and safety, the environment and the earth's biosphere. Risk requires oversight in the form of regulation, governance or a hybrid of both but regulation requires information and more certainty of scientific information than is presently available. To that end, NT risk and the lack of scientific certainty place regulators in a dilemma. NT presents regulators and policy makers with a paradigmatic "Wicked problem". In the EU, regulation is largely framed on the basis of the precautionary principle– in itself an ethical concept underpinned by utilitarian consequentialism. For many reasons the precautionary principle is not an effective regulatory instrument yet precaution can be traced as a consistent thread through EU legislation which applies to NT – REACH, food, cosmetics, pharmaceuticals, occupational safety, waste and biocides. Save for novel foods, cosmetics and biocides, EU regulation is not NT specific and is based on risk assessment - theoretically straightforward but difficult in reality because of the extent of uncertainty surrounding risk of harm. In fact there is a view that for many reasons it is too soon to regulate NT effectively. Furthermore, the technology has already outpaced the legislation and it is possible that the regulation can be avoided or at least circumvented so as to be rendered

inapplicable and outside the scope.
All of this presents an opportunity to develop alternative approaches to oversight largely based on voluntary governance frameworks which are not dependant on scientific certainty and which shift the focus from risk assessment and analysis to risk minimisation and mitigation. In the NT context there is scope for framing "soft law" governance mechanisms based on deliberative democracy and distributive and procedural justice which can be regarded as an exercise in ethical due diligence. An alternative approach focuses on the voluntary assumption of responsibility, on participation, deliberation, reflexivity and the future. The approach posited is grounded on jurisprudential theories of distributive and procedural justice incorporating John Rawls' theory of overlapping consensus and model of wide reflective equilibrium with the ultimate goal of the alignment of NT governance with the thinking of the "Law of People". It is anticipatory, flexible, adaptable and evolutionary. Because the acceptance of risk is a societal consideration the approach is multi- disciplinary forward looking and future care oriented which encompasses a broad stakeholder base.

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