Fostering regional stakeholder engagement in ethical risk governance of nanomaterials

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Abstract & introduction

In the EU-funded project RiskGONE (https://riskgone.eu/), we are developing and testing online tools for risk governance, to support dialogue in a newly established nano risk governance council. This toolset includes an integrated system for performing an ethical impact assessment (EIA) [1], based on a CEN Workshop Agreement [2]. The EIA procedure, explained in the methodology, incorporates targeted stakeholder engagement during the identification and evaluation of ethical impacts of a nanomaterial or nanoproduct, and in making recommendations for remedial actions. The EIA tools can also be used to support ethical impact assessment of regional stakeholders. We illustrate how this could be done in a case study of the use of nanomaterials in wastewater remediation in a developing country. Policy implications are that the EIA procedure is useful for identifying ethical issues and engaging stakeholders in their evaluation and in suggesting recommendations.

[1] RiskGONE D3.6 *Draft guidelines on Identification of regulatory and ethical risk thresholds*. RiskGONE project, December 2020

[2] CEN, *CWA 17145-2:2017 (E) Ethics assessment for research and innovation - Part 2: Ethical impact assessment framework.* CEN, Brussels, June 2017

Keywords: Risk Governance, Ethics, Nanomaterials, Stakeholder engagement

Methodology

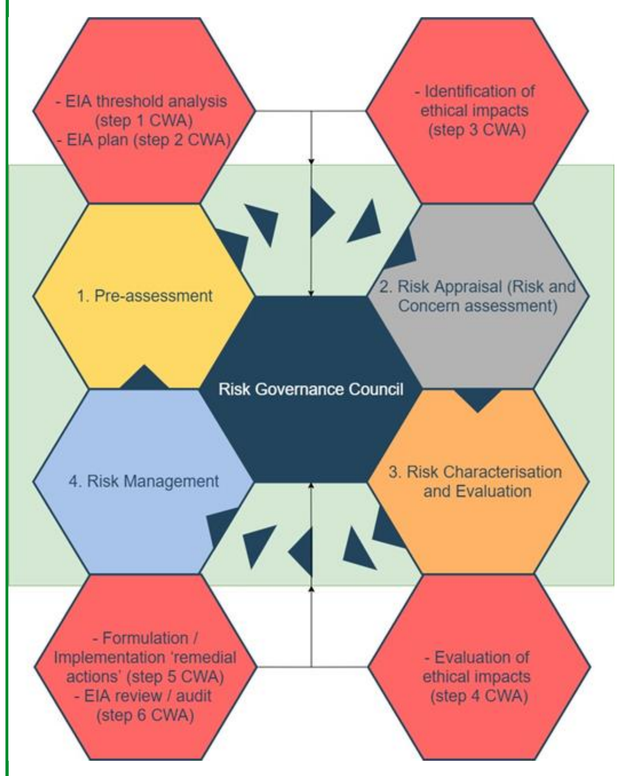

Figure 1: EIA procedure. Source: Malsch, I., Isigonis, P., Dusinska, M., Bouman E. A., Embedding Ethical Impact Assessment in Nanosafety Decision Support. Small 2020, 2002901, https://doi.org/10.1002/smll.202002901

The 6-step Ethical Impact Assessment procedure fits in the stages of the overall Risk Governance process:

1. **Threshold analysis** – self-assessment of foreseen ethical impacts by project leader to determine the need for and scope of the EIA
2. **EIA-planning** of resources, methodologies & stakeholder engagement
3. **Identify** ethical issues – desk research (optional stakeholder & expert engagement)
4. **Evaluate** ethical issues – desk research, engage stakeholder
5. **Remediate** ethical issues – draft recommendations, stakeholder consultation
6. **Review** the EIA – external ethicist

Methods used

The ethicist performing the EIA searched open access literature on the internet to identify known ethical issues in published case studies relevant to the use of nanomaterials in wastewater remediation in developing countries. To limit the engagement of stakeholders to a single meeting, this literature search included also a review of relevant ethical principles, values and theories needed for evaluating the identified ethical impacts. Likewise, relevant recommendations made in the literature were collected to facilitate proposing remedial actions. Online forms in the RiskGONE cloud platform were used to guide the analysis of the ethical impacts identified in this literature. These tools will become publicly available after the end of the project.

The identified and evaluated ethical issues, and draft recommendations were discussed with nanosafety experts in RiskGONE, Gov4Nano and NanoRigo during the online NMBP-13 meeting on 14-04-2021.

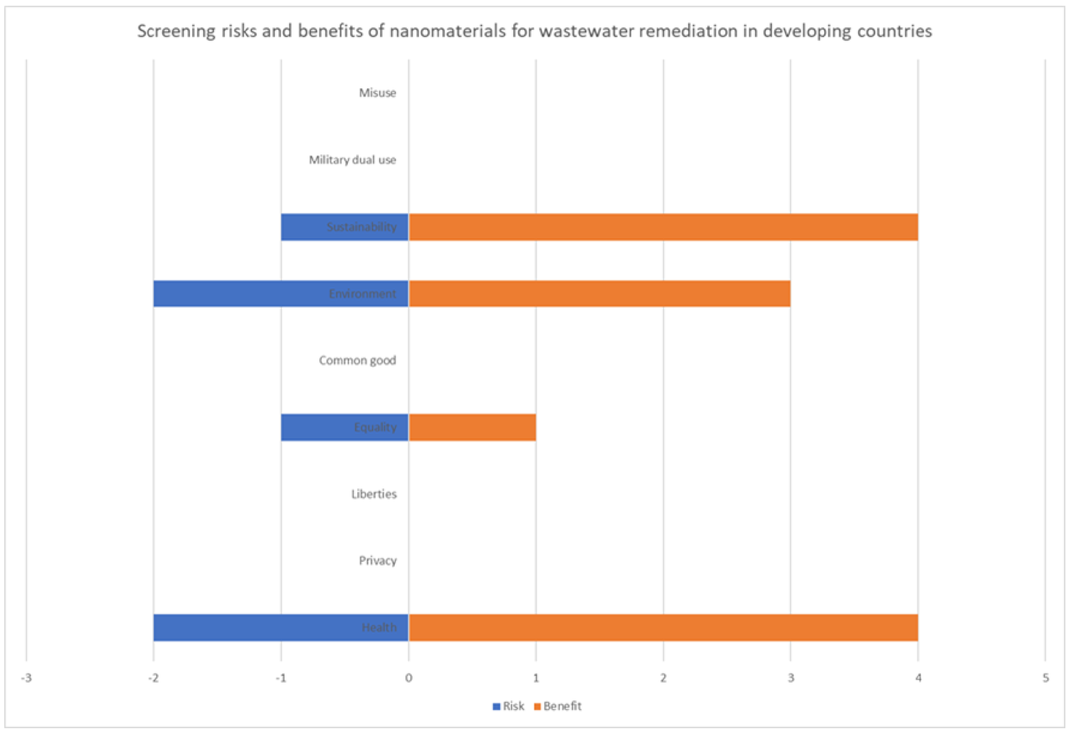

Figure 2: Self-assessment identified health, environment, sustainability and equity-related ethical risks and benefits of nano-enabled wastewater remediation in developing countries. The threshold analysis suggests a small Ethical Impact Assessment.

Discussion of ethical issues and values

Tables 1 and 2 compare ethicist and stakeholder (nanosafety expert) estimates of some identified ethical impacts of nano-enabled wastewater remediation in developing countries. The significant differences between the ethicist's and stakeholder estimates is explained by a lack of common calibration of the 5-point scales. To ensure fruitful stakeholder engagements in ethical impact assessment, the discussion should focus more on arguments why identified issues are deemed relevant than on soliciting semi-quantitative estimates of their subjective importance.

Issue	Citation	Ethicist Risk	Sth. Risk (n=22)
Risk distribution	Nanoparticles may pollute water, air and soil, raising safety issues and balancing interests of industry, competing for market shares, against other interest (EGE 2007)	1	3.5
Effect on people in developing countries	Maintenance, training of local technicians and adaptation of local regulatory frameworks may not be properly integrated in the wastewater remediation system (Padma 2009)	2	3.2
Effect on people in developing countries	if the wastewater purification system is made of expensive materials, it may be less accessible to poor people (Makoni 2009)	2	3.7

Table 1: Analysis of negative ethical impacts of nanotechnology for wastewater remediation found in literature, excluding EHS risks. 0 = no, 1= minor, 2= moderate, 3= medium, 4= high, 5= severe.

Sth Risk n=17	Ethicist risk	Identified principle or value	Ethicist benefit	Sth. Benefit n=14
4.2	1	Water ethics: equity	4	4.6
3.5	1	Water ethics: multiple and beneficial use of water	4	4.4
3.9	1	Water ethics: users and polluters pay principle	4	4
4.4	2	Fairness, respect, care, honesty	1	4.2
3.5	2	Precaution	2	3.6

Table 2:Assessing the likelihood and intensity of violation of ethical values. 1 = minor; 2 = moderate; 3 =medium; 4= high; 5=severe or high.

Opportunities for engaging regional stakeholders

While we are developing the online EIA tools primarily to support the work of the (European) nano-Risk Governance Council, the underlying CEN pre-standard methodology can be adapted to engaging regional stakeholders in discussion of ethical impacts of local projects where emerging technologies are applied. Stakeholder engagement may be more effective in such cases, because it is easier to organise face-to-face discussions between the stakeholders on the identified issues, values and recommendations. Our RiskGONE online tools are also useful to support the analysis in those cases, since they are not nano-specific. See: http://enaloscloud.novamechanics.com/riskgone/.

The preliminary analysis of this case study suggests that the EIA procedure is useful for identifying ethical issues. More work must be done to test effective and efficient approaches for engaging stakeholders in their evaluation and in suggesting recommendations.

RiskGONE has 22 partners. The coordinator is NILU (Norwegian Institute for Air Research). More info: https://riskgone.eu/project-structure-partners/. This project has received funding from the European Union's Horizon 2020 research and innovation programme under agreement No814425.

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