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The ethical dimensions of the co-expertise process after a nuclear accident

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Abstract

Following the Chernobyl and Fukushima disasters, decision-making processes have been largely challenged leading the experts to revise their role and to favour participatory processes and to rebuild trust. In this context, ethical considerations are crucial to ensure a fair implementation of the co-expertise process to address the future of the local communities and allow people to live well with each other while facing a complex situation in areas affected by the accident. This chapter discusses different ethical issues relating to the role of experts, and situations to be avoided such as: experts trivialising the radiological risk in contaminated areas, co-expertise as a progressive trend to leave people managing their situation alone, co-expertise as a justification of decision already taken by the experts and co-expertise only accessible for few local communities. To overcome the complexity of the post-accident situation, the deployment of co-expertise processes must promote and expand the empowerment of citizens, implement fair and inclusive decision-making processes, ensure institutional commitment and address the conditions for long-term sustainability of community life as well as organising the vigilance.

Introduction

Calls for more open and democratic modes of governance have long been a feature of the social sciences, achieving great success from the 1990's onwards. Ours is an age in which calls for more citizen science and public participation

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are commonplace, and many imagine them to be a remedy for political disaffection. The OECD has framed public participation as the “missing link” in modern societies, for example. The field of nuclear disaster management is no exception to this trend. Faced with public suspicion following the Chernobyl and Fukushima Daiichi disasters, experts have pioneered governance approaches aiming at both favoring participatory processes and rebuilding public trust. In addition, to be efficient, it emerges that the management of the long-term consequences had to better consider the characteristics of the local situation and the practical knowledge of the local citizens. The co-expertise process outlined in this book has emerged as one of the most prominent of these mechanisms. Much of this textbook is dedicated to making the case for a co-expertise approach and how to implement it in practice. The aim of this chapter, however, is to reflect critically on the *ethics* of the co-expertise process. What values have shaped it? How has the experience of implement it spurred ethical reflection in radiological protection specialists? And what ethical challenges does the implementation of the co-expertise process pose?

1. Co-expertise as a site of ethical reflection

Broadly speaking, it can be said that the co-expertise process has been a catalyst for ethical reflection on the values structuring the condition of intervention of the experts in the process, in particular in the field of radiological protection (Lochard, 2021; Schneider et al., 2019). For experts of the domain, who were members of the International Commission on Radiological Protection (ICRP), the opportunity to work with the people most affected by the Fukushima disaster was an important prism through which they could reflect on the ethical principles that guide their profession. Though the ICRP had long recognized that radiological protection is a matter of both facts and values, between 1928 and 2016 it had only rarely made explicit statements about the values that guided its work. On the heels of the 2011 Fukushima Daiichi disaster, however, the ICRP resolved to rectify this state of affairs and at a meeting in Fukushima, Japan in October 2012, the Commission decided to set up a working group on the ethical foundations of the system of radiological protection including professionals with experience in the co-expertise process. This culminated in ICRP Publication 138 five years later which highlighted four fundamental ethical values and 3 procedural values considered fundamental to the radiation protection system namely: beneficence and non-malevolence, prudence, justice and dignity with respect to core values and accountability, transparency and inclusiveness to aid their implementation in practice (ICRP, 2018):

- **Beneficence/no-maleficence:** promoting or doing good and avoiding doing harm. This is reflected, for example, in the primary aim of the system of radiological protection which is to achieve an appropriate level of protection without unduly limiting desirable human actions;
- **Prudence:** making informed and carefully considered choices without full knowledge of the scope and consequences of an action. Prudence is

reflected, for example, in the fact that in all decisions aimed at protecting people or the environment, the uncertainties of radiation science are taken into account by acting in a judicious and reasonable manner, in particular with regard to low exposures;

- **Justice:** fairness in the distribution of advantages and disadvantages. Justice is a key value underlying, for example, individual dose restrictions that aim to prevent any individual from receiving an unfair burden of risk;
- **Dignity:** the unconditional respect that every person deserves, irrespective of personal attributes or circumstances. Personal autonomy is a corollary of human dignity. This underlies, for example, the importance placed on stakeholder participation and the empowerment of individuals to make their own informed decisions.

Publication 138 further outlines three procedural values, which are highlighted to aid the practical implementation of radiological protection:

- **Accountability:** to be responsible for one's own action. This requires to report on the activities and decisions, endorse the responsibility of the actions and decision, and account for the consequences, if necessary;
- **Transparency:** to share available information and favour the accessibility of information about the deliberations and decisions concerning potential or ongoing activities. It relies on the honesty with which this information is transmitted;
- **Inclusiveness:** to involve relevant stakeholders in the decision-making processes by establishing the conditions for their participation and promoting their empowerment.

1.1. *The co-expertise and the good life with others*

How the parameters of a problem are defined is inseparable from the success in solving it. Frame the issue too narrowly and the policy solutions will fail to address the real-world issue; frame it too broadly and the interventions may prove too diffuse. In practice, most complex real-world issues can be framed in innumerable ways and defining the nature of the problem is an essential political choice. Nonetheless, experts, politicians, and members of the public often frame the problems they face in highly specific ways, without recognizing how they are (inadvertently) defining the scope of action. Dialogue between actors can serve to catalyse reflection and create an opportunity to develop shared policy frames. The notion of “normalcy” is illustrative of the objective of nuclear disaster management, which is often framed as a return to normalcy. Many understand “normal” as indexing their pre-disaster living and working conditions, in which radiation was of no consequence to their daily life. This is an entirely legitimate expectation but is unlikely to be satisfied, due to lingering contamination as well as the social and economic effects of nuclear disasters. In this context, the establishment of a “new normal” will necessarily have to reflect these post-accident realities. Explicitly framing the goals of disaster management in these terms and engaging in an open dialogue with the relevant stakeholders about

the contours of this “decent living and working conditions” in the new context is essential to avoiding disappointment and disaffection and creating opportunities for affected people to meaningfully shape the response to the disaster, fostering the autonomy upon which *dignity* rests.

Radiological protection is not an end in itself. The objective of post-nuclear accident recovery is, beyond protection, to ensure decent and sustainable living conditions in the affected communities. Rebuilding living together requires implementing local projects that help improve the well-being of individuals and the quality of living together. This is why experience has shown that the communities having participated in co-expertise experiments are keen to develop projects in the fields of radiological protection but also education, memory and culture (Schneider et al., 2021). To effectively implement these local projects, cooperation with the competent authorities, public and private organizations, experts and professionals is essential

The co-expertise approach aims to integrate technical expertise and the values carried by the people concerned in compliance with regulatory requirements. The philosophy behind the process is that experts and stakeholders can jointly solve the challenges facing the community through their respective expertise — that of scientific and technical experts and that of daily human experience made up of traditions, culture and aspiration to live well with and for others. Local actors are a valuable resource for understanding the concerns of the community but also for deciding what actions to implement, because their interests are at stake. Experts are a valuable support to help gather technical data and assess rational options and their impacts. Affected people live with the consequences of decisions and are therefore the best judges to decide which options to adopt.

1.2. *The co-expertise at the service of people*

At its core, co-expertise is an exercise in the values of *prudence* and *modesty*. Foundational to the practice is the recognition that we must act in an uncertain world. Though the effects of ionizing radiation on human health are well-studied, claims about the effects of exposure to low doses (i.e. <100mSv/y) continue to be contentious: some suggesting harm, others suggesting that no effect should be assumed, still others contending that low doses of radiation may be beneficial to human health (*radiation hormesis hypothesis*). The basis for ICRP recommendations, in general, and the co-expertise process, in particular, is that because of the uncertainties in the estimation of the risk at low dose, it is *prudent* to adopt the precautionary principle and assume that the risk is proportional to the dose, whatever the level of the dose (*linear non-threshold (LNT) hypothesis*). Contemporary radiological protection is thus framed as a matter of *optimisation*, whose implementation consists in acting to ensure that exposure to radiation is *as low as reasonably achievable*. (This dictum is often abbreviated to ALARA.)

But who should determine what is reasonably achievable? The co-expertise approach advocates having the humility to recognize that experts do not have

a monopoly on reason, so cannot claim the sole right to define what exposures are (un)acceptable. Risk management is always a matter of facts and values, in which actors must define when the optimization process can cease. Far from being a purely technical determination, this is inherently a matter of judgement. Modesty might help experts to recognize a simple means of addressing a complex problem. Namely, that if the object of risk management is to promote the well-being of affected people, then these very people have something valuable to contribute. This observation undergirds the invitation to work with people as “co-experts” in order to develop among them the “practical radiological protection culture” necessary to protect themselves in daily activities.

A post-accident situation differs in many aspects from a normal situation. It is particularly disturbing for those affected. Therefore, the success of a co-expertise process requires the experts to adopt an appropriate attitude vis-à-vis the other concerned parties, taking into account their actual situation. From an ethical point of view, it is a duty for the experts involved in a co-expertise process to demonstrate commitment and accountability, often over the long term. For instance, it is important that they come on the spot several times, that they get to know the members of the various parties concerned, that they engage with them in a two-way dialogue.

After a nuclear accident, it is possible and even likely that trust in radiological protection experts will be impaired. In order to regain trustworthiness, it is crucial that experts involved in the recovery process adopt an attitude marked by: modesty by avoiding overly academic postures; openness by being attentive to the questions and concerns of the affected people but also to their knowledge and experiences that they wish to share; transparency by providing the information and explanations in an understandable manner; empathy by taking due account of the disruption and pain suffered by those affected; and inclusiveness by helping to organise a balanced dialogue between all concerned parties.

It is essential that the experts involved in post-accident management engage with the populations in order to improve their protection and restore their living and working conditions. The aim is to be committed at the service of the society and to work with the local people rather than for them, in order to improve the well-being of the population.

In radiological protection and more specifically to address exposure at low doses, prudence is a key ethical value to which the experts should refer, both to estimate the risk and to manage it. It is necessary for the radiological protection experts to recognize the assumption behind the radiological risk, the limits of their own knowledge with regard to the complexity of the post-accidental situation as well as the uncertainties associated with the management of the post-accident situation. Experts have to provide the good science and relevant scientific and practical knowledge to address the situation together with due consideration of other issues to be embarked in the context of post-accident situation. Experts have also to show modesty by acknowledging the fact that they will not be able to fully understand the impact that may have a nuclear accident on the daily life.

Thus, it is never easy and not the role for the experts to conclude that a situation is safe or not and, more generally, to discuss the effects and risks associated with exposure to ionizing radiation with those affected. Putting the exposure due to the accident into perspective with other radiological exposures or even other risks is generally a sensitive issue. The first ethical position for the experts is to acknowledge that in any case the contamination due to the accident of the local areas is not at all legitimate. The experts should remain both consistent with the scientific knowledge relating to the radiological risk and the basic principles of radiological protection, as well as attentive to the perception of this risk by the affected population as well as the consequences of this contamination for the daily life of the residents. They notably have to recognise that acceptability of the exposure situation is not only a matter of level of risk and cannot be decided by the experts solely with scientific arguments but needs to be addressed by the affected people themselves, with due consideration of all the facets of the daily life affected by the presence of radioactivity in their own environment.

1.3. *The fairness of the co-expertise process*

It is common for risk management strategies to subdivide the population into different groups, identifying specific populations as particularly “at risk”. In radiological protection, the basis for this classification is often biological. Women and children are framed as particularly vulnerable, while the elderly are deemed less “at risk”. In addition, specific attention should also be devoted to future generations. This diagnosis usefully captures one dimension of the post-disaster scenario but can disguise the social dimensions of vulnerability. How might the elderly, though less sensitive to radiation exposure, be particularly adversely affected by both the experience of evacuation and the subsequent collapse of community infrastructure, for example? (In Fukushima, numerous studies have reported that evacuation led to excess mortality in the institutionalized elderly (Nomura et al., 2013; Yasumura, 2014) and the social isolation of the elderly is of real concern (Yoshida et al., 2021). When evacuation orders have been lifted, it is overwhelmingly older residents who have chosen to return to the affected territories, often leading to a separation from the younger generations of their family. However, the media’s celebration of the elderly’s tenacity and dedication to rebuilding Fukushima — epitomized by news coverage of seniors in the so-called “Fukushima 50” and later “suicide corps” which volunteered to replace younger cleanup workers — has often led the needs of the elderly to be neglected.) And how might women’s experience of the disaster be distinct, not only due to factors of biology, but due to uneven distributions of household activities (in societies in which childcare, cooking, and cleaning remain gendered, so too do daily encounters with radiation risk) (Ando, 2025). Or indeed, how might women’s experiences of a nuclear disaster be shaped by misogyny? Women disproportionately face forms of discrimination and social policing in post-disaster situations. Marriage discrimination is more acutely experienced by

women from Fukushima, for example (Heath, 2013); while stereotypes of “hysterical women” can make it more difficult for women to express their concerns. The prominence of the phrase “radiation brain mom” (*hōshanō mama*) in Japanese popular discourse is indicative of the stigmatization that concerned women face (Kimura, 2016). Factors such as class and indigeneity may also be important concerns. The dignity of indigenous peoples may be tied to specific lands or forms of life, which would be violated by broad policies aimed at optimizing the general population’s health (consider, for example, the centrality of reindeer herding to Sami culture (Stephens, 2021)). To act with humility is to recognize that one’s schema for categorizing the affected public is inevitably partial. When seeking to engage stakeholders, it is therefore important not to assume that we know what “the stakes” — and therefore who “the stakeholders” — are, in advance. Rather, it is through dialogue with affected people that experts can learn how the disaster is being experienced. Put plainly, affected people should ideally act as co-experts in defining who the stakeholders in the process are. In a post-accident situation, experts will face competing accounts of *justice*, where justice is conceived in the ICRP’s terms as the fair distribution of advantages and disadvantages. Actors on the ground will likely have different accounts of what is “fair” but also subdivide the population into different groups, who may identify different conditions as necessary for human dignity. Sensitivity to these competing worldviews is a core precept of the co-expertise process.

1.4. *The co-expertise and the empowerment of affected people*

Despite the rise of participatory practices across the policy landscape, public engagement is often conducted “downstream” as a means of legitimizing predetermined policy decisions. This leads to a failure of the promises to “empower” participants, as the scope of decision making is already heavily constrained. This is a key criticism that has been levelled at the co-expertise process. Rather than take seriously the view of affected people, the argument goes, experts could engage in discussion only to persuade affected people that it is safe to live in the affected areas and that they should return. As a point of principle, participants in the Dialogue avoid answering questions on whether specific actions are safe, recognizing that this is a judgement that affected people are best placed to make for themselves. The criticism nonetheless correctly identifies that many activities occur “downstream” from national (and even regional) decision-making. Ensuring that affected people are given opportunities to shape “upstream” framing of radiological protection policies is therefore essential for co-expertise to achieve its full potential.

The foundation of co-expertise is mutual respect and learning between citizens and experts. One test of the extent to which dialogue is genuinely two-way is to ask, what have the expert participants learned from the experience? In the course of the Fukushima Dialogues, for example, expert participants have come to develop a great appreciation for the role of community rituals and traditions as a source of comfort and meaning for affected people, worthy

of prioritizing.⁷ Yet experts can often face institutional barriers to learning. By nature, most institutions are committed to framing policy issues in specific ways. Consequently, learning is constrained to working more effectively within this frame, rather than questioning its assumptions. Factors such as cultural practices, crucially important to the affected peoples, may nonetheless be deemed to fall outside the proper purview of the experts by their parent organisation, leading to efforts to dissuade action on these issues. For co-expertise to be most effective, the commitment to humility must be cultivated at an institutional, as well as a personal level.

However, the mandate of the experts engaged in the process may limit the scope of this empowerment. Individual experts can only invite local people to participate in decisions that they themselves have the authority to make. Experts have broadly two (overlapping) options for overcoming this obstacle. The first is to advocate for the co-expertise process, both within their institution and across different policy institutions. The second, parallel strategy is for experts to shift their attention from “invited” forms of participation to what social scientists have variously called “uninvited” (Wynne, 2007), “bottom-up” or “spontaneous” (Bucchi and Nereseni, 2007) participation: civil society initiatives and interventions, organized independently of established policy institutions. Rather than feeling the need to lead the co-expertise process, by creating new spaces for dialogue between stakeholders, experts can also volunteer their support to “bottom up” projects and organisations, lending these existing endeavors their expertise, social capital, and support (NPO Fukushima Dialogue, 2026). In the wake of the

⁷ Talk of recovering community traditions and cultural heritage can seem a little abstract, so we’d like to offer two examples of volunteer projects undertaken in the village of Iitate, prefecture of Fukushima, which was evacuated between 2011 and 2017. When a small fire broke out in 2013, no one was close enough to prevent the 11th Century Yamatsumi Shrine from being burned to the ground. The nuclear disaster had (indirectly) claimed another piece of Fukushima’s cultural heritage. Luckily, researchers from Wakayama University had been studying the shrine and carefully photographed the ceiling, on which 242 wolf deities had been painted. Together with 20 of his graduate students, Tokyo University of the Arts Professor Kei Arai went about carefully reproducing the prints, which were installed into the rebuilt shrine in 2016 – ready for the shrine to host its first festival since March 2011 and for the return of villagers in the spring of 2017, when the evacuation orders were lifted.

Another site of citizens’ efforts to recover their cultural heritage is Yasaka Shrine, Iitate. For more than 300 years, the dance of three lions was performed at the Shrine every October. This tradition, which came to a halt in 2011, was resumed on 17 October 2017. However, while the dance is traditionally performed by young boys, it is now performed by adults because few children have returned to the village. Nonetheless, keeping this intangible cultural heritage has become a focal point of some local people’ efforts.

Initiatives such as these were unlikely to be prioritized under traditional radiological protection approaches, which focused more on public health (narrowly defined) and economic activity. A co-expertise approach advocates that practitioners allow affected people to frame the task of reconstruction for themselves, acknowledging that there is more to “living” than (biological) health, and support local citizens’ efforts to build a “new normal”.

Fukushima Daiichi disaster, for example, numerous citizens groups were independently organized to monitor radiation levels (e.g. SAFecast) and exposure (e.g. D-Shuttle), as well as promoting dialogue (e.g. NPO Fukushima Dialogue). Experts should have the humility to place themselves at the service of such local initiatives, rather than feeling the need to lead or manage the interaction.

By empowering those involved, the co-expertise process develops a practical radiological protection culture which allows members of the community to interpret the results of radiation measurements, to build their own benchmarks in relation to the radioactivity present in their daily life, to make their own decisions to protect themselves and their loved ones and finally to assess the effectiveness of protective actions implemented by themselves or by authorities and organizations (ICRP, 2020).

2. The ethics of the co-expertise process in practice

2.1. *Ethical challenges of implementing the co-expertise process*

Four main ethical issues have been identified in the post-accidental context: experts trivialising the radiological risk in contaminated areas, co-expertise as a progressive trend to leave people managing their situation alone, co-expertise as a justification of decision already taken by the experts and co-expertise only accessible for few local communities.

2.1.1. Experts trivialising radiological risk

One of the major issues for affected people in a post-accident situation is to know if it is safe or not to live or work in a contaminated area, if it is safe or not to eat food produced in affected areas and what is the health risk for them and their relatives, with a main concern for the health of their children. People are expecting that the experts could provide unambiguous answers on the possible health effects for the current and future generations. At the same time, different points of view are expressed including false rumours about the nature or the magnitude of the risk arising from radioactivity, and even with manipulation of scientific knowledge.

On the other side, experts generally consider and observe that the doses for most of the people living in authorised affected areas in a post-accident situation are expected to be low or even very low from a radiological protection point of view. In this context, experts can be tempted to respond with scientific arguments and relying on risk calculation without providing enough nuance in the sense of low risk and uncertainties associated with radiation-induced risk at low level of exposures.

Due to the fact that the linear non-threshold dose-effect relationship is an assumption and the lack of evidence about radiation-induced heritable effects for human, experts may argue that the risk associated with radiation exposure for people living in affected areas is trivial. Such a position has been observed following the Chernobyl and Fukushima accidents clearly emphasizing the lack

of due consideration of the perception of the risk as well as the various non-radiological factors affecting the exposure situation and missing to recognize that the radioactivity should not have been there.

In the prolongation of this issue of risk at low doses, some formulations should be used with caution, such as the concept of normality. The primary aim for local citizens is to come back to the ante situation as soon and as much as possible. In this perspective they generally rely on the cleaning of affected areas and radioactive decay to reduce and even delete exposures due to the fallout of the accident. There is a legitimate expectation to come back to “normal” living and working conditions (i.e. referring to decent living and working conditions) where the radioactivity has no more consequences on their daily life.

In fact, this “return to normality” is generally not achievable due to the long-lasting presence of radioactivity in the environment and due to the complexity of the consequences of the accident not only on radiological exposure but more broadly on the societal and economic activities. In this context, the concept of normality only makes sense if it incorporates the new living and working conditions, which is not explicit. In this regard, the focus on radiological criteria is a pitfall for experts to address the complexity of the situation in its many dimensions and to justify the difference with ante situation. Anyway, the ardent desire to turn the page should not overshadow the necessary long-term vigilance on health and environmental issues, and more generally the prolonged commitment of affected communities.

2.1.2. Leaving people alone

The empowerment of local populations in the co-expertise process, in particular with the aim to favour their involvement in the management of their own protection, could be considered as a disengagement of the experts. It could even be viewed as a strategy to progressively let people manage their situation alone, in the perspective of reducing the support from the public bodies. This concern is understandable as ideas of localism and volunteerism have historically been used to justify cuts to the size of the state.⁸ It is therefore important to stress that co-expertise is intended to reinforce the partnership between residents, experts and authorities and could lead to *shape* and *augment* the state’s support for affected people, not to *substitute* for it. It cannot replace compensation, provision of healthcare, or decontamination, to name just a few

⁸ Famously, David Cameron’s UK Conservative party promoted the idea of *The Big Society*: a package of policies with the stated aim of “creat[ing] a climate that empowered local people and communities, building a “big society” that would take power away from the politicians and give it to the people”. In practice, this Conservative party platform aimed to *devolve* more powers to local administrative units and encourage citizens to *volunteer* in their local community, whilst also imposing *austerity*. The promised “empowerment” thus took the form of local governments and citizens assuming more responsibility for governance, while also receiving reduced resources. Given that *The Big Society* (2009-2013) was contemporaneous to ICRP’s adoption of a “co-expert” approach, suspicion about the language of “empowerment” is understandable.

vital state functions. These forms of material support are *necessary* to citizens' empowerment. Yet it is also true that they may not prove *sufficient*. Citizens who feel their material needs are adequately met may nonetheless feel isolated or overwhelmed by the enormity of a nuclear disaster. The co-expertise process offers such citizens a community in which to make sense of the disaster and take (individual or collective) decisions. (Some have noted that the format shares important features with group therapy (Takahashi, 2021).) Moreover, it aspires to be a space in which citizens can articulate their material needs, thereby shaping both local initiatives and the state's allocation of resources. However, the extent to which co-expertise is able to accomplish this latter goal depends upon the authority of the convening body. (Note that neither the ETHOS Project nor the ICRP had the authority to determine compensation policy in Belarus or Japan, respectively.)

Beyond the first step when experts help citizens to characterise the radiological local situation, there is a temptation to progressively leave them to make additional measurements and to interpret the results. In the same spirit, the dissemination of individual monitoring devices may contribute to this challenge and progressively transfer the responsibility of dealing with the radiological situation to the affected people. In this context, one of the difficulties for the experts is to ensure the articulation and complementarity of protective actions to be handled by the local people themselves with the protective measures implemented by national and local authorities. Depending on the available resources (financial, human, material), this articulation may evolve rapidly and may put experts in a difficult position with regard to leaving people alone, or not.

2.1.3. Deciding for people

Co-expertise processes require a close relationship between experts and local populations. Progressively, this could be seen as a potential manipulation by experts, forcing people to stay in contaminated territories. At least, the experts could be suspected of influencing the decisions of those affected, notably by trivialising the risk. By taking refuge behind their knowledge and experience, experts may take decisions on behalf of the individuals or community concerned or initiate protective actions without involving them. On this basis, the experts should wish to protect people even without them or despite them.

Involved in co-expertise process, it is not so trivial for the experts to put aside their own convictions to accompany people and help them to make their own opinion by giving access to meaningful technical and scientific knowledge, without influencing them. Due to the complexity of the post-accidental situation and the demanding process for experts involved in co-expertise, they may overstep their role and wish consciously or not to become involved in the choices based on scientific arguments or even personal considerations while these choices should be made by the citizens themselves. For the experts, finding a good position to favour the autonomy of local people without leaving them in isolation is not easy to address.

2.1.4. Only accessible for few local communities

The development of co-expertise process generally relies on interaction between experts and local leaders. In this regard, the contact that experts have to establish with local stakeholders, in particular those from civil society, can also constitute a key challenge. Some are harder to reach than others. The pitfalls in this area are numerous, for example: involving only the elite or those who come forward while forgetting the most deprived or those who remain in a waiting position, working with certain communities and not others, neglecting the evacuees who have not returned, etc.

On the other hand, the number of radiological protection experts is limited and they cannot be everywhere. An important challenge is to guarantee the access to participation and empowerment process of the communities willing to implement it. It is also challenging to share and disseminate the results with communities which do not implement it.

2.2. *The way forward*

2.2.1. Expanding the empowerment

In order to contribute to the autonomy of affected people, the role of the experts is not to make decisions for individuals on their future, nor even to convince that a path is the right one. As a matter of dignity of affected people, experts have to respect everyone's values and choices in the co-expertise process without imposing their views. They also have to provide adequate means and support to allow them to recover their autonomy. A fair balance has to be found in the process between scientific knowledge and experience, local knowledge of the situation, values and habits of local citizens, societal, environmental and economic considerations. In addition to the restoration and development of the capacity for each individual to take informed decisions in the new post-accidental context, the experts should support communities in their self-assessment, in accordance with the values of justice and equity.

A fair engagement from the experts includes contributing to the development of a practical radiological protection culture for citizens involved in co-expertise processes, helping them to characterize the radiological situation and the potential impacts on their day-to-day life while preserving their autonomy. Such a contribution encompasses many ways, several of which have already been mentioned in other chapters, for instance: allow the access to pluralistic scientific information and multidisciplinary expertise, support people to make their own measurements without imposing it to all individuals, help them to interpret the results, share the results with everyone, help to understand and use the radiological protection criteria and possibly assist people to build their own reference system. It has to be considered with a sustainable implication of experts to avoid the pitfall of leaving people alone.

Any protective action can have advantages and disadvantages for those for whom they are intended or for other people: disruption of daily life, loss of goods or values, separation from loved ones, transfer of risk, appearance of new

risks, etc. In order to contribute to doing more good than harm, i.e. to respect the values of beneficence and non-maleficence, the experts should favour a joint assessment of the advantages and disadvantages of decisions with affected people within the co-expertise process. This should be considered by assessing protective actions or combination of actions, taking into account the prevailing circumstances for the individuals and the communities as well as their own values.

2.2.2. Promoting fair decision-making processes

Decisions involve consideration of many dimensions and the radiological issue is just one of them. In post-accident situation, the radiological experts need to acknowledge that their background is not sufficient to address the complexity of the local situation. There is a need to promote a pluralistic approach and a multidisciplinary view by involving experts from different origins and from different disciplines. In such a context, it is not easy to address the non-radiological factors in the assessment and management of the situation and to set up the rules of cooperation between these experts themselves and with local citizens, notably with the distrust of public experts and authorities after a nuclear accident.

However, the interdisciplinary cooperation is essential to properly balance the different components in the decision-making process and to prioritize the decisions considering as much as possible the diverse dimensions of the situation: preservation of health, protection of environment, maintenance of economic and societal activities. Promoting such a process for the co-expertise could reinforce the robustness of the decision-making process with due consideration of the value of non-maleficence and the autonomy of decision of affected people.

At the local level, it is essential for the experts to consider carefully the equity between all concerned parties, ensuring that no individual or group of individuals is discriminated compared to others. Adopting a global and average approach is generally not adapted to the post-accidental situation in the long-term. Addressing equity is a concern in particular with regard to vulnerable groups such as children, pregnant women or the elderly, or people who are constrained by protective actions without benefiting from them.

Special attention should also be paid to the protection of future generations who are not involved in the co-expertise process but who will bear the consequences of the decisions to be made. Addressing the issue of transmission of the situation to the next generation is therefore a necessity. Compliance with the values of justice and equity will also help to find compromises between the inevitable conflicts of interest generated by the complexity of the situation. Experience shows situations and expectations can vary from one community to another, and radiological protection issues can be quite different.

Thus, in this context, experts have to adapt their expertise to each local specificity and individual's need, without any preference or special privilege. For instance, experience shown a lack of support from experts to communities of evacuees not returned to their homes. It was generally not considered as a priority while in fact those people were left alone with their concerns and expectation, even suffering discrimination. Testimonies reflected that those who left suffer as much if not more than those who stayed or returned. These evacuees

need support, in compliance with the values of beneficence, justice and equity. In that perspective, some questions should be dealt with, such that the obstacles to reach these communities, the difficulty for the experts to be committed outside the contaminated areas and even how radiological protection experts can help them.

Ensuring the dissemination of the experience achieved in a specific local community to others are key elements to promote justice and equity. Despite the limitation of available resources, promoting the networking among affected communities and sharing experiences is a way to stimulate the development of co-expertise processes and to favour the implication of experts with a larger number of affected communities. All concerned parties should cooperate in such a dissemination, with the support of the local and national authorities, by being attentive to the needs and expectations from communities that are not yet engaged in a co-expertise process. It should be done respecting the autonomy of each local community facing common but also different issues. Transparency, including notably the traceability of local experiences, would help to organise the access to information and to share these experiences with other communities.

The contribution of experts should be organised not only at local and national levels but also at international level. Indeed, thanks to their networking with their peers around the world, the experts are able to relay information from the local to the international and vice versa. It could help sharing information, contribute to a better understanding of the actual situation and mitigate misinterpretation, false rumours and discrimination. This information can take the form of reports or publications intended to ensure the traceability of data and actions and to facilitate subsequent research. In doing so, experts will need to exercise restraint so that local citizens do not feel like “guinea pigs”. Globally speaking, the experts can play the role of “The Ferryman” illustrated by both paintings made by the Japanese and French artists Utagawa Hiroshige and Jean-Baptiste Corot, which bear this title. To be fair and efficient, such role should be played in accordance with ethical values such as transparency, equity, prudence and dignity.

Experience from Chornobyl and Fukushima has shown that to be credible, experts must not only master the scientific basis of radiological protection and its practical implementation (Accountability), but must share openly all information they own and recognize their limitations (Transparency) and deliberate and decide together with stakeholders (Inclusiveness). Here we find in action the procedural values highlighted by the radiological protection system.

2.2.3. Mandate and institutional commitment

While the disruption of administrative, economic and social practices after a large nuclear accident leads to a change in the political governance of the affected areas, notably by further involving the relevant parties at local level, the co-expertise process also creates a change in the governance of expertise. The experts should be prepared to take and/or support initiatives as soon as possible in the recovery phase, i.e. to establish dialogues with the population, its representatives and notably those who invest themselves as

citizen-experts, in order to share experience and knowledge, to engage affected people in measurements and sharing results, to identify and implement protective actions and to organise citizen vigilance as well as the implementation of local socio-economic projects. Such initiatives should be carried out in a multidisciplinary mode taking into account the multidimensional feature of the situation. Further, the experts should stimulate and support initiatives of the same nature from local parties. They also should respect local projects even when they are not in line with the institutional approach. These initiatives, in accordance with the procedural values as identified in ICRP Publication 138, will greatly contribute to the increase of the resilience of the affected people. The experts who commit themselves in this way should be as much as possible prepared, supported and benefit from appropriate resources as well as a certain autonomy in their approach.

2.2.4. Addressing long-term sustainability and vigilance

In the long-term perspective, while there is a need to recognize that radiological protection is not necessarily the major issue for the local communities, the co-expertise process has to cope with the implementation of the optimisation principle in order to reach a level of exposure considered as low as reasonably achievable. This has to be done in a broader perspective, including the various components of the local situation in order to contribute to the well-being of the affected population in reference to the ethical values of beneficence and non-maleficence.

The evaluation of this achievement and the corresponding criteria should be agreed with the concerned parties. The restoration of the living and working conditions includes due considerations of health and environmentally sustainable protection with the long-term vision of the socio-economic development of the territory. From a radiological protection point of view, this long-term perspective needs to be accompanied with the organisation of the overall vigilance on the radiological situation comprising sustainable and adequate radiation monitoring and health surveillance of the affected population.

Considering ethical values may also guide the allocation of resources and the choice of priorities for deploying co-expertise processes. Commitment to co-expertise is time-consuming and resource-demanding for all concerned parties, particularly to ensure long-term commitment. For instance, it is difficult for the experts to be committed with a large number of local communities for a long time. While it is a duty for the national and local authorities to provide appropriate resources to address the situation, these are not unlimited and priorities must be defined.

The selection of the priorities should be made in consultation, in accordance with the values of inclusiveness, transparency, beneficence and justice. For example, in the long-term, during the implementation of a socio-economic programme aiming at a sustainable development of the territory, it is necessary to regularly evaluate whether its implementation ensures an adequate level of protection as well as a good and fair balance in the allocation of human and financial resources. On this basis, it is necessary to identify whether additional efforts

should be granted for certain local communities, if the support programme is still equitable and proportionate as well as if it addresses the expectation of affected communities.

Conclusion

The situation after a nuclear accident is very complex, including many dimensions among them the radiological protection may not be the major issue. All ethical values underpinning the radiological protection system provided by ICRP, both core values (beneficence/no-maleficence, prudence, justice and dignity) and procedural values (transparency, accountability, inclusiveness), are at stake in addressing such a situation on the long term.

The co-expertise process refers directly to ethical values. The difficulty is that in a context of plurality of points of view there is no value which is a priori dominating. What is preferable can only be a matter of democratic debate between the stakeholders. Finally, the co-expertise process is based on the recognition that to make sense for people confronted with radiation, knowledge about radiological protection must be anchored to their daily reality to allow them to act to improve their future living conditions. This is only possible if they are directly involved in the process and it requires putting ethical values at the service of the overall ethical objective of promoting individual well-being and the quality of living together in order to satisfy the desire for accomplishment to which every human being aspires (Ricœur, 1992).

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