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Rehabilitation of Living Conditions in Contaminated Territories:

The ETHOS Approach

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SUMMARY

The approaches applied for the management of post-accidental situations have revealed the multiplicity and interdependency of the problems at stake in such a context. These problems are not limited to the radiological protection dimension but are also related to psychological, social, economic, political and ethical ones. In this perspective, the new challenge for post-accident management is to improve the living conditions of the local population taking account of all the aspects of the life and to consider the long-term issue in the perspective of a sustainable development.

In order to present and discuss these different issues concerning the rehabilitation of living conditions in contaminated territories, the lecture will be focussed on the approach developed in the ETHOS project. This project was implemented in a village of the Republic of Belarus with the support of the radiation protection research programme of the European Commission. The global approach applied in this project addressed jointly the technical and societal dimensions and involved actively all stakeholders into a decentralised approach. The expectation was to obtain a long term commitment of all actors with a view to develop among the population a concrete radiological protection culture and to promote a rehabilitation process focussed on the living conditions of the local population rather than on the environmentally based approach.

Concretely, between 1996 and 1998, the approach adopted in the ETHOS project led to the setting up and follow-up of working groups involving inhabitants of the village as different as teenagers, young mothers, farmers, teachers or foresters. Each working group dealt with a specific facet of the private or social life in the village: the radiological protection of children, the management of the radiological quality of the milk production as well as the meat production, the education of children to living in a contaminated environment, the management of contaminated wastes and the shooting of a video film by the youth of the village.

The methodological steps which emerged from this approach will be discussed in this lecture and will be illustrated by the experience of some of the working groups. The main dimensions to be considered in the stakeholder involvement process are the following:

- Development of respectful relationships with the affected populations and relevant stakeholders
- Characterisation of the local situation in co-operation with voluntary stakeholders
- Construction of choices reflecting the local context and the concerns, constraints and values of the affected parties
- Development of a day-to-day radiological protection culture relying on personal commitment

After a brief presentation of the results and conclusions of the ETHOS project, the lecture will aim at discussing the lessons which can be drawn from this global approach especially regarding to the role of the radiological protection in the process of rehabilitation of living conditions in contaminated territories. Furthermore, the needs and developments which should favour such an approach will be discussed with specific emphasis on:

- the empowerment of the collective actors in the management of quality,
- the interrogation related to the radiation protection criteria,
- the needs for practical developments in radiation protection.

The ETHOS Project in Belarus

1996 - 1998

Synthesis of the major outcomes
of the ETHOS research project
on the rehabilitation of living conditions in contaminated
territories affected by the Chernobyl accident

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1. INTRODUCTION

The post-accidental situation in the territories affected by the Chernobyl accident is characterised by a high degree of complexity [1, 2, 3, 4]. In the first place, the inhabitants are confronted with a risk which is omnipresent in every facet of their everyday life but they do not know how to cope with it. They have the general feeling to be ignorant and to have lost the control on the simple and traditional situations they used to manage in the past. In such a context, the role of authorities and scientific bodies is pre-eminent. Everyone relies on experts to propose relevant countermeasures and on State to bring in the appropriate resources to implement them. However the economic environment is difficult, to say the least, and many proposed actions are not completed. This is reinforcing the general feeling among the population to be abandoned and deceived. Next, all realms of the private and social lives are altered. Ethical, social, economic, political, but also aesthetic and symbolic values are more or less seriously depreciated. As a result, the quality of life as a whole is perceived as being irreversibly affected. Moreover, the population is also confronted to contradictory speeches from scientific and political authorities who have different views on the situation according to their convictions and their strategies. Scientific controversies related to the long term consequences of living in contaminated territories, and particularly health consequences, are reinforcing the lack of trust of the population in the authorities and its general feeling of insecurity. The question of the development of the situation in the long term is also a concern which makes complex the management of the territories. The steady contribution of a significant extra financial and material aid from the Governments of the affected countries and from the international assistance is not a sustainable strategy.

Facing such a complex situation, how to restore the living conditions in contaminated territories? How to find a balance between the protection of the inhabitants and their quality of life? How to bring back the feeling of safety of the population? How to optimise resources in the long term perspective? The temptation is strong to adopt an analytical approach of the problems and to reduce this complexity by privileging one or two dimensions identified as key in the process of restoration. Because the origin of the problems lies in the contamination of the environment, there is a clear inclination to think that a well designed radiological protection program based on adequate criteria is the cornerstone of the process. Since the Chernobyl accident, the search for acceptable levels of exposure of the population was a constant priority of the successive programs implemented in the contaminated territories. It is not the place here to analyse in details how the debate about individual exposure limits evolved and how finally the regulation framework put in place in territories has been essentially driven by radiological protection criteria. Retrospectively it is evident that this approach was a strong blocking factor, not because of the severity of the criteria, but merely because of the role of exposure limits was misunderstood by most of the actors and did not favour at all a prudent and responsible attitude among the population. The radiological protection approach is not the only example of reducing strategy that prevailed within the last decade in the contaminated territories. The psychological care approach to cope with the stress of the population and the risk communication strategy which were also implemented all along the nineties did not bring any of the improvements of the situation that were expected [5].

In fact, in the light of more a decade of experience, the long term rehabilitation of the living conditions in the contaminated territories appears as a process to be constructed step by step

taking into account the characteristics of the various specific local and regional contexts [6]. No global and universal strategy seems to be adequate to cope with the variability of these contexts. Because, the consequences of the Chernobyl accident are affecting life in its individual and social dimensions, it is necessary to start off again from the day-to-day actions of the inhabitants. This means to look for all opportunities for improving the daily life and to give those affected the means to act by themselves, within the framework of the collectivity, to build a new normality. In this perspective, the direct involvement of the local communities turns out to be the only practical way to reach reasonable and accepted decisions balancing various and sometimes conflicting objectives such as radiation protection, quality of life and economic development.

2. THE ETHOS PROJECT

2.1 Initial objectives of the ETHOS strategic approach

Observing the shortcomings of the successive post-accident strategies implemented in the eight years following the Chernobyl accident, the ETHOS project was proposed as an innovative strategy for post-accident rehabilitation in order to better cope with the main features of the post-accident situation, notably with the long term social and economic dimensions [7]. A main goal was to create conditions for the inhabitants of the contaminated territories to enable them to become more autonomous actors in a rehabilitation process embracing the improvement of the local living conditions as well as increasing radiological safety. The recovery of self confidence and control among the population as well as the restoration of social trust were also key objectives in the ETHOS approach as they were considered as a necessary component in the rebuilding of security. The ETHOS approach was therefore based on a strong involvement of the population and surrounding community. A specific feature of the ETHOS approach was to avoid the dissociation of the social and technical dimensions of the post-accident management. In order to better take into account the observed complexity of the post-accident situation, an interdisciplinary approach was adopted involving a group of experts from the relevant following disciplines :radiological protection, sociology, agronomy, nature & life management, economics, social management of risk, technological safety, communication, social trust. Another characteristic of the ETHOS approach was to develop radiological safety as part of a more general improvement of the quality of life. This emphasis emerged due to several reasons, among them the observed social dynamic of loss and restriction resulting from the strategies focusing on solely on risk reduction. Since many factors affected the progress in radiological safety, for example the economic recession, another motive for aiming at a global improvement of the quality of life was to achieve solid and durable progress, but also to facilitate the balancing between radiation protection and other priorities in the local decision making processes. The ETHOS approach dealt with all the day-to-day aspects that were affected or threatened by the contamination among them: health (especially that of children), food, safety at home, professional life, social life, environmental quality, leisure time, economic value of local production, the future (especially that of children), individual and collective identities and culture.

2.2 The ETHOS project implementation

Initiated at the beginning of 1996, this three year project was implemented in the Republic of Belarus. The ETHOS project involved an interdisciplinary team of European researchers from the following institutions: the Centre d'étude sur l'Evaluation de la Protection dans le domaine Nucléaire - CEPN (radiation protection, economics), the Institut National d'Agronomie de Paris-Grignon - INAPG (agronomy, nature & life management), the Compiègne University of Technology (technological and industrial safety, social trust) and the Mutadis Research Group (sociology, social risk management) which was in charge of the scientific co-ordination of the project. The Belarussian partners in the ETHOS project included the Ministry of Emergencies of Belarus, the National Chernobyl Committee of Belarus as well as the relevant regional and local authorities concerned with the implementation site. A first mission in Belarus was organised in April 1996 in order to select the implementation site. An important selection

criteria was a voluntary commitment of the local community. After discussions and negotiations with local, regional and national authorities, the candidate village of Olmany in the district of Stolyn (Brest region) was selected. According to the Belarussian law (1991) the village of Olmany is located in a "voluntary relocation zone" where the estimated average annual individual exposures range from 1 to 5 mSv, the ground caesium contamination ranging between 185 and 555 kBq/m^2. Among the criteria taken into account for the site selection was the location of the settlement in a zone which, according to the Belarussian law, was not dedicated to a complete relocation and where the rehabilitation of the living conditions was therefore necessary. Another was the existing social network including families with children, and the clearly expressed willingness of the population to participate in the project.

The village of Olmany (1265 people) is linked to a collective farm of roughly 1800 hectares whose main production is milk, wheat and meat. Problematic contamination levels of privately produced food appeared to be a real concern for both the population (notably the mothers) and the local authorities. Tradition is very deeply rooted in the social organisation, and the population, contrary to other districts more severely affected by previous relocation policies, has a large proportion of young people (369 people less than 17 years old). Only a few families with very young children left Olmany when the consequences of the accident in their village were officially recognised in 1991. Despite an on-going political debate concerning the possibility of relocating the population of the village there was a firm opposition from most of the inhabitants to leave.

A co-operation framework was signed in July 1996 between the European research team and its CIS partners at three administrative levels: the Chernobyl Ministry of Belarus, the District of Stolyn, the village of Olmany (represented by the collective farm). According to the terms of this framework, each party committed itself to provide the project with the necessary means for involving its representatives. The European participation was clearly restricted to the involvement of the research team and the corresponding expenses (travels and subsistence). The participation of the Belarussian partners was by no means financed by the European part. Humanitarian support was therefore strictly excluded from the project in order to ensure the sustainability of the results to be achieved. A series of 12 missions of about 10 days each were made between March 1996 and December 1998.

2.3 The methodology developed throughout the ETHOS project

The preparation of methodological guidelines was initiated during workshops held in Paris and Stolyn involving the interdisciplinary research team during the first semester of the project. Among the principles elaborated by the participants was the absence of a unique model to represent the local situation in Olmany. Although stating that a systemic and interdisciplinary understanding of the situation was needed, the participants also acknowledged the absence of a ready-made methodology given the complexity of the local post-accident situation. In order to cope with the real situation and also to benefit from a continuing interdisciplinary analysis of the problems at stake, the participants decided to build the action from the confrontation with the local situation and from its interactions with the local actors. The next step in the project was to engage a dialogue with the population of the village in order to encourage co-operative actions with the local inhabitants and to involve them in the project. A general public presentation of the project to the population was

organised in the village in July 1996 with the participation of some one hundred and fifty inhabitants and the research team. Two main concerns were raised by the population during the discussions: A first category of questions was: “Do you think we can live here with our children ? Are there any risks to our health ? Should we leave this area or can we stay?” Taking into account the difficulties created by the population’s distrust in experts, the research team expressed its ethical position as refusing to make decisions in the place of the people confronted with the contamination while proposing to help those having decided to stay in the village to improve their safety and their quality of life. This response led to questions from the population such as “What would you do? Would you come and live here with your children? which were then answered by each team member on the basis of his personal feelings towards the situation. The population also expressed a feeling of “being treated like guinea-pigs“ by scientists, “without any kind of benefit for the inhabitants in return,” and a kind of scepticism about the potential benefit to be expected from the project for their village. This made it necessary for the research team to commit itself to adopt as a main goal the practical improvement of the real local situation in the village of Olmany during the lifetime of the project. To adopt the objective of studying the situation in Olmany for proposing future improvements after the end of the project in Olmany and in other contaminated villages would have been a different option. All the actions taken by the research group had to aim directly at a concrete improvement of the living conditions in the village within the lifetime of the project. In the later stages, this commitment appeared to be a key methodological option in the ETHOS approach since it involved reshaping the objectives of the actions engaged according to the views expressed by the population with regard to its priorities and concerns.

From the contact established with the population several working groups involving local volunteers were created and dedicated to a specific objective, such as: the radiological protection of the children, the production of clean milk, the marketing of privately produced food, the diffusion of a practical radiological culture at school, the involvement of young people in the general rehabilitation process and the management of domestic radioactive waste.

2.4 The main results of the ETHOS project

The main results of the ETHOS Project can be summarised as follows. The inhabitants of Olmany have gained a more precise and reliable picture of the radiological situation within and around the village. The production of milk with less than 111 becquerels per litter (contamination limit for marketing) has increased from 25 to 55% in winter and from less than 10 to about 80% in summer. The economic circuits with the district and the non-contaminated zones have been restored for milk and meat. The average internal contamination of children has been reduced by at least 30%. Many villagers have recovered self confidence and initiative. The objective of the ETHOS team is now to apply the approach in the other contaminated villages of the Stolyn district. This second phase which has been planned in close co-operation with the Belarussian national authorities will start at the beginning of year 2000 for two years and will involve new stakeholders, particularly at the district and regional levels.

3. THE INVOLVMENT OF THE LOCAL POPULATION WITHIN THE ETHOS PROJECT

3.1 The involvement of mothers in the radiological protection of the children

The first discussions with the inhabitants of Olmany revealed that mothers were quite anxious about the health of their children [8]. Mothers expressed concern based on the relatively bad picture drawn periodically by the medical doctors examining children at school. This concern was also reinforced by the general context of scientific uncertainty surrounding the long term consequences on health of living with the contamination. A dozen young mothers joined the working group proposed by the ETHOS team with the objective of better understanding the situation with regard to their children and to explore the possibilities of improving the state of their health. The first meetings showed that ten years after the Chernobyl accident, despite all the measurements of the contamination performed over the years, the mothers of Olmany were not able to say anything about the levels of contamination in their environment nor the mechanisms of exposure of their children. This was obviously not due to a lack of understanding but because the available information had never been shared with the population. In response to this situation an attempt to teach the mothers about the basic radiation protection concepts and principles turned out to be useless and even counter productive by increasing the level of confusion. This led the working group to adopt a more pragmatic approach by involving directly the members of the group. It was then decided to start with a measurement campaign of ambient dose rates in houses and gardens. First, a few mothers were taught how to perform dose rate measurements in their own homes and gardens with radiation meters brought by the ETHOS team and how to mark the results on schematic maps. Within a few months, several tens of maps were produced and initiatives were taken to extend the measurements to various places all around the village where children played.

The results of the campaign opened the way for new discussions within the working group. Several points emerged from this exercise. The first one was the need to relate the measurements to some reference values. The value of 0.15 microsievert per hour, corresponding to the average ambient dose rate associated with the natural radiation background in France, was adopted as a reference. The second point was the characterisation of the situation. The levels of ambient dose rates within houses were all below this reference value except those close to or inside stoves due to the presence of contaminated ashes. Nearly half of the ambient dose rates measured in gardens were higher than 0.15, especially those close to wood piles and manure heaps. The highest values measured in the environment were found in the forests surrounding the village.

Based on this information, the group created a dose rate scale giving mothers advice on how to behave according the level of ambient dose rate and the time spent in a given location. The values of 0.15 and 1 microsievert per hour (corresponding respectively to an annual dose of about 1.3 and 8.7 millisieverts in case of an exposure time of 8700 hours) were selected to characterise the three ranges of the scale.

The second phase of the work focused on internal exposure with the objective of gaining a better understanding of how children were contaminated through the ingestion of foodstuffs. Mothers did not know how to estimate and manage this type of exposure apart from banning

the consumption of food not respecting the enforced contamination limits by authorities. In a first step some voluntary mothers noted down in details the daily diet of their children including the quantity of each food and its origin. Parallel to this action a measurement campaign of all foodstuffs consumed in the village started. Because of the large variability of the diet and the wide spectrum of levels of contamination, it was impossible to consider an average daily diet and an average contamination level of the foodstuffs. An individual approach was therefore adopted. Each participating mother with the help of the group reconstituted the intake of her child(ren) for a few days considered as representative in terms of diet and contamination. Based on all measurements performed the group was then able to draw a “foodstuff table” including the various foodstuffs to be found in the village classified according to the range of levels of contamination. All products were divided into three categories depending on their sensitivity to contamination: highly sensitive products (considerable variations and high contamination levels), products with a low degree of sensitivity (low, slightly variable contamination) and “neutral” products (mainly products bought in shops which were generally not contaminated or only slightly). Mothers were then in a position to predict crudely the number of becquerels ingested by their children in one day as a function of their diet and the level of contamination of the foodstuffs.

This process provided opportunities to regain control over the contamination of their children. The most striking was the fact that, depending on whether the level of contamination of the foodstuffs available in the village was assumed to be the minimum or maximum, the same diet could lead to a difference in the daily intake by as much as a factor 20. These results also demonstrated that, assuming a constant diet and daily intake over the whole year, the corresponding annual individual doses could range from a fraction of millisievert to a few millisieverts. Furthermore, only the few foodstuffs indentified by the authorities as potentially dangerous were found to be mainlyresponsible for this large variation. This latter result was a revelation for the mothers of the group indicatng that all previous warnings concerning these products had been meaningless.

Similar to the ambient dose rate scale, the group developed "an internal contamination scale "giving advice about the daily intake of becquerels. The concept of an annual budget of intake was adopted as a means to introduce some flexibility in the management of the diet according the level of contamination of the food. A daily intake of 50 becquerels (corresponding to an annual budget of about 20 000 becquerels and an annual dose of about 0.2 millisievert) was retained as the target value to keep doses at a reasonably low level and the value of 300 becquerels per day (100 000 bequerels and 1.3 millisievert per year) as the frontier beyond which it was not recommended to go.

These discussions allowed the group of mothers to change profoundly their attitude towards the management of the situation. Previously the concentration limits for foodstuffs enforced by the law were understood as values to judge if a food was "clean" or "dirty". As many products of Olmany were much over the limits - as for example mushrooms and berries picked in the forest but also most of the milk products - their banning was logically seen by the mothers as the only possible strategy to protect their children. However the total elimination of these products, and especially milk products, was difficult to envisage without introducing a severe dis-equilibrium in the daily diet, without speaking of the general economic difficulties limiting the opportunity to buy clean products in the village store. As a result, when mothers used products, knowing they were not respecting the regulatory limits,

they felt guilty. They overcame this very uncomfortable situation by deliberately ignoring the levels of contamination of the products they were using. The major consequence of this easily understood attitude was that all contaminated foodstuffs, irrespective of their level of contamination, were considered by mothers to be the same. In such a context, an ALARA attitude in which preference should be given to less contaminated foodstuffs, was not possible.

The work on the diet and the scale gave the mothers the opportunity to get a grip again on the situation. Breaking the concentration limits from time to time was no longer felt as a problem as long as they had the feeling they could maintain globally the annual budget of intake below the target adopted by the group. The meaning and the role of the concentration limits were reinterpreted as a quality objective and the mothers realised at this occasion that the policy enforced by the authorities was rather ambitious and perfectly in line with the objectives of the group. This was an important point as far as the restoration of confidence in the administration was concerned. The work also pointed out the importance of each possible improvement with regard to the quality of the food available in the village and the obvious links between the strategy developed in the group and the strategies developed by the other ETHOS working groups, especially those dealing with the radiological quality of the meat and the milk.

At that stage, the question of the control of the effectiveness of their actions became an issue. It was soon recognised that the best and only way was to co-operate with the doctors responsible for monitoring the children’s health. So far the relationships between mothers and the medical doctors, who visiting the children twice a year through the school system, were rather difficult. In fact doctors, facing a health situation with all their indicators showing a downward trend, were tempted to make the mothers feel guilty because they were not following the official recommendations, especially with regard to the banning of the most contaminated food products. On their side, mothers, not at all informed about the means to manage the radiological situation, were facing the dilemma of providing their children with the food they liked - although contaminated - and also struggling with the economic situation reducing the opportunity to buy clean products.

A meeting was organised by the ETHOS team with the health authorities of the Stolyn District to present the experience of the mothers' group. This was received positively by the doctors who rapidly foresaw a new perspective for their prevention role in the contaminated areas. As a result, a paediatrician and a health physicist volunteered to work with the mothers' group in order to develop a protocol to follow the health status of the children. The protocol was put in place at the beginning of 1998 for a dozen children including clinical examinations and whole body monitoring. After a few months, the first results of this follow-up verified that the internal contamination of the children was significantly reduced. The reduction was not only remarkable for the small group of children surveyed by the paediatrician but was general among all school children. Between July 1997 and December 1998, the average reduction of the body contamination (expressed in becquerels per kilogram) for the children was more than 30%.

This result opened discussions about the respective contribution of the various actions undertaken in the other working groups to improve the radiological situation of the village. The group realised that in fact the improvement measured at the level of the children was the result of all combined actions implemented within the ETHOS project without the possibility to discern any particular action that could explain alone the evolution. Particular attention was

given to the effectiveness of the various stays of the children outside the contaminated territories in sanatoriums during the course of the school year and abroad during the summer holidays. These stays organised by the authorities are rather disrupting for the school work as well as for the family life. However, for many families, they were considered as the only effective measure to reduce the impact of the contamination and perceived at first as a legal due. For example a 14 year old school girl with an average daily intake of 250 becquerels including a period of 30 days in a sanatorium was considered to evaluate the effect of a stay in sanatorium. In this particular case the situation of the whole body contamination of the girl at the end of a 70 day period would have been the same just by reducing the daily intake to 120 becquerels on an average (0.5 millisievert per year) without leaving the village. For those children ingesting more than 200 becquerels per day the objective of 120 Bq/day was considered perfectly achievable given the new situation allowing a better management of the radiological situation. This finding triggered lively discussions among the mothers but also questioned the authorities. Until today, no decision was taken about this issue but the question of the effectiveness of the sanatorium's stays is clearly an issue to be looked at carefully in the future.

It is too early to draw conclusions about the real impact of the actions implemented by the mothers' group. From the medical point of view it will be difficult to see improvements, if any, before a few years, taking for granted that mothers will maintain their vigilance. However, it is interesting to mention that during the three years a profound change with regard to radiological protection took place and several interesting lessons can be drawn. The first obvious one is the negative role of limits as long as they are interpreted as a boundary between safe and unsafe. This is a strong blocking factor which is discouraging those confronted with higher levels to develop an ALARA attitude i.e. an attitude where every opportunity to reduce the external exposure or the intake of becquerels is exploited. The process followed by the mothers illustrates how it is possible to develop a framework for setting acceptable levels of risks where limits are considered as point of reference to guide action. It is also noticeable that both scales developed by the group are based on a prudent attitude and on the active involvement of the mothers in the decisions related to the use of time (for external irradiation) or food (for internal contamination) and not on restrictions and interdictions. The ability to make for themselves measurements or to have direct and quick access to information, as far as the contamination of foodstuffs was concerned, was a key element in the adoption of the protective strategies. On this last point, the ETHOS project highlighted the lack of robust and easy-to-use measurement instruments on the market. Globally the mothers have demonstrated that radiological protection can be practically and effectively integrated within the day to day activities of the family in the fields of personal hygiene, education and diet. Who could be more effective than mothers within these spheres?

3.2 The management of the radiological quality of milk

One of the achievements of the ETHOS project was to enable private producers manage the radiological quality of their milk. From the early discussions with the population of the village, the problem posed by the radiological contamination of private milk appeared to be a source of concern. First, milk is an important part of children’s diet; however it was generally considered by the inhabitants to be homogeneously contaminated at the scale of the village. Furthermore, it must be noticed that the trade of private milk was stopped in Olmany after the accident because of its contamination, which has strongly perturbed the economy of the village. Finally, the inhabitants used to express strong doubts about the efficiency of the

countermeasures, having the feeling that the authorities did not really care about the concrete improvement of the daily life. The idea of constituting a working group emerged on this basis. Existing information on contamination measurements of private milk was collected and discussed with a group of volunteer private producers. It gave a more detailed picture of the actual situation. For example, in Olmany in 1995, it showed that although a proportion of the milk proved to be fairly contaminated, with values in excess of 2000 Bq/l, samples with fairly low contamination levels were also found. The private producers were then in a position to understand that the situation was not entirely bad from a radiological point of view and that it might be worth investigating under which conditions relatively uncontaminated milk could be produced at home.

A working group involving private producers, who volunteered to take part in the work, was created to improve the radiological quality of milk. One of the main aspects of the approach was to differentiate between the two production conditions, in summer and in winter. In summer, the production of milk is organised at the community level: the 400 or so private cows of the village are split into 7 herds. Each herd is allocated a specific pasture on the outskirts of the village by the collective authority (kolkhoze). In winter, the situation is completely different. The cows return to their byres next to the family homes and each producer can manage his resources (fodder, complementary products) more individually. It must be noticed that winter fodder has 2 origins: part of the hay is collected during summer by the producers, and usually comes from different places in the outskirts of the village (this hay may sometimes be very contaminated). Parallel to this, the kolkhoze provides each family with a certain amount (depending on the number of cows) of hay before winter (non contaminated hay).

As far as summer production was concerned, the working group started to assess the radiological quality of the milk for each herd, taking account of the different pastures in which the herds were grazing. They measured the contamination level of the milk produced by ten to twenty cows of each herd. In summer 1997, this work showed that only two herds (which were grazing in woodland areas) had specific problems, with milk contamination that might reach 1000 or even 2000 Bq/l. The other five herds which were grazing in pastures having been improved (countermeasures taken after the Chernobyl accident, consisting in ploughing pastures, sowing new grass and using a certain number of fertilisers to reduce the amount of caesium absorbed by the grass and, more particularly, transferred to milk) were less than 300 Bq/l. These results created a considerable stir in the village: private producers could see concretely the efficiency of the work of improvement of pastures made by the kolkhoze, and about which the population were expressing doubts. This contributed to the re-establishment of confidence between the producers and the kolkhoze, as they acknowledged the reality of the pasture improvement achieved by the kolkhoze. This provided the local population with considerable bargaining power and allowed negotiations with the kolkhoze which finally facilitated the use of “improved” pastures for the two other herds. Finally, after these two herds were moved, the contamination levels in almost 80% of the milk produced privately in Olmany in the summer 1998 dropped to less than 100 Bq/l, compared with less than 10 % in 1997.

As regards winter production, the situation was very different. The situation was not homogeneous across the village. Because each family managed the winter fodder resources individually, the radiological quality of milk tended to vary greatly from one producer to another, and also for a same producer within the winter period.

It became apparent that in order to improve his winter production, each producer had to plan ahead the distribution of his available resources (fodder, ferrocene – ferrocene, or iron hexacyanoferrate $Fe_4(Fe(CN)_6)_3$ is used as an additive in cattle fodder making it possible to reduce by a factor of around 3 to 10 the transfer of ^{137}Cs to milk, according to the results of studies carried out in Belarus, Russia and the Ukraine – etc). Fodder stocks needed to be separated out in the barn into stacks with different levels of contamination, requiring the producer to measure the contamination level every year before the onset of winter. The producer can then draw up a production schedule for the winter, using the most highly-contaminated fodder before the calving season (when the cows are not milked), using ferrocene with relatively highly-contaminated fodder, reserving good fodder for cows producing milk to be drunk by the family, using contaminated fodder for cows whose milk is given to animals etc.

Based on these " good practices " a simple optimisation model was elaborated to facilitate the realisation of such planning by producers. During the winter 97-98, a dozen private producers volunteered to test this simple optimisation model. They separated their different fodder stacks and measured the corresponding radioactivity. Then they established a feeding planning, taking account of the calving period, in order to manage their available resources in the most economical way. At the same time, observing the good results obtained in summer and the regain of interest of private producers in the improvement of the radiological quality of their milk, the authorities started to consider the possibility of trading private milk again, strongly encouraged by the district dairy facility which was suffering a lack of supply. Consequently the kolkhoze provided each private producer with a surplus of hay during the winter 1998. This action led to a significant improvement of the radiological quality of the winter production of private milk. At the end of the winter 97-98, about 56 % of the private milk production was contaminated less than 100 Bq/l (compared with approximately 25 % in the winter of 96-97). The impact of this ETHOS action was limited to those few producers who participated in this exercise. Consequently it was quantitatively marginal, but nonetheless qualitatively significant. It facilitated more general changes in attitude within the village, motivated by the possibility of restoring trade of private milk. It was enough to demonstrate to the other producers in the village, and also to the authorities, that such an approach where the population is actively involved, was feasible and was concretely improving the radiological quality of private milk.

As a consequence of the improvement of the radiological quality of milk both in summer and in winter, discussions began between the group and the milk factory which expressed its strong interest as regards private milk production. The milk factory facilitated the process and the trade of private milk started again in March 1999 in Olmany. This is of important economic benefit for the population and for the authorities, and is a guarantee of the sustainability of the work of the group.

3.3 The management of meat quality

For the private producers in Olmany the radiological contamination of meat has created two problems. Since nearly all the meat produced is eaten by its producers, the presence of contamination has rendered all the food products suspicious. However, "one has to eat", in particular when the food sold in the shop in the village has become too expensive for families

living in Olmany. The presence of contamination has also stopped the private meat business. Indeed, if a private producer wants to sell a pig or a calf, the contamination of the animal has to be controlled at the abattoir or the market in Stolyn. A private producer therefore has to pay for the transport of the animal, slaughter it, if it is a pig and, if the meat is too contaminated, risk being burdened with an animal that he is now certain is contaminated, knowing that the only possibility open to him is to give it to his own family to eat!

Starting from this situation, a group of private producers was created, those individuals most interested in improving the radiological quality of meat used for food and for sale. Each of the actors involved in the meat production network was contacted. Some were involved directly in the work of the group while others were kept up to date with its evolution. Discussions with the private producers showed that they were completely ignorant about the level of contamination of the meat. This ignorance fed a feeling of resignation and "loss": "we don't know what we are eating". Concerning the commercialisation of meat, producers said: "we cannot sell our meat at the market like before … the calves are sold at very low prices to the kolkhoze in Olmany". The group therefore decided to concentrate on two objectives: the evaluation of the radiological quality of the meat produced at Olmany and, if possible, to re-establish the meat production network.

The second stage comprised a study of the radiological quality of meat. Private producers and ETHOS team members carried out an inventory of the meat produced in Olmany. Next, the group decided to centre its actions on the two most important meats, pork and veal, and to collect measurements of their contamination. Measurements were taken of the quality of pork. For the veal, contamination was not easily measurable since the calves are sold live to the kolkhoze. The private producers took measurements for pork and observed that they were almost all under the concentration limit for commercialisation (370 Bq/kg). They were surprised by these results: the radiological quality of the pork proved to be quite good. These measures led them to "re-qualify" the meat for consumption and commercialisation. The group then searched for ways to improve the radiological quality of pork in order to decrease its contamination further. This objective meant that the producers had to control the contamination of the pork making sure that it stayed under the 370 Bq/kg limit and endeavour to improve its radiological quality taking into account the individual possibilities and the climatic conditions throughout the year.

The private farmers generally sell live calves. There are three possibilities open to them when they fatten a calf. Firstly - the most commonly chosen option - the animal is sold to the kolkhoze in Olmany. The kolkhoze buys the 100 kg calves, after weaning, at quite a low price and under bad conditions of payment in view of inflation in Belarus: producers are usually paid one year after the sale of the calf! However, the sale to the kolkhoze is advantageous since the producer doesn't have to pay for transport and there is no radiological control and therefore no risk of refusal. Other kolkhozes around Olmany do propose slightly higher prices and pay immediately. Finally, a third possibility is available and is clearly the most interesting economically: the kombinat at Pinsk buys bull calves (up to 400 kg weight) for a much higher price and pays immediately. In addition, at the kombinat, a sample of meat is taken for radiological control. If the contamination is too high, the private producer finds himself with 400 kg of non saleable meat which he is then obliged to take back with him for his own family. Producers have to pay for the transport in order to get to the kombinat: Pinsk is 80 km away from Olmany.

In order to improve this situation, the working group first tried to evaluate the importance of the private production of bull calves. The private farmers who fatten up their calves themselves generally obtain a better quality of meat than the kolkhoze in the village: calves are fed at the udder for a long period and looked after carefully by the producer who makes sure that there are only one or two calves. With this knowledge, the group studied how to increase the private production of bull calves. Another objective was envisaged in order to increase the incomes in the village: if private producers sold their calves outside the village, this results in a loss for the kolkhoze at Olmany and therefore the villagers also since the kolkhoze earns less revenue and consequently has more difficulties assuring the multiple services that it has to deliver to the inhabitants (clean hay, veterinary services, incomes etc.). The Belarussian kolkhozes, and particularly the kolkhoze at Olmany, are confronted by a dilemma between their social and their economic functions. For example, the radiological countermeasures are implemented both as a health and social action, since clean hay is given to inhabitants and clean meat is supplied to the country. This measure also has an economic function since in order to sell its bulls, the kolkhoze in Olmany cannot produce meat which is contaminated over the limit of 600 Bq/kg. However, the more an area is contaminated, the more the countermeasures are numerous and expensive. In addition they employ people without necessarily having a lot of work to give them since they function as the “social security” of the village. But the kolkhozes also have economic imperatives. Consequently, they are in competition amongst themselves for the purchase of calves weaned by the villagers that they can fatten up and sell to the meat factories.

A protocol concerning the fattening of the calves was established with the veterinarians and private producers, incorporating an evaluation of the contamination of the animal based on a direct contact measurement. In this way the private producer finds a way of managing the fattening of his bull and operating some choice over its date of sale. If he wants to sell his calf at 300 kg and realises that it risks being rejected on the grounds of radiological control, he can continue to fatten his animal a bit longer to try to eliminate the contamination. The protocol is not yet satisfactory however, since it does not offer enough guarantees to the producer: the sale of a calf depends on the will of the veterinarian, the will of the kolkhoze to supply clean fodder, the possibility of transport, etc. This arrangement, therefore, remains quite fragile. The actors in the meat production network in the district seemed to be interested in a more overall agreement. The stakeholders concerned with the transformation and distribution looked to supply healthy products, in particular having lower levels of radioactivity and considerable controls are applied at each step of the meat transformation process. However, the meat networks were handicapped by seasonal shortage from May to October. Indeed, if the kolkhoze network is highly structured, all the private potential for production remains under-exploited despite the efforts to establish contracts between the kombinats and the private farmers (not including the kolkhozes).

The private farmers in Olmany wanted a follow-up of the quality of meat production and more realistic incomes; the kolkhoze needs to secure its supply and the kombinat in Pinsk wishes to develop private meat production and to secure its supply. Taking into account these common interests, after several working group sessions with the various individuals involved, a tripartite contract between a private producer, the kolkhoze at Olmany and the kombinat in Pinsk was drawn up. This contract was based on the following principles: 1) the private producer fattens bull calves up to a weight of 400 kg – this represents the threshold, which has a more interesting quality-price ratio for the producer at the kombinat, 2) the kolkhoze in Olmany assures the supply of clean hay to the private producer and delivers veterinary and

radiological services which are no longer considered as profitable below a weight of 100 kg, the threshold beyond which the kolkhoze makes a profit and no longer represents uniquely a social action (indeed, the producer has then made the choice to continue to fatten his bull), 3) the kombinat at Pinsk guarantees good conditions of payment, by making an advance payment to the kolkoze, 4) the district authorities control the validity of the contract based on this protocol.

This contract guarantees good radiological quality and follow-up. It could increase trust between the different actors in the meat production network. It allows the development of private rearing, an important issue for the entire population and source of revenue for all concerned. It is also a strong sign for the producers of the coupling possible between the improvement of the radiological quality and economic development. Today, the contracts have been validated by all concerned but have not yet been signed. A meeting in December 1998 between the kombinat of Pinsk, private producers, the kolkhoze of Olmany and the administration of the Stolyn district showed there were not sufficient conditions for an agreement. The application of such a contract necessitates a long and subtle process (the fattening of a calf over 400 kg takes more than a year) and the risk still exists for each contractor to lose money. The district administration controls the application of normal contracts but this kind of contract needs a “facilitator”, accepted by all the stakeholders, who could enforce the role of each actor. The ETHOS team has played this role of contributing to the building of confidence between the actors of the meat networks during the period of the project but the implementation of the “meat quality” contract needs a facilitator who could work to re-build the food networks in the contaminated areas.

3.4 The education of children living in the contaminated territories

The involvement of the school of Olmany in the ETHOS project started in the very beginning of the project and resulted in various types of co-operation with the local teachers as well as with the school institution. This co-operation lasted during the whole project. It was filled with re-orientations, stops and starts. However it resulted in very successful outcomes particularly in the perspective of the future dissemination of the ETHOS approach. Many teachers were personally interested in the ETHOS approach and participated actively in other groups. Whereas the other groups started with the free participation of local volunteers acting as private people, the co-operation with teachers at school had from the beginning an institutional dimension which was at the origin of specific challenges. Three main phases can be distinguished in the co-operation with the school.

The first phase is that of a “romance” between the research team and the school. Privileged relationships were established since the first missions. The objective of educating the population, of providing the children with practical knowledge on radioactivity was immediately shared by the teaching body which encouraged the project. Introducing specific modules dedicated to the problem of contamination was not however something new in school as the existing programmes already included the diffusion of theoretical knowledge on radioactivity but mainly as a part of the civil defence education. The existing pedagogic material did not address the practical problems caused by the contamination in the day-to-day life of the population. The local director of the school opened widely his institution to the European team. The first meetings were held in the school premises while the research team found it very convenient to adopt it as a first platform to start the project. Specific projects with the school were started in this first phase. The director appointed three teachers to start a

co-operation with the ETHOS team. The first objective was to develop specific learning modules involving the active participation of pupils and relating to problems linked with the contamination. The three involved teachers did not however constitute a working group at this stage. Each appointed teacher started a specific project in co-operation with the research team. The results of this first action were modest but real. During this first phase, the problem of the motivation of the involved teachers was raised as they provided professional work requiring a great deal of time outside school hours. The continuation of the co-operation therefore appeared to imply additional remuneration.

The second phase was a clear step back for the research team in relation to the school. The project developed diversified activities and co-operation with different types of actors in the village as well as in the district. As the research team decided to rent, as an office, the old presbytery in the village, the school no longer appeared to occupy a central position in the project. According to the co-operation framework of the project, the question of the teachers' motivation was discussed with the national partners of the ETHOS project in order to examine to what extent a specific Belarussian budget could be raised for this task. At the request of the Ministry for Chernobyl a project foreseeing the implementation "of a new pedagogy for the contaminated areas" was prepared, notably to justify the allocation of a specific Belarussian budget including complementary remuneration for the participating teachers. This project described practical work for the pupils tackling problems related to contamination under several angles (ecology, agriculture,…) by several disciplines, in the frame of a local club involving children and teachers. This project received support from the national EMERCOM administration but met strong opposition from the representatives of the education authorities in the district. As the project entered the domain of pedagogy it was perceived by the district administration as competing with the official programmes which were in the process of being established. Concerning the physics of radioactivity, this official programme remained very theoretical and far from the everyday life of the children. Despite those negative reactions from the education authorities, the project was presented to a group of school teachers of Olmany, in the absence of the school director, in October 1997. The reactions were mostly favourable but it was made clear that nothing could be done without support from the director and from the education head in the district authorities.

This led the research team to adopt a different approach during the third year of the project (third phase) in order to take into account the above difficulties. It appeared that each of the other working groups had produced valuable material in terms of practical radiological culture directly linked with the everyday life of the population in the village. Moreover, many teachers had been actively involved in a personal way in those groups during the two first years of the project. As the other working groups had already achieved very positive outcomes, a basis for interpersonal trust between the research team and the involved teachers had been established. At the same time EMERCOM confirmed its willingness to support the development of a practical radiological culture among the children in the village of Olmany. The research team decided to reorientate its approach adopting a different perspective as regards the co-operation with the school. The revised objective was to co-operate with the school of Olmany and with the district head of education in order to exploit, at the pedagogical level, the existing outcomes of the ETHOS working groups in terms of practical radiological culture. It was clearly stated that the Belarussian partners were providing the new project with pedagogic expertise whereas the research team was acting to facilitate the transfer of experience. A group of seven teachers accepted the principle of participating in this new group. Six of them had previously participated in other ETHOS groups. Modest

remuneration was provided by the EMERCOM administration. However the volunteers stated that their participation was mainly motivated by a personal commitment for the future of their village. The new orientations were presented to the district administration of education which adopted a more positive attitude. This change can be attributed to several factors: a better characterisation of the role of the different partners (the pedagogic expertise clearly belonging to the Belarussian part), the existence of a group of volunteer teachers from the school of Olmany, the financing by and commitment from the EMERCOM ministry, the existence of relevant material on radiological culture emerging from the ETHOS project in general. The district administration of education accepted the project and proposed to organise a seminar at the end of it with the participation of other villages from the contaminated zones.

Very effective and productive work was then achieved by the "education group" of teachers in co-operation with the research team within the last quarter of the ETHOS project and resulted in a district seminar chaired by the district head of education in December 1998. The director of the school was entrusted with the task of co-ordinating the administrative aspects of the education group. It appeared that the existing group of teachers already involved in other ETHOS working groups were in best position to operate this transfer of practical radiological culture. However the research team was actively involved in the preparation of the pedagogical modules with the teachers as well as in the reporting and drawing up of the conclusions of the seminar.

3.5 The youth video project

The young people of Olmany form an important social group in the village. The 16 to 25 year old have either just left school, are searching for work, preparing for military service or further studies, are young parents or are students working in the locality. They play an important role for the future of the village. At the beginning of the ETHOS project, the research team faced difficulties in approaching the subject of the radiological situation with the young people. A long period - over six months - of talking and listening to young people through interviews and informal discussions, showed that they saw their future prospects diminishing in a context of unemployment and a lack of economic activity. Working either in the garden or in the house, collecting wood or other products from the forest when they were not studying, the young people appeared to be completely uninterested in the subject of the radioactivity. There appeared to be no one obvious way of starting constructive actions with the young people. According to the conclusions of informal interviews with the youth, the research team proposed the idea of working on a project that would capture their imagination: the making of a video film describing the life of the village during the four seasons of a year. A small working group was formed in February 1997. Twelve months later, the young people had learnt how to use the camera equipment and had filmed several hours of video-tape depicting scenes of the nature surrounding the village, the work in the fields, the festivals, the school life. However, exploring the village with the use of the video camera alone had not enabled the young people to approach the subject of the radioactivity. The videos showed the beauty of the local environment and principal events of the life in the village but the problem of contamination had been by-passed altogether.

Having produced several hours of descriptive film the group, faced with a lack of motivation, entered a new phase in its activities. Some animated discussions took place where the European participants highlighted the absence of the issue of contamination and the paradoxical contrast between the peaceful village scenes filmed so far and one recent dramatic

sequence, filmed by two group members, where doctors described the effects of contamination on health and blamed the mothers in the village for their children's state of health. The young people took a step back from their work and reflected on the theme that the film was going to convey to its eventual viewers. Their question was how to represent the subject of contamination which is invisible. Deciding to carry out interviews with inhabitants, investigating further the problems that the contamination posed for the characters in the film, the young people set out to present the various interpretations of the problem from the point of view of the villagers. Re-motivated to continue their work, they learnt how to edit their work and gradually built up a video involving interviews with a wide variety of inhabitants concerning the radioactivity.

3.6 The management of contaminated wastes and long term environment protection

The last working group to be set up dealt with the management of the contaminated ashes from stoves and fire places in houses. The starting point for the group was the discovery by the mothers' group that the ambient dose rates measured close to the stoves were some ten times higher than in the rest of the house due to the presence of contaminated ashes. Although they rapidly concluded that the potential impact of these high dose rates did not pose any particular problems in terms of external exposure, they considered that the use of these ashes was a problem to be looked at. Was there any risk that this type of waste might contaminate the environment on the long term, given that most of the villagers used to spread the ashes as fertiliser in their gardens? Facing this question, a few mothers and some foresters expressed the wish to better know if the spreading of the contaminated ashes was a potential problem for the future. From a strictly radiological protection point of view, examination by the ETHOS research team of the various studies carried out on the potential impacts of ashes revealed that individual doses from ingestion and external exposure would never exceed a few tens of microsieverts per year. Nevertheless, the re-use of ashes as fertilizer is part of a process which may have significant consequences in the long term. It was estimated that, from a contribution to the annual individual dose from about 15 microsieverts in 1996 associated with the use of ashes as fertiliser in the garden, it will reach about 30 microsieverts in 2016. In fact, the question of ashes has not to be posed in terms of radiological exposure but the re-use of ashes is part of a process which slowly and continuously increases the contamination of the environment. This aspect was pointed out through simple calculations performed together with the villagers on the basis of local conditions concerning the production and the use of ashes. It was estimated that the annual production of ashes in the village as a whole represented several hundred kilos per household, since wood is used for cooking and heating, several hundreds tons in all for the whole village. Therefore, assuming an average contamination of ashes of 50,000 Bq/kg**,** this corresponds to a total activity of 11,200 MBq/year 'imported' in the village. Considering that all ashes are spread onto the gardens in the village), the annual input is about 37 kBq/m^2/year, i.e. 26% of the initial deposition of 187 kBq/m^2 corresponding to the deposition in the garden at the time of the Chernobyl accident.

In the wake of these discussions, a working group was set up with mothers and foresters. Its first task was to gather data on the contamination of ashes, to find out where the wood came from and to describe how it was used (cooking or heating), with the view to determine how much margin there was for reducing the production of contaminated ashes. Was it necessary

to select the wood used, as the forestry workers suggested or to focus on the collection of ashes as suggested by the household? The members of the group started with the measurement of samples of ashes from their stoves covering various origins of the firewood. All measurements were far in excess of the 1000 Bq/kg concentration limit above which contaminated materials are considered as radioactive waste. The average concentration was found to be in the range of 30,000 to 50,000 Bq/kg with some values even exceeding 100,000 Bq/kg. The first reflections of the working group focused on the upstream selection of wood according to its origin and on the possibility of separating out the bark which was more contaminated than the rest of the wood. It was rapidly concluded that the selection of wood was not realistic because of the limited amount of wood available and that the techniques required for the separation of the bark were too sophisticated to be implemented in the village. Downstream, the working group envisaged setting up a system for collecting and disposing of ashes with sufficient quality and allowing a sustainable management for the environment. Technical solutions involving the population were envisaged for the collection of ashes and the working group established some contacts with the authorities of the village and the district in order to set up such a system. The conditions for implementing a collection and disposal system were still under discussion at the end of the ETHOS project in the village of Olmany. Waiting for the setting-up of such a system, many persons in the village stopped spontaneously to spread ashes in their gardens and started to gather them in a confined place as remote as possible from daily activities.

Within the short time of its existence, the "ashes' group" did not come out with concrete actions to manage collectively the question of the contaminated ashes. However, the discussions and experiences performed by the group revealed some interesting aspects of the decision making processes related to the management of the contamination. Although ashes can be considered as a minor problem from a strict radiological protection point of view, for the Olmanians, this is an issue which needs to be addressed seriously taking into account their concern about the preservation of their cultural heritage for now and the future.

4. FUTURE NEEDS AND DEVELOPMENTS

Concluding remarks

The irruption after a nuclear accident of a significant contamination of the environment as well as the discovery of an environmental contamination resulting from past activities is a profound perturbing factor for a community. The population is facing a new reality for which she is not at all prepared. The natural tendency of experts and authorities to appropriate problems when they are considered as too technical and complex is also reinforcing the feeling of loss of control. The inevitable controversies and propensity to minimize the difficulties slowly finish to ruin the public confidence already severely affected by the accident itself. The ETHOS experience shows that the focus on the radiological protection dimension is strongly reducing the spectrum of possibilities to improve the situation. The introduction of radiological criteria to control external and internal exposures tends to transform the everyday life into a world of interdictions. The focus is put on the restoration of the environment, and living conditions are considered as irreparably deteriorated.

The experience of the mothers of Olmany, but also of the other working groups of the ETHOS Project, has demonstrated that the direct involvement of the population in the rehabilitation process of living conditions in a contaminated environment is a determining factor to restore self-confidence among the individuals as well as social trust. It also favors the adoption of a prudent and responsible attitude in the management of the day-to day situations. Decisions and actions are taking into account more effectively the specificity of the situations and this is finally resulting in a more effective and sustainable protection of all segments of the population. Moreover, the appropriation of a radiological protection culture adapted to the everyday life is paving the way to a new form of normality.

By avoiding to keep the population locked up into the technical dimensions of the rehabilitation process, the involvement of stakeholders liberates individual initiatives. It also opens the opportunities for affected persons to speak to each others, to dialog with experts and authorities and to act autonomously which means finally to maintain human dignity despite all the difficulties.

Toward a new kind of normality?

The motivation of the local participants along the ETHOS project

Twelve missions representing about 600 man-days of the European participants have been performed during the three years of the ETHOS project which ended in December 1998. But the project also entailed a considerable involvement of the local population as well as from the local, regional and national authorities. As a matter of fact, the willingness and motivation of the population to participate in the project varied along the successive stages of the project during three years.

In the very beginning of the project local inhabitants although sceptic about the possible outcomes of the project were puzzled by the presence of a large European team which represented novelty in a small Belarussian village. However after six months this

“engagement“ phase was followed by a new step where some 100 inhabitants committed themselves to participate actively in the working groups. Considerable resources of time and efforts were allocated by these individuals which were genuinely motivated by the focus goal of improving the living conditions for their own and for the community as a whole. Some inhabitants even participated to several working groups according to their concerns and priorities. During each mission of the ETHOS team an intense activity took place in the village. Each working group used to have several meetings during each mission.

By the end of the project however, as soon as the concrete outcomes of the groups were obtained, it was noted a tendency to disengagement in the population. As soon as a certain level of confidence was reached the participants expected the relevant collective actors such as the local authorities, the doctors, the teachers, the kolkhoze to continue the follow up of the situation and the maintenance of safety. While expecting the collective actors to take up the responsibility of maintaining a reasonable level of safety and acceptable living conditions, the local participants also observed that some conditions would guarantee the lasting of the durability of the progress achieved. Among those conditions was the existence of an independent certification of the quality of the products. A second condition was the public availability of the information on the relevant radiological measurements. A third condition was the enlargement and the institutionalisation of the ETHOS approach at the level of the district.

Confidence and social trust

Current north American social research on trust proposes a theoretical framework which is very interesting when trying to interpret the variation and changes in the involvement of the local actors within the duration of the ETHOS project. The north American research on trust emphasises the differences between social trust and confidence as different forms of sociality (Earle [9]). This distinction is very useful when considering the possible pathways to confidence in institutions.

This new understanding characterises Confidence as a relationship between a person and an organisation or a system. Confidence characterises a rather passive situation where one individual is familiar enough with a system not to have to worry about it. The system represents a comforting environment that does not necessitate his awareness.

In a very different way Social Trust as a relationship between persons within an existing or emerging group. Social trust is a demanding relationship. It entails the conscious and active involvement of one individual trusting another individual. According to this research trust is based on similarity. Social trust implies a personal choice and entails a risk resulting from the freedom of the trusted.

Putting in perspective confidence and social trust as different social bonds, Earle described sociality as a continuum. Confidence and social trust are seen as social means to save cognitive resources in human society. Confidence and social trust are mutually interdependent and occur in different combinations. They do not require the same level of resources and involvement. In the every day life, confidence is the usual relation we have with large organisations we rely on. Confidence does not encourage awareness but is pretty useful as a non demanding relationship. When an individual expresses confidence in an organisation, he exposes himself to the dangers that he expects the organisation to control.

When confidence is affected or lost over time and change, social trust is required to provide a transition to a new, stable state of confidence. Social trust is the repairing capacity of society which is regularly needed to rebuild affected confidence. But social change such as crisis or large accidents may also destroy the basis of common meaning and values on which a group is formed. The building of social trust then requires a more demanding involvement of individuals necessitating the building of new shared meaning and values (similarities) across the existing conflicting memberships.

The contribution to trust reconstruction in the ETHOS project

The post-accident context of Chernobyl was strongly characterised by the lack of social trust. In many ways, the ETHOS project brought a contribution to the reconstruction of various types of trust among the population. The project contributed to increase the reliability and the credibility of the information on the radiological situation as well as on the assessment of the associated risks for the population. Whereas the first contacts in the village were characterised by scepticism, the ulterior relations between the research team and the population were characterised by some kind of social trust if not interpersonal trust. Surprisingly the population of Olmany often stated in the course of the project that: “These people are like us“ when talking of the European researchers. One could see in this statement the sign of existing similarities between the population of the village and the researchers.

Many factors contributed to this situation among them the ethical premises of the ETHOS approach but also very concrete facts such as the regularity of the missions performed every three months, the renting of a house in the village and the purchasing of furniture by the European team which gave concrete signs of a durable involvement. The working groups also allowed the local participants to regain self-confidence and capacity to cope with the situation. The involvement of other actors such as local and regional authorities in the working groups also were at the origin of regained element of social trust as presented above. As a matter of fact, the relation between the population and the ETHOS research team on the one hand and between the local, regional and national authorities and the ETHOS team on the other hand were at the core of this process as the research team behaved as a mediator between the two parts within the duration of the project.

Empowerment of the collective actors in the management of quality

But the involvement of the local inhabitants remained intense and very demanding. As the economic crisis arose in Belarus the individuals had to develop new activities by any means in order to survive. The depreciation of salaries with a strong inflation created a context where for instance local teachers or doctors had to develop farm activities in order to provide their families with food. But in a more general way, as explained above, it was considered by the population that the collective actors should take up the follow up responsibilities as soon as they felt confident again in the situation. One could see here a switch from social trust to confidence necessitated as soon as possible by the constraints of the day-to-day life in order to save social resources. One could also consider that a new kind of normality has been reached within this process of rehabilitation.

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