Communication in Practice

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Abstract

The paper presents results from the "Communication 2000" project within the Nordic Nuclear Safety Research (NKS) framework which aimed at developing methods as well as knowledge related to problems in risk communication. Focus groups and questionnaires were used to explicitly pinpoint the problems encountered when informing about or discussing risk and technologically advanced information (e.g. PSA-results) relative the public and across professional groups with different types of expertise. Personnel at a nuclear power plant and politicians of a local safety board provided their views of essential communication problems related to their work tasks in focus group discussions. Central topics that emerged from these discussions were later used in a questionnaire study, distributed to similar groups of power plant personnel, and politicians and administrators, in the local community. Some results are presented, together with a comparison of the two modes of investigating what is problematic in risk communication (e.g. focus groups vs. questionnaires). The difficulties involved in establishing a similar understanding of a phenomenon is addressed in the discussion.
Key words: risk communication, problems, understanding, focus groups, indices

1. Introduction

The project was initiated in consideration of a specific event in 1998 where results from a probabilistic safety analysis (PSA) related to a Swedish nuclear power plant (O2) was unfavorably compared to PSA results of a Lithuanian nuclear power plant and published in the media. The headlines and articles caused concern at the national level, and especially in the local community of Oskarshamn where the nuclear power plant in question is situated. Politicians of the local government, and specifically the members of the local safety council, were suddenly and rather forcefully faced with complex technical questions involving PSA results and risk comparisons, as well as questions about their work regarding the reliability and safety of the local nuclear power plant.

The background to the media event was a standard report from the plant to the Swedish Nuclear Power Inspectorate (SKI) which included the PSA results. The documentation was written by experts for experts, although publicly available in

accordance with Swedish law. A free lance journalist used the material and compared the PSA results to data available from the Ignalina nuclear power plant, drawing the conclusion that the risk for an accident was significantly higher in the Swedish plant. The event, which subsequently was denoted a "non-event", stimulated further interest and activity, among others a Nordic Nuclear Safety Research (NKS) seminar in April 1999 and continuous discussions of the Local Safety Council in Oskarshamn. The current project became one of the subsequent concrete initiatives. It aimed at developing a better understanding of what specific circumstances, factors and issues that are experienced or perceived to be essential in problematic information and communication situations related to nuclear safety. Points of departure included finding descriptions or tools to further elucidate on perceived problems *per se*, i.e. to pinpoint their core substance and to investigate their contexts or relationships to other circumstances. The idea was to investigate to what extent it was possible to isolate or "crystallize" specific problem matters from the vast area of potential, or fuzzy, problems related to communication. The defining of the crystallized problem themes would be put to empirical evaluations and tests of reliability as well as discussed with respect to face validity in a seminar. It was assumed that such close scrutiny of perceived problems would facilitate overall understanding as well as guide future work on developing concrete improvements with respect to nuclear safety communication. It was also assumed that involvement of nuclear power personnel as well as politicians would facilitate a description of different perspectives, motivations and reactions to identified problems [1], as well as provide an adequate context against which problems in risk communication across different expert groups may be highlighted. A steering principle of the project was to facilitate future enhancement of transparency with respect to communicated contents as well as forms, as generalized from ideas in earlier work on decision making and public participation [2,3].

2. Method

2.1 Aim and design of the study

The project included two phases. First, discussions in (two) focus groups, each including 10-12 persons from the nuclear industry and the local safety council. Second, a data collection in two waves based on a questionnaire, and somewhat larger samples of participants from the nuclear industry and the area of community politics and administration. The discussions in the mixed focus groups followed a semi-structured agenda covering information and communication aspects related to e.g. organizational frameworks, knowledge requirements, content and presentation of information, image and personality factors. The discussions aimed at collecting examples of what was experienced as difficult or problematic areas or contexts in the communication of nuclear safety issues. This material was intended to provide the specific themes to be evaluated in the subsequent work. Following the questionnaire data collection the participants were invited to a seminar discussing the results.

In the questionnaire part of the study it was possible to ask for quantitative ratings of isolated problems, situations and characteristics. Such items were to be treated as "building blocks" in the further analyses, including reliability tests of the novel constructs, and estimates of their importance within the groups, their interrelations, etc. The questionnaire also included a number of open ended questions that had emerged from the focus group discussions.

2.2 Samples and Participants

Contacts within the Nordic Nuclear Safety Research (NKS) project were helpful in the sampling of relevant personnel groups and individuals at the nuclear power plant in Oskarshamn (OKG). Participants worked primarily in the area of probabilistic safety analysis or with closely related tasks. The local government of Oskarshamn includes a group of persons responsible for nuclear safety issues at the political level in the community, i.e. the local safety council, and representatives of this group agreed to participate in the project. These two "core groups" of experts were involved in the entire project, but the questionnaire part also involved additional individuals from the nuclear power plant and the community's political and administrative top leadership. All participants (N=42) were in some way working with tasks related to nuclear safety.

2.2 Data Collection: Discussions and Questionnaires

The discussions of the focus groups were framed within three major areas: the organizational framework (e.g. work organization and tasks, decision pathways, legal responsibilities, etc.), information content aspects (e.g. knowledge basis for work or information, terminology and choice of expressions, etc.), and personal image (e.g. roles of the communicators, expected behavior, attitude, use of language, etc.). A central question in the discussions was "Which problems could be identified?" Topics and situational characteristics that emerged were subsequently summarized and put into the questionnaire for evaluation.

The questionnaire was structured into five parts: (A) The handling of problematic situations, where the respondents were asked to rate 22 situational descriptions, on 5-point scales, as to how easy or difficult they would be to handle. For example, "to follow reasoning that involves unfamiliar expressions" and "to show patience when under stress". (B) Problems in information transmission (including communication), where the asked for ratings on 5-point scales concerned how usual or unusual the given descriptions were in one's work situation. For example "there exists uncertainty regarding who is responsible for information distribution" and "available information is not distributed". (C) Ways to improve communication was another part asking for evaluations of to what degree active efforts in the described ways would lead to an improved communication situation regarding nuclear safety issues. Each of the 16 items were rated on a 5-point scale ranging from "not at all" to "to a very high degree". Examples are: "Clarifying the relationship between absolute and relative risk" and "Development of more effective feed back systems for information

between the local nuclear power plant and the local safety council". (D) The background variables asked for e.g. work area, type of expertise and work task requirements. There were also three questions about knowledge about the work of the local safety council, the local power plant's nuclear safety work, and the communal work regarding a possible, future high level waste repository. (E) Open ended questions (approx. 14) covered three pages of the questionnaire, including the space for self produced answers. A first wave of data collection asked everyone the same questions, e.g. "Can you explain what PSA-results mean?" and "How should an ideal information communicator work in your opinion?" In a second data collection wave, however, some open ended questions were asked to everybody whereas others were asked of each of the respective participant groups.

Examples from the qualitative and quantitative results are given below. The quantitative items remained the same in both data collection waves, and results presented from these parts are based on one, merged data set.

3. Results

A potential communication problem identified in the focus group discussions was who should provide information (especially relative media and the public). Should it foremost be a well-known role figure or a person with expertise knowledge required for answering questions within a specified area? In the former case it might be possible to make use of, or develop, trust on the basis of e.g. familiarity or a person's reputation, whereas there might be a risk of less satisfactory answers in specific expertise domains. In the latter case, specialized experts could provide more solid explanations to area specific questions, but the use of a variety of experts might present a less coherent image of an organization or may, in some circumstances, influence multiple interpretations of what should be explained. The respondents' views on this matter in the questionnaire varied somewhat, but they normally underlined that information should be given by expertly knowledgeable people, thus either by experts trained in communication or by "teams" where area specific experts were immediately available in e.g. media interview situations. It was noted that expectations and requirements of information vary due to the type of situation, and that a good long-term investment might be to dwell on information issues well in advance of incidents or acute information situations. It was also noted that the Nuclear Power Inspectorate is an excellent source of information, evaluations and expertise, for e.g. the local safety council, to corroborate their role in that context as the local society's independent guarantor of nuclear safety.

A major problem related to information transmission was the sheer volume of materials available or received. The issue of how to make priorities therefore quickly became salient in the discussions, especially for non-technical experts, who might chose their readings from the pile of decipherable materials rather than from the total volume of information. Thus, the discussion underlined the importance of making clear what information is worthy of attention, and to provide some ideas or tools for the facilitation of sorting information materials with respect to importance.

A well known, but nevertheless difficult, problem is that of language use and the choice of terminology. It is a multifaceted problem, however, since it concerns the use of words in the range from everyday language to highly domain specific terminology, as well as the use of words which have rather "exclusive" and well defined meaning to constructs which mean different things in different contexts or scientific disciplines. The discussions noted at least two difficulties: (a) the problem of understanding reasoning which requires prior knowledge or skills (e.g. probability, PSA-analysis, 10^{-6}, etc.). And (b) the problem of not being aware of not understanding that a commonly used term should be interpreted within a specifically defined framework (e.g. risk, system, etc.). Knowing that one does not understand seems easier to react to and to act upon than finding certain reasoning just incoherent or simply non-problematic. A similar problem may have been the cause of the project, i.e. it is not immediately obvious that numerical results from the same type of analyses (i.e. PSA) cannot be compared regarding safety evaluations across selected reactors. The results based on the quantitative ratings (below) will here focus on the identification of "building blocks" i.e. themes or indices, with respect to the rated situations and problems, but a few of the single items are presented in the tables as well.

Table 1. Mean values and standard deviations of ratings of 10 statements with respect to how often they occur in information transmission within the work situation, groups of nuclear power personnel (NPP) and politicians/administrators POA.

Statement	NPP M	NPP SD	POA M	POA SD
Not all concerned are given important information	2.46	1.00	3.08	1.32
It is unclear who is responsible for information transmission	2.29	0.98	2.77	1.24
The problem is difficult to explain in a comprehensive way	3.14	1.18	2.85	0.80
Routines are missing for the handling of unexpected or unusual events	2.57	1.10	2.85	0.99
The wrong persons make statements	2.37	0.63	2.62	1.19
Information leaks cause problems*	1.89	0.75	2.58	1.31
No familiarity with the way media works	3.46	0.92	3.38	1.12
Some use misunderstandings to their own advantage	2.82	1.16	2.69	1.18
It was impossible to predict a specific situation	2.82	0.82	2.92	1.12
Available information was not distributed	2.46	1.00	3.00	1.41

Scale: 1="Very unusual" 2="Rather unusual", 3="Neither unusual, nor usual", 4="Rather usual", 5="Very usual". * Statistically significant difference between the groups $p<0.05$.

The results showed that the more prominent problems were a) not being familiar with the way media works, b) to explain a problem in a comprehensive way, and c) that an encountered situation was impossible to predict. The least problematic situation, as shown by the mean values, was the only one among the ten provided statements that resulted in a significant difference between the groups, i.e. that information leaks cause trouble. This type of circumstance was rated as less problematic in the group of nuclear power personnel as compared to the group of politicians and administrators.

The situations perceived as especially difficult to handle were a) to explain a point at issue in front of national TV cameras, b) to find the time to enter deeply into a subject area one needed to have knowledge about, and c) to give a review of risk problems at one's area of work. Although the mean values of the ratings normally ranged between "rather easy" and "neither easy, nor difficult" there were a few substantial differences between the groups. The politicians found it significantly more difficult to understand mathematical formulas and expressions (m=3.62 vs. 2.57, $p<0.001$) than others, and the nuclear power personnel found it significantly more difficult to present selected issues in front of a larger group of the general public (m=2.86 vs. 2.00, $p<0.001$).

Among the suggested initiatives that could improve communication about nuclear safety issues, the need for descriptions of nuclear technology activities provided in easily understandable language was rated highly in both groups, together with the need to develop measures which would increase the trustworthiness of risk information, and the education of various kinds of technical experts to become good information providers. The group of politicians emphasized more than others the need to clarify the responsibilities of various actors regarding providing media and the general public with information (m=3.57 vs. m=2.46, $p<0.001$).

On the basis of the ratings within the three main areas of the questionnaire several indices were constructed. See Table 2.

Table 2. Indices based on the three parts of the questionnaire, number of included items, and internal consistency of the indices (Cronbach's alpha).

Part of the questionnaire	Name of index	No. of items	Cronbach's alpha
Problems in information transmission*	Structural problems	6	0.753
	Human problems	4	0.707
Handling situations#	Communication ability	7	0.856
	Competence	5	0.716
	Ability to synthesize	4	0.809
	Context uncertainty	3	0.671
	Bridging ability	3	0.741
Ways to improve the com. situation+	Understanding and clarity	7	0.845
	Relations and context	4	0.719
	Development and feedback	5	0.834

* Scale: 1=Very uncommon, 2= Rather uncommon, 3= Neither/Nor, 4= Rather common, 5= Very common. # Scale: 1=Very easy, 2= Rather easy, 3= Neither/Nor 4= Rather difficult, 5= Very difficult.
+ Scale: 1= Not at all, 2= To some extent, 3= To a rather high degree, 4= To a high degree, 5= To a very high degree.

The items which concerned information transmission (see also Table 1) could be summarized in two indices, i.e. structural problems and human problems. The overall ratings of politicians and administrators were often somewhat higher than for the nuclear power personnel, but rarely significantly different. Regarding the five indices

based on 22 items related to handling problematic situations, the group of politicians and administrators underlined "competence", whereas the plant personnel provided somewhat higher ratings on the remaining indices. The only significant difference between the groups, however, was their emphasis of effects of context uncertainty, as compared to politicians and administrators (m=2.88 vs. m=2.27, p<0.01). The three indices of the third part of the questionnaire summed up possible ways to improve communication, i.e. by increasing understanding and clarity (e.g. systematic development of knowledge, clarity in the use of language, etc.), and development and feedback (e.g. training of experts to good communicators, improved contacts with the media, better feedback systems for information, etc.). Table 3 presents Pearson's correlation coefficients for the two participant groups separately. It can be seen that in the group of nuclear power personnel (below the diagonal) there were positive relationships between perceptions of "structural problems" and the indices of "human problems", "ability to synthesize" and "bridging ability". There were positive relationships between perceptions of "communication ability" and three of the other indices related to the handling of problematic situations (i.e. ability to synthesize, context uncertainty, and bridging ability). Within the group of politicians and administrators on the other hand (above the diagonal) there was no significant relationship between perceptions of "structural problems" and "human problems", and perceptions of "communication ability" covaried with the indices of "competence", "ability to synthesize" and "context uncertainty".

Table 3. Correlation coefficients between indices within the group of politicians and administrators (above the diagonal) and nuclear power personnel (below the diagonal).

Index#	1	2	3	4	5	6	7	8	9	10
1	1.00	.18	.25	.35	-.00	-.12	-.06	.16	.39	.22
2	.53**	1.00	.41	.51	.13	.42	.44	-.03	-.04	.06
3	.27	.16	1.00	.76**	.61*	.79**	.10	-.17	-.07	-.13
4	.16	.15	.12	1.00	.34	.72	.06	.25	.23	-.02
5	.52**	.27	.54**	-.00	1.00	.58	.34	-.06	-.05	-.24
6	-.19	-.34	.48*	.09	.12	1.00	.38	.01	.01	-.11
7	.38*	.11	.42*	.42*	.45*	.24	1.00	-.02	.03	-.12
8	-.09	.30	-.15	.27	-.25	-.07	.05	1.00	.90	.67
9	.15	.30	.01	.14	-.08	-.16	.02	.52	1.00	.76
10	.01	.38*	-.15	.26	-.14	-.12	.17	.68	.57	1.00

(1) = Structural problems, (2) = Human problems, (3) = Communication ability, (4) = Competence, (5) = Ability to synthesize, (6) = Context uncertainty, (7) = Bridging ability, (8) = Understanding and clarity, (9) = Relations and context, (10) = Development and feedback. * = p>,05 , ** = p<.01

It should be noted that the current results are generated from a rather small data set and that specific correlations or differences may fail replication in future analyses. The results tended, however, to accentuate expected differences in expertise regarding technical knowhow and enjoyment of social situations, i.e. nuclear power personnel expressed less problems regarding technical content and understanding of scientific issues and more problems or uneasiness with respect to presenting information in social contexts or in situations described as high in context

uncertainty, whereas the opposite tendencies could be discerned in the group of politicians and administrators. Furthermore, there were a few interesting differences in the relationships between the indices within the respective groups. The results furthermore showed that the questions elicited from the focus groups could be used as items in further analyses to provide reliable indices reflecting components of problems in information and communication settings. A few central topics are discussed shortly below.

4. Discussion and Conclusions

The focus group discussions of approximately 2-3 hours provided an ample platform to elicit examples and experiences from which to construct a review of problems encountered in daily work. It is hard to conceive the results had these discussions not taken place. The forum also introduced several of the participants to discussions where experiences and problems could be shared and pursued towards potential solutions. The method was appreciated in both groups of participants, and especially the importance of personal encounters across expert fields were commented upon. The interaction is important for increased awareness of the different perceptions of risk that are usually encountered in studies of experts and the public [4,5]. Awareness of various existing perspectives would also enhance communicative alertness, and stimulate increased transparency. The resulting indices could provide a starting point for the building of a more comprehensive and systematic tool to improve existing communication standards within and between organizations. The indices resulting from the study seem to indicate that it is possible to distinguish between, and to classify into reliable constructs, various aspects of the "soft" prerequisites, values and components of communication. Such a refined tool could be functional for e.g. descriptions of organizational functioning, identifying knowledge gaps, or in the training of communication skills. The overall conclusion of the study is that it seems feasible to continue the search for reliable constructs for a better understanding of various interacting parts of the communication process. Focus group discussions are instrumental in the elicitation of experienced problems.

References

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