EUROPEAN COMMISSION

5th EURATOM FRAMEWORK PROGRAMME 1998-2002
KEY ACTION : NUCLEAR FISSION

LearnSafe

LEARNING ORGANISATIONS FOR NUCLEAR SAFETY

CONTRACT N° FIKS-CT-2001-00162

CHALLENGES FOR THE NUCLEAR INDUSTRY;
A compilation of views given by three top-managers

Björn Wahlström
VTT Industrial Systems

30.9.2002

List of content:

SUMMARY

The following report is a compilation of three interviews conducted in Finland and Sweden as a part of the LearnSafe project. The aim with the interviews was to collect top manager views on challenges facing the senior management at the nuclear power plants. The main question in interviews was: *What are the perceived emerging challenges in the management of nuclear power plants in the context of safety?*

The report has been structured into three sections in line with the interviews, which consisted of discussions of the given question, a prepared list of challenges and a few issues connected to management and organisation within the nuclear industry. The report has been written to include almost literal statements from the interviews, which have been edited and rearranged to ease the readability of the report.

The nuclear power plants today are faced with many challenges. These challenges are matters of continuous management attention and various strategies to approach them have been created. In a consideration of challenges facing the nuclear power plants today it is evident that they have increased the burden on people. Fortunately at the same time new ways to structure work, new tools and new management practices have been found to make the use of resources more efficient.

In sharing the results of a study based on interviews it should be borne in mind that they are subjective. The condensation of the interviews into a report is also depending on the reporter and his interpretations of what was said. With these qualifications it is hoped that its readers will find the report useful.

CHALLENGES FOR THE NUCLEAR INDUSTRY;

A compilation of views given by three top-managers

1 INTRODUCTION

The following report is a compilation of three interviews conducted in Finland and Sweden as a part of the LearnSafe[1] project. The aim with the interviews was to collect top manager views on challenges facing the senior management at the nuclear power plants. The main question in interviews was: *What are the perceived emerging challenges in the management of nuclear power plants in the context of safety?* In the introduction to the question it was noted that the nuclear power plants themselves have to respond to their short term challenges and therefore challenges on a medium term are more interesting, because the project could have some impact in responding to them.

The interviews consisted of the following three parts:
- a free discussion of the given question,
- a discussion of a list of challenges (Appendix),
- a discussion of a few interesting issues connected to management and organisation within the nuclear industry.

The length of the interviews took about 1,5 hours and they were conducted in the period 5 to 30 April 2002. Two of the interviews were conducted in Swedish and one in Finnish and all three were taped. The report has been written to include almost literal statements from the persons during the interviews. These statements have however been edited and rearranged to provide a logical entirety.

In interpreting the views as discussed below, it is important to understand that there are national differences between Finland and Sweden and there are differences in corporate structure and culture. In spite of that it is however believed that the views reported at least in some way are characteristic for the nuclear industry in Europe. It is also believed that the partners in the LearnSafe project will find the views presented interesting to discuss and that such discussion may open up new views on how to cope with the challenges.

2 MAIN CHALLENGES IN THE NUCLEAR INDUSTRY

This section gives an account of the first part of the interviews, which consisted of a free discussion of the question: What are the perceived emerging challenges in the management of nuclear power plants in the context of safety? The three persons took up slightly different subjects and in different orders, but the five headings below represent a kind of condensed account of the discussions.

2.1 The development in the nuclear field

The nuclear power plants in Western Europe were built during a rather intense period after which the building of new plants came to a practical standstill. This has influenced all actors in the nuclear field including plant operators, major vendors, contractors, regulators, research

[1] Learning Organisations for Nuclear Safety, Contract N° FIKS-CT-2001-00162, 5th EURATOM Framework Programme 1998-2002, Key Action: Nuclear Fission.

organisations and universities. The development has lead to a wide spread concern that nuclear competency will decrease with time.

All three interviews touched on this challenge in slightly different words. There is a danger that a development with decreasing investments leads to less work opportunities for young engineers and correspondingly to less interest of making careers in the nuclear field. In a longer term this may lead to a situation, where no new development in safety and efficiency of the plants is undertaken. The respondents saw the possibility for a new plant to be built in Finland as an opportunity to turn the present trend.[2]

The political opposition to nuclear power was also touched on in this connection. The main problem is the uncertainty, which makes it difficult to plan for the future. The recent agreement between the German government and utilities to phase out nuclear power was considered problematic, but understandable as an attempt of the industry to create peace within an agreed frame of operation. All three respondents saw a second opening for nuclear power in Europe, but they were afraid that it might take a long time.

2.2 The deregulation in the electricity sector

Both Finland and Sweden deregulated their electricity supply in the mid-nineties. The problems of adaptation to the new situation was aggravated by a few wet years in the Nordic system, which caused decreasing spot prices for electricity. Production capacity in the Nordic system has been mothballed and the electricity consumption has increased to a point where supply and demand seems to be in balance. Some fears for a deficit in power during dry and cold years have even been raised.

The respondents believed that present production and demand will give spot prices with which nuclear power can compete relatively easy. All respondents agreed that the new situation places a demand for a more careful consideration of costs. Two of the respondents mentioned that reductions in staff had taken place at their nuclear power plants.

The deregulation can actually be beneficial for the utilities, because now the frames for operation are clear and open. The new situation carries a larger business risk, which is connected to the possibility for extended outages if several plants are facing the same generic safety problem.

2.3 Ageing and renewal of the plants

Many of the nuclear power plants in Europe have reached their designed midlife. Modernisation projects have been initiated at some plants to extend their operational lifetime. Stricter regulatory requirements have also initiated plant changes. The modernisation projects at the plants have been seen also as providing challenges for the personnel and thereby supporting development of competency.

Funds have always been found for the investments, which have been seen necessary by the senior management at the plants. The tighter economic climate has however lead to a closer scrutinisation of plant modifications and their impact on safety and economy. A special challenge is to carry out renewals within a schedule of production, because the economy does not allow for longer outages.

[2] The Finnish Parliament decided on the 24.5.2002 to approve the construction of a fifth nuclear reactor with a vote of 107 in favour and 92 against.

All the respondents stressed the importance of keeping the plants in good condition and gave reference to long term investment programs. One plant has set as a goal to always have 40 more years of operation. The plants are maintained in good condition through continuous investment programs, careful inspections and testing as well as research and development efforts. One of the respondents pointed to the increasing difficulties to find components with a nuclear grade, due to a globalisation among the suppliers making it increasingly difficult to obtain the documentation necessary to license them.

2.4 Competency

The danger of a decreasing competency at the nuclear power plants has been raised at different occasions. Many plants in Europe are in addition facing a generation change, which may aggravate the situation. The career expectations and mobility of young persons entering their working life seems also to be different from what it was for the persons who entered the field when the plants were taken into operation.

There are ongoing efforts at the nuclear power plants to establish a competency inventory for their personnel to be able to react to this challenge in a proactive way. There have been contacts between the plants to investigate possibilities to find ways to share efforts in maintaining the special nuclear competency. One of the respondents stressed specially the need also to attract managerial skills to the nuclear industry.

In spite of the concern for maintaining competency in the future the respondents agreed on that there so far has not been any problems in recruiting new persons to the nuclear power plants. One can argue that the competency that is found at the nuclear power plants today is very high in spite of the fact that younger persons may not have acquired the experience in starting up a new nuclear power plant. When new persons have been recruited they have had a solid education and they have been well equipped with new ways to think and challenge existing practices.

2.5 Management of safety

Fears have been expressed that cost pressures on the nuclear power plants may result in a compromised safety, as the result of misdirected actions to save costs. If the pressures would start an uncontrolled process of cutting personnel costs and delaying investments this might actually be the result. Responding to regulatory questions and concerns may in such a case lead to further diminishing safety margins.

All three respondents expressed as their firm view that such cost pressures have not been present and that safety has not been compromised in any way during the last years. Instead all of them pointed to various indicators showing that safety actually has been improved. They mentioned for example several large safety oriented investments that had been carried out in spite of a harsher economic climate. One of the respondents even saw a positive development in the present need to scrutinise investments more carefully and plan them over a longer time period.

Investments in better management and quality systems were also seen as carrying improvements both in safety and efficiency. A more accurate goal setting and follow up as well as the structuring of work activities according to processes was seen to carry many benefits. One of the respondents pointed to the need for setting quantitative goals not only for operational performance, but also for safety to serve as crossbars when actual performance is evaluated.

3 RESPONSES TO A LIST OF CHALLENGES

This section reports on the second part of the interviews in which the respondents were presented with a list of challenges as developed within the LearnSafe project (cf. Appendix). The order of the challenges as reported below has been structured under larger headings to ease the reading of the report.

3.1 Restructuring of the electricity sector

Deregulation and competition (11). Before the deregulation the electricity production sector was a protected business where costs were transferred to the tariffs. The deregulation has led to a situation where prices are set based on supply and demand. In practice this has lead to a need at least for some of the producers to be more cost effective. There was an agreement that many positive things were also brought to the nuclear industry with the deregulation. The problems that may arise from the new situation should all be possible to handle.

Changes in company ownership (9). There has been a large restructuring in the whole electricity production field, but this has not considerably changed the way of work at the nuclear power plants. The changes have been largely positive, because stronger organisations have been formed and it has become possible to exchange information in a larger group of people. New contacts through changes in company ownership will also made it possible to build exchange programs for young engineers between different countries.

Asset management when there are multiple owners (20). The plants have often had multiple owners from the beginning and this has not represented any problem. If many different owners with diverging interests are represented in the governing boards, this may introduce some problems. The present plants were often built as co-operative efforts, but now the assumption is that there should be competition. An agreement with the regulator on what can be considered as an acceptable level for outsourcing may be difficult to reach.

Pressures from owners and higher management (6). Pressures from owners are conveyed through the boards of directors and they are taken care of in goals and action plans. Undue pressures have to be handled and this may need both insights and pedagogical skills at various levels in the organisation. With the increasingly large utilities there is a risk that an understanding of the special nuclear demands disappears on a high management level, which may introduce difficulties for the senior management at the nuclear power plants. All respondents denied the existence of any such pressures.

Focus on short-term goals and performance (10). There is a short-term requirement to manage the economy for the plants, but this is a matter of balance, because a focus on only short-term goals can be dangerous. The condition of a plant is an asset, which can be assured only through long term planning and systematic work.

3.2 Procedure and practices

Requirements on formalisation and documentation (15). A sound formalisation is needed and should be acceptable by everybody within the organisations. There have been large projects in Sweden to reconstitute the design base of the plants. The consideration of process thinking can help in simplifying established documentation efforts. A simplification of the system of procedures and instructions can be an important action with a positive impact also on safety.

Internal debiting for services[3] *(14).* This is a question of how to manage and control costs, where the directions have changed a few times during the last decade. The practice can evidently be exaggerated, but it is always necessary to stress that nothing is for free. The practice will become counterproductive if too much time is used to compete for the same internal customers.

3.3 Own personnel

Ageing personnel (1). It is important to take into account the age structure of the personnel and to be proactive in recruiting. This is easy to achieve if one has an inventory of knowledge and skills needed to run the plants. It is positive to get in new personnel, because new people often have a questioning attitude, which helps in developing operational practices. One of the respondents noted that they have defined as a quantitative goal for themselves that the average age of the personnel should decrease.

Recruiting young people (3). It is already in the first place necessary to get them into a suitable path of education, but unfortunately there has been a decreasing interest in natural sciences and technology. The plants are involved in direct contacts with colleges and universities to recruit persons who are in the beginning of their careers. In Sweden the nuclear power industry has taken initiatives to fund professorships at the universities. It is a good policy to be proactive in creating career paths for younger people within the organisation, not to have them to wait for too long for openings to more responsible positions.

Maintaining nuclear competency (28). This is an important issue for the whole nuclear field. The need for persons who can do the calculations necessary to dimension fuel loading and do safety assessments is not that large and therefore it should be possible to manage this challenge. Today there is a decreasing number of students that select a nuclear career. More generally this issue may warrant joint actions within Europe.

Motivational problems (4). The political opposition against nuclear power has had some influence on motivation, but it has also tended to weld the nuclear community together. The situation has stayed the same for a number of years and no dramatic change is expected for the near future. The political pressure in Sweden connected to the closing down of the Barsebäck unit #1 was one severe demotivator. In general however, motivation and commitment seems to be largely untouched by the political debate.

Human and organisational factors (12). This is an important issue, because many of the challenges appear as a burden on people and the organisation. It has shown that also people who have a long experience from the nuclear industry sometimes make astonishing mistakes and it would be important to create a better understanding of why. This also points to the need to create better protection against unexpected mistakes. In addition there is also a need to have effective measures at the plants against intrusions from people who seek attention and publicity.

3.4 Technology

Cost pressures as compared to competing energy sources (13). This is an issue that is addressed continuously within the utilities. On the Nordic market nuclear power is competing mainly with hydropower. With the present level of consumption there is no excess of hydropower during normal years and there could even be shortages during dry and cold years. All

[3] This practice has been used in Sweden, but not in Finland.

new plants are more expensive to operate than the old nuclear power plants. With their diversity in primary energy sources the companies have access to reliable information on production costs of electricity.

Ageing plants (24). There has been a concern that various ageing mechanisms may impede the safety of the nuclear power plants, but this concern is exaggerated in a consideration of the continuously ongoing investment programs to keep them in shape. At the plants stainless pipes in the containment have been exchanged, cables have been renewed, instrumentation has been modernised, reactor internals have been exchanged, etc. Better methods for inspections have also developed. All respondents gave references to large investment packages for the coming years.

New technologies (21). All respondents saw new technology as a challenge in a positive way. When something new is built a forward driving force is initiated and you get a lift also in the old solutions. New technologies get their breakthrough in areas where they carry an added value as compared with old technology. Instrumentation and control is one area with a large potential, but unfortunately there is still licensing issues to be resolved. A new plant would today be built differently with a much shorter timetable. New information technology provides an opportunity to make work practices more efficient.

3.5 Vendors and contractors

A decreasing number of vendors (17). This is a problem and it is expected to become worse. It has become more difficult to get services needed and the prices have been increasing. The new power plant in Finland may function as a turning point in this respect. The plants have been systematic in their efforts to invite several vendors to their modernisation projects in order to create a competitive situation.

Contractor competency and skills (2). This problem is more difficult to cope with as compared to own personnel. The competency and skills of the large vendors have been decreasing and they have not being responsive to their customers. With a continuation of this development it may even be necessary for the nuclear power plants to take a larger responsibility themselves for maintaining crucial competency and skills.

Adapting to the role of a skilful customer (7). It is necessary to have competing vendors and contractors. One of the respondents thought that they would have a potential in developing their skills as a purchaser. Another gave reference to efforts in networking purchasing activities within their concern. Two of the respondent noted that their plants have outsourced some peripheral activities, but stressed at the same time the need for maintaining core competencies within the plant organisations.

3.6 Regulatory oversight

Differences in national regulatory requirements (18). Europe is moving towards an integrated market, which means that there is a need for harmonisation of regulatory requirements, taxation principles, etc. All respondents viewed the present taxation of nuclear power in Sweden as bringing in distortions in the electricity market. The formation of WENRA (Western Europe Nuclear Regulatory Association) was greeted with satisfaction.

Dissimilarities in regulatory philosophy by different authorities (27). The situation with two nuclear regulators in Sweden was mentioned to have introduced occasional difficulties in communication. The plants in Finland and Sweden have introduced environmental certifica-

tion and in that process some differences in philosophies in the fields of environmental and nuclear safety have been encountered.

New regulatory requirements (5). New requirements have to be harmonised with similar requirements to be applied at least in the whole Western Europe. It is also important that the regulatory body has an understanding for what is practical to require for old plants as compared with new plants. Ageing is a more important issue within the investment plans than the new regulatory requirements. If no new plants will be built it is to be expected that the development also of regulatory requirements will stagnate. The joining of the EU has brought in new responsibilities and lobbying that has to be taken care of.

Diverging views between regulator and utility (23). There is a role-play between utilities and the regulator, which means that they are supposed to disagree at least sometimes. Relations between people can sometimes get infected and when this happens managerial intervention may be necessary. Provided that an open dialogue between the regulator and the nuclear power plant can be maintained, there should not be any problem in resolving differences in views. Today there seem to be diverging views on the extent to which outsourcing of work can be applied at the nuclear power plants. There seems also to be diverging views on the need for the extent of evidence that digital instrumentation and control systems are fit for their purpose. Any deeper conflict between the regulator and a utility company would always be a serious matter.

Loss of confidence in national and international regulators (22). It is an absolute precondition that the regulators have a confidence from the public, because only then the public can have confidence in the nuclear power plants. Fortunately both in Finland and Sweden a politicisation of the regulatory body has been avoided. A regulator can hardly be of a different opinion than the political establishment.

3.7 The society

Changing societal priorities (29). It would be important to break the trend of decreasing number of students who select technical subjects and naturals sciences for their studies. There seems today to be an increasing mobility of people during their careers. An increasing number of people in Finland and Sweden view today global warming as one of the most important issues of environmental protection. In a historical perspective there have been large fluctuations in the societal priorities regarding primary sources of energy and it is likely that the final word has not yet been said.

Public confidence (8). The public confidence in Sweden is very high, with about 80% of the population supporting a continuation of operating the present nuclear power plants. This means that there is a clear discrepancy between opinions of the political establishment and the public. It is necessary to foster public confidence continuously and to remember that it can collapse very rapidly. One action mentioned in this connection, was an active involvement from the Mother Company of the nuclear power plants in developing renewable energy options. The nuclear power plants have programs to measure public confidence continuously and they use the measurements as a performance indicator.

Negative publicity (16). When something occurs on a nuclear power plant it gets publicity. Negative publicity is never welcome, but the interest media show in the nuclear business can on the other hand also be positive. Negative publicity can only be responded to by a full openness on all relevant issues. It seems that media today are more educated on issues related to nuclear power than only a few years ago.

Decommissioning of plants (25). Ageing of major components implies that all plants will be shut down at some point in time. When this time comes necessary preparations should be made, but not before. The plants will when this time comes to establish contacts and co-operation with other nuclear power plants, which are faced with similar projects. When the final date of production has been set for a plant a special care should be given to the handling of personnel issues. At the premature closing down of the Barsebäck unit #1 the personnel reacted with dignity and pride.

Handling nuclear waste in a short-term perspective (19). The waste management solutions that are selected in Finland and Sweden are farsighted and sustainable. The selected solutions are indisputable excellent, but they can be considered somewhat expensive. For a technician it feels like a waste to stove away fuel with a major share of its energy content unexploited.

Terrorism and sabotage (26). It would be unfortunate if present excitement would lead to excessive requirements. Another question is how large the danger for the nuclear power plants actually is as compared with threats to other vulnerable objects in the society. It seems that the present openness and rapid communication also can give various crackpots ideas of what to do to cause attention and disgust.

4 A DISCUSSION OF SELECTED MANAGEMENT ISSUES

In this section the third part of the interview is reported. The first paragraph of the subsection is a condensation of the introduction to the issue and the questions asked on the subject. The consequent paragraphs give a summary of the views of the respondents.

4.1 Organisational change

One adaptation mechanism to changes in the environment is to carry out organisational changes. International experience has shown that sometimes the organisational changes are not in line with safety objectives and therefore it is understandable that the regulators have shown an increasing interest for understanding impacts of organisational changes. There has in several European countries already been a regulatory requirement that organisational changes should be reported to the authority. One may then ask if the regulator has enough insights and skills to take a stand on these reports.

It is very seldom that outsiders can give detailed advice to the senior management. On the other hand they can, if they have insight and experience, in a discussion take the role of a facilitator, who stretches the argumentation of a manager and thereby gives him or her confidence in selected solutions. This also implies that for example board members should not involve themselves in the details of management, but rather define a general frame within which the senior managers at the nuclear power plants are supposed to operate.

The regulator should naturally have the right to ask questions during organisational changes to be convinced that no undue challenges to safety are created. This also means that the utility should keep the regulator informed in a proactive way. There was a clear consensus that regulatory bodies often have not enough expertise in industrial management to take a firm stand on different organisational solutions. Such a stand would also interfere with the basic principle that the utility should have the undivided responsibility for the safety of the plants. If a regulator prescribes a certain organisational solution this border would definitely be crossed. A fair requirement to place is that organisational changes should be analysed in detail before their implementation.

4.2 Organisational drift

If an organisation is put under pressure there is a tendency that it will respond to short term goals even with the danger that long-term objectives are less well cared to. If an organisation focuses too much on short-term goals there is a danger that decisions made in the small can undermine the global mission of the organisation. Such an organisational drift is also documented in the global experience of the nuclear industry. The question is then what kind of indicators may be used to alarm for the danger of such organisational drift.

One possibility for the board of directors is to engage closely in how goals are defined, followed up and fulfilled. If there is a large discrepancy between the goals defined and those achieved this is an indication that something is wrong in the management processes. If goals are defined are on a reasonable level to be both challenging and achievable such an indicator can be of value.

In this connection it should be borne in mind that the management at a nuclear power plant is given the responsibility for its operation. If the board then has its own strong views on what is right and wrong it could be dangerous. The most efficient practice seems to be that board members are active, they ask questions, they define borders and they react when the borders are crossed.

Peer reviews can provide another instrument to detect and react on a possible organisational drift. With a suitable group of insightful persons properly sensitised, peer reviews have shown to be efficient in detecting various problems. The difficulty seems sometimes be to convey the insights of the peer review team to the senior management to make it possible for them to initiate remedial actions. A necessary precondition for successful learning is also that suggestions for improvements are handled forcefully by the senior management at the nuclear power plant.

Attempts have been made to establish safety culture indicators and measure them continuously. These efforts are important as they lift a discussion of components of safety culture to a more concrete level. It is not enough only to measure safety performance, but the measurements have to been followed up with discussions and concrete actions within the whole organisation.

4.3 Leadership

International organisations as well as regulatory bodies have tried to specify requirements to be placed on senior managers at the nuclear power plants. It is evident that a discussion of such issues will make it easier for all players in the game to define their stand and to agree on approaches for achieving an acceptable safety. The difficulty however is that the requirements tend to pile to the extent that one may ask the question, if it is possible to find and train suitable individuals for the task of being for example a plant manager.

There is no fixed model for how leaders should be appointed and trained and the regulator should certainly not influence the process. Leadership will involve many different skills and a nuclear experience is evidently a benefit. Nuclear experience is however not compulsory for senior managers, provided that this experience successfully can be combined in the senior management group. Leadership training is one important issue and the training should be continuously ongoing and to create a commitment. It is never enough just to hire a manager and give him or her a short introduction course.

A commonly seen problem is the visibility of managers in their organisations. This has certainly to do with scarcity of time. Here a process orientation could help in separating between responsibility for equipment and for personnel to make it possible for managers to allocate more time for both activities.

With everything else in place it is still important to know the people, who are given important positions within the organisation. This is possible only if enough time is allocated to discuss both work and leisure to get a good mutual understanding of personalities and abilities. As a manager one has to have a feeling for how people think and act. A skilful manager should be able to sense when something is not in order and have a psychological eye in actions.

4.4 Future organisational structures

With due consideration of the demands that are set on the organisational solutions at nuclear power plants, it may be beneficial to make projections into the future. If we consider the organisations that are running our plants 25 years from now it seems clear that many things have changed. On the other hand many things will also remain the same. It seems however clear that organisations in the future will rely much more on inter-organisational teams and networking. What can today be said about things that will change and things that will remain the same?

In hindsight some of the organisational changes that were opposed, have shown to be very successful and also vice versa. One thing seems clear that people also in the future will have one and only one boss. Networking and matrix organisations can be great when everything is going well, but when problems accumulate there is the need to have one superior to consult. Another thing that will not change is the importance of ownership. It will also in the future be important to give people a clear responsibility for something to which they can identify as theirs. It may be important to change this area of responsibility from time to time to force people to see things from different angles.

It seems possible to aggregate competency and skills in larger units and already now many utilities have adapted to a situation when they buy services from all over the world. What will happen with the specialised nuclear knowledge is difficult to predict, because it will depend on many different things. It seems likely that a concentration of operational activities will continue at the plants with a corresponding higher reliance on services bought on an international market.

It seems likely that in the future the nuclear operators will be larger companies with several plants, because that would make it easier to maintain competency and skills. Steps in this direction have already been seen in the United States, where large nuclear operators have been formed. It is also likely that such nuclear utilities will rely on global services, which again may reinitiate a discussion on the content of the core business. In this discussion it is however likely that safety management still will be considered important enough not to have it outsourced. Technology services may on the other hand be located to separate companies.

4.5 Challenges for the LearnSafe project

The first phase of the LearnSafe project is focused on organisational change and a major task has been to identify challenges that are facing the nuclear power plants. In this process it would be interesting to collect challenges for the project from its participants by collecting views on issues where additional understanding is needed. Given the situation today where the nuclear power plants are fighting to make the best of the situation, which challenges would be the most important for the project to approach?

One issue that would be important to address is the real driving force in organisational change. In many cases it may be trends and even whims, which put an emphasis on some characteristics. Is it possible to go beyond these and create a better understanding for when organisational changes actually are needed and how they should be carried out? Would it possible to achieve the same effects at a lower price with more modest organisational changes?

There is a need for some innovative thinking for how the special nuclear competency could be maintained. Would it be possible to initiate a co-operation between colleges and universities within Europe to support the nuclear industry with the knowledge and skill that is needed? It seems evident that some sort of network should be built and that a mobility of people has to be ensured.

One issue, which may be important to act on, is how to enhance contacts between the nuclear power plants and society. This has also to do with the creation of a stimulating environment for the highly skilled people, who by the location of the plant may not have that much challenging activities for their families. It seems necessary to create new models, which makes the nuclear power plants even more attractive work places than they are now.

5 CONCLUSIONS

The nuclear power plants today are faced with many challenges. It is apparent that these challenges are a matters of continuous management attention and that various approaches to resolve them have been created. A satisfactory resolution of some of the challenges may however also require co-ordinated actions from several actors within the nuclear field.

In a consideration of the challenges facing managers at the nuclear power plants it is evident that they have increased the burden on people. Fortunately at the same time new ways to structure work, new tools and new management practices have been found to make the use of resources more efficient.

In sharing the results of a study based on interviews it should always be borne in mind that they are subjective. The condensation of the interviews into a report is also very much depending on the reporter and his interpretations of what was said. With these qualifications of the content of the report it is hoped that it will be found useful by its readers.

APPENDIX. LIST OF CHALLENGES AS GENERATED BY THE LEARNSAFE PROJECT

The following list of challenges was generated within the LearnSafe project based on internal discussions, references from the literature and from the personal experience of project members.

1. Ageing personnel
2. Contractor competency and skills
3. Recruiting young people
4. Motivational problems
5. New regulatory requirements
6. Pressures from owners and higher management
7. Adapting to the role of a skilful customer
8. Public confidence
9. Changes in company ownership
10. Focus on short term goals and performance
11. Deregulation and competition
12. Human and organisational factors
13. Cost pressures as compared to competing energy sources
14. Internal debiting for services
15. Requirements on formalisation and documentation
16. Negative publicity
17. A decreasing number of vendors
18. Differences in national regulatory requirements
19. Handling nuclear waste in a short term perspective
20. Asset management when there are multiple owners
21. New technologies
22. Loss of confidence in national and international regulators
23. Diverging views between regulator and utility
24. Ageing plants
25. Decommissioning of plants
26. Terrorism and sabotage
27. Dissimilarities in regulatory philosophy by different authorities
28. Maintaining nuclear competency
29. Changing societal priorities