Country-Specific Safety Culture Forum

Sweden

Country-Specific Safety Culture Forum: Sweden

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Foreword

NEA Director-General Magwood

Of the many important lessons learnt about nuclear safety over the years, the one that has been most difficult to communicate and difficult to address is the lesson that human aspects of nuclear safety may be as important as any technical issue that arises in the course of nuclear operations. Nuclear power is a highly technical undertaking and those who design, build and operate nuclear power plants are highly experienced, very qualified specialists in a wide range of engineering and scientific fields. Often, nuclear technologists are among the best and brightest of the technical community in a country.

Given this, it is not always easy to present these experts with the reality that issues such as safety culture, organisational effectiveness and communications may weigh as heavily in determining the success of safe nuclear operations as might material conditions, health physics and maintenance practices. Engineers are well-qualified and prepared to confront a challenging vibration or sign of wear in a nuclear component; they are perhaps less able to address problematic sociological issues among plant staff.

However, it is now widely understood that nuclear safety culture is an issue that requires substantial attention. The Nuclear Energy Agency (NEA), for example, has made this area of safety a key area of work and has formed the Division of Radiological Protection and Human Aspects of Nuclear Safety (RP-HANS) to lead the way. With the engagement of experts from across its member countries, the NEA has begun to address these non-technical areas of nuclear safety, exchanging experiences and identifying best practices.

As work in this area has progressed, the challenging issue of the relationship of national culture on nuclear safety culture has also arisen as an area of focus. Operators from many countries can easily work together to identify and address an issue associated with nuclear fuel operating under certain conditions and compare experiences; but how do they address areas of human behaviour and evaluate best approaches from country to country? Physics always works across borders; but can the same be said of issues of safety culture and communications within organisations? For many years, it was assumed that the answer was "yes".

However, practical experience has shown that there are important differences in how people work together and communicate as one travels across borders. The national context in which people live does not stop at the gate of a nuclear plant. The NEA Country-Specific Safety Culture Forum (CSSCF)

was thus established to begin creating an understanding of how a national context relates to safety culture, and how operators and regulators could think about these effects in their day-to-day activities.

We have learnt that all cultures have characteristics that reinforce nuclear safety culture; and all have characteristics that may not. No national culture is preferable to another but as safety culture is optimised in any setting, an understanding and reflection of the relevant national context can make training and absorption of nuclear safety culture principles more effective.

The outcome of a CSSCF will hopefully help regulators and operators to improve their training activities and thus make further improvements to their nuclear safety cultures. Because this is a first-of-a-kind NEA activity, it required considerable work and thought from many people. This would not have been possible without the incredible efforts of our partners, the Swedish Radiation Safety Authority (SSM) and the World Association of Nuclear Operators (WANO), and the dozens of people from the Swedish nuclear community that took the time to engage in this project. The multi-organisational team that assembled and implemented this forum, co-ordinated by the creative and dedicated staff of the NEA's Division of Radiological Protection and Human Aspects of Nuclear Safety, worked very hard to achieve this outcome and should be very proud of their efforts. The NEA would like to thank everyone involved for their contribution to this successful first CSSCF.

William D. Magwood, IV
Director-General, Nuclear Energy Agency

WANO Chief Executive Officer Prozesky

The World Association of Nuclear Operators (WANO) certainly has the opportunity to appreciate the influence of regional, national and enterprise-level cultures on the nuclear industry and the way in which it carries out the mission of delivering safe and reliable energy to stakeholders and customers. This is perhaps best reflected in WANO's internal slogan, "Think globally, but act locally", when providing guidance to staff as they go about delivering products and services from the WANO regional centres. We acknowledge that there is not a single, universal recipe that can be effectively applied in our more than 30 member countries, and that local cultural influences are a fundamental part of what we need to consider in seeking out and promoting best practice across the global nuclear power fleet of plants.

With this in mind, WANO nevertheless does believe that there are a number of fundamental principles that underpin the behaviours of leaders and workers that are necessary to deliver safe and reliable operations. WANO has documented these in the report titled "Traits of a Healthy Nuclear Safety Culture".

The importance of entering into a local dialogue with leaders and workers to understand these traits in the context of local prevailing norms and standards is vital if we are to ensure that the resultant safety-focused behaviours are nurtured and deployed. WANO was therefore delighted to collaborate with the NEA, the Swedish Radiation Safety Authority (SSM) and Swedish nuclear industry to ensure progress in this dialogue on nuclear safety culture.

Peter Prozesky
Chief Executive Officer, World Association of Nuclear Operators

SSM Director-General Persson

In Sweden and in the Swedish supervision of nuclear power plants, there has been a strong commitment to safety culture and human, technology and organisation (HTO) aspects and their interaction. For the past 30 years, there has been a great and passionate focus in Sweden on emphasising the importance of safety culture in supervision. To a great extent, this is due to the accidents that have occurred. Over time, we have acquired solid experience in applying a systematic HTO strategy for safety.

One question that has been updated in the wake of the Fukushima Daiichi nuclear power plant accident is how safety is affected by the national context and culture. Based on this, it was important for the SSM in Sweden to also revise not only the operators' safety culture but also our own safety culture. For several years now, we've been working on our safety culture and on the way in which we all contribute to our national context and to the operators' safety. Since our supervisory culture is a part of the national context, it is essential to remember that we, as a regulatory body, also influence the safety culture of the licence holders.

There is an international focus on how the national and cultural context affects safety. This question is not new, but the Fukushima accident brought it to the fore. Within this context, WANO and the NEA discussed how they could support NEA member countries based on the respective country's culture. The SSM was contacted to support the creation of a new concept: the Country-Specific Safety Culture Forum (CSSCF). Sweden thus became the first country to conduct this forum.

The idea behind the CSSCF is to start out from the respective country's cultural realities and conduct a reflective dialogue about strengths and weaknesses, as well as what can be done to strengthen the safety culture within the authorities and operators concerned. Above all, in such a context, daring to look at oneself in the mirror and being able to openly discuss shortcomings within both the authority and the operators are essential to becoming aware in the long term.

It is always easier to see problems in other people's cultures and so much easier to consider one's own culture the norm. The challenge with this forum was to identify whether there was anything in our Swedish culture that could affect safety both positively and negatively. The CSSCF enabled us to reproduce our national culture in a cross-organisational dialogue. The outcome of the forum provides us with a better understanding of the factors that contribute to or undermine a sound safety culture in the Swedish context. We have already given the results from the forum careful consideration, and we have also heard from industry representatives who took part in the forum and who thought that it was very worthwhile, having made similar observations.

We believe that openly discussing weaknesses and strengths in the light of national characteristics both within an organisation, as well as between the authority and licensees, fosters and improves an effective safety culture at all levels within an organisation, which leads us to be able to ensure continuous improvement of nuclear power plant safety.

Having said this, I'd like to highly recommend other countries to follow our lead and choose to participate in the forum.

Mats Persson
Director-General, Swedish Radiation Safety Authority

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List of abbreviations and acronyms

CSSCF	Country-Specific Safety Culture Forum
HTO	Human, technology and organisation
IAEA	International Atomic Energy Agency
INSAG	International Nuclear Safety Advisory Group (IAEA)
NEA	Nuclear Energy Agency
NPP	Nuclear power plant
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
OECD	Organisation for Economic Co-operation and Development
OSART	Operational Safety Review Team (IAEA)
SKI	Swedish Nuclear Power Inspectorate
SSI	Swedish Radiation Safety Institute
SSM	Swedish Radiation Safety Authority
WANO	World Association of Nuclear Operators

Executive summary

Background

Achieving and maintaining high levels of safety is the goal of all organisations involved in nuclear energy. Experience has shown that a healthy safety culture is essential to the overall safety performance of any organisation, and that safety culture is influenced by many factors. Over the years, it has become increasingly evident that among these factors are elements characteristic of the national context. Hence, it is important that the nuclear community take time to uncover these national influences, realise their potential impacts on safety and develop a path towards sustaining a healthy safety culture. The Country-Specific Safety Culture Forum (CSSCF) is a step in this development, conceived jointly by the NEA and WANO as a means of providing an arena to explore the impact of the national context on nuclear safety and derive approaches to sustain and improve nuclear safety culture.

In order to improve safety culture, the attributes that make up the national context must be understood. It is important to keep in mind that national attributes are neither good nor bad. They can support a sound safety culture or, if disregarded, can in some instances counteract safety culture. The goal of the CSSCF is not to change the national attributes but rather to create awareness of how they manifest in organisational behaviours. The aim is to work *within* the national context for sustainable change.

Methodology

The main components of the CSSCF methodology consist of carrying out a process of reflection and dialogue to collect information on the national attributes and of finding ways to work within this context in order to sustain a healthy safety culture.

The first step of CSSCF Sweden, prior to the forum, was to capture and identify the elements of a Swedish national context related to nuclear energy. A series of interviews and focus groups took place with various licence holders, owner organisations and the nuclear safety authority, the SSM. The information gathered was analysed and several national attributes and organisational behaviours were initially identified. This step will hereafter be referred to as "the snapshot study".

The result of the snapshot study was integrated into a technical role play based on a scenario provided by WANO, which was designed to start a dialogue between forum attendees on the impact of the national context on nuclear safety culture.

The actual CSSCF, a one-and-a-half day programme, allowed time for reflection and dialogue. All licence holders in Sweden were invited – Westinghouse Electric Sweden, Svensk Kärnbränslehantering (the Swedish Nuclear Fuel and Waste Management Company), Ringhals nuclear power plant (NPP), Forsmark NPP, Oskarshamn NPP, Vattenfall and Uniper Sweden. Between five to seven representatives (mostly senior managers and executives) from each of these organisations took part. Seven international guests were also invited to contribute their perspectives and observations at the conclusion of the forum. The programme mainly consisted of structured group and plenary discussions that were prompted by role play. This programme led to fruitful conversations about nuclear safety culture and aspects considered to be typical of Swedish organisational behaviour.

Extensive notes were taken during the study and forum dialogue sessions and a qualitative thematic analysis was carried out. This report presents the results from the forum. It aims to encourage further dialogue to explore how the identified national attributes and patterns of organisational behaviour may influence nuclear safety.

The authors emphasise that this report should be considered as material from which to draw inspiration for further reflection rather than viewed in any way as a definitive study of Swedish culture.

Outcomes

This report is based on views of representatives of the Swedish nuclear community, as expressed during focus groups, interviews and at the 2018 CSSCF held in Stockholm, Sweden.

The results of the snapshot study and the forum identified Swedish national attributes that generate organisational behaviours which may or may not reinforce a healthy nuclear safety culture. Other than a few specifics that forum participants observed in the course of the exercise, this report does not present judgements or broad recommendations, but invites the Swedish nuclear community to further explore and determine how the identified cultural features need to be addressed in relation to nuclear safety. Some cultural features may need to be fostered and some others may need to be attended to in a proactive manner. A matrix with explorative questions is provided to trigger further dialogue and to start actions for improvements. International frameworks for sound safety culture are suggested to be used as guidance in this process.

The identified Swedish national attributes have been named below, using, in some cases, terms that are unique to this report. These terms are explained in detail in the report, and include:

- *samskap* (being in unity/harmony);
- *allskap* (everyone having the same rights/fairness);
- security and trust;
- expectations of freedom;
- complacency/national pride;
- desire for shared understanding.

The national attributes described above manifest in various organisational behaviours. Consideration of the discussions reflected in CSSCF Sweden identifies the following five principal areas:

- employeeship/leadership/managership;
- decision making;
- accountability;
- feedback;
- learning.

The CSSCF proved to be an appreciated and valuable initiative for all those involved. The SSM's active partnership in developing the methodology, and as a pioneer to host the first CSSCF, was pivotal to its success.

Judging from the wealth of exchanges in both the snapshot study and in the forum, CSSCF Sweden contributed to greater insight into how national attributes can influence organisational behaviours, which can in turn impact nuclear safety culture. The dialogues identified several questions for future exploration, particularly, "what does successful leadership look like in the Swedish nuclear operations context?"

The hope is that this first CSSCF will provide the impetus of a process that will continue in Sweden and that will encourage other countries to start their journey into better understanding their national attributes and their relation to safety culture. The forum also demonstrated that the national context clearly has a very powerful impact on nuclear safety, and it will be important for all countries to address the individual aspects affecting their own cultures.

The Methodology of the Country-Specific Safety Culture Forum

Purpose of the forum

The Country-Specific Safety Culture Forum (CSSCF) was developed jointly by the Nuclear Energy Agency (NEA) and the World Association of Nuclear Operators (WANO) to provide countries with a forum for dialogue and reflection on how the national attributes of a given country can influence nuclear safety culture. The forum enables the country's licence holders and regulatory body to examine which factors can influence safety culture. The forum was designed to facilitate dialogue about what is required to maintain the sound aspects of safety culture and what can be done to mitigate the possible negative aspects and identify best practices.

One of the forum's primary objectives was to conduct an open and explorative dialogue, which was achieved at CSSCF Sweden held in Stockholm. Participants had clear instructions that they were to share information in their personal capacity rather than as a representative of their organisation or of their profession. The organisation of the forum was designed to create an informal atmosphere and this approach contributed to the open dialogue.

It should be noted that relating the national attributes to the culture of an organisation is not an absolute science. As a result of several factors, it is difficult to determine what the typical behaviour or traits of a nation may be. For example, there may be major cultural differences even within a country, whether these are geographical or related to social class, ethnicity, political orientation or profession.

Conducting the first Country-Specific Safety Culture Forum: CSSCF Sweden

The programme for CSSCF Sweden was developed by a team consisting of representatives from the NEA, WANO and the Swedish Radiation Safety Authority (SSM).

The structure of the CSSCF methodology consists of five steps (as shown below in Figure 1).

Figure 1: **Structure of the CSSCF methodology**

1st step
- Conduct a snapshot study to capture information about national cultural aspects, including through interviews and focus groups.
- Qualitatively analyse the captured data to distinguish themes related to the national attributes of the culture.

2nd step
- Integrate the national attributes into the role play used as the basis for the dialogues during the forum.

3rd step
- Conduct the forum with a wide representation of the nuclear community (regulator and licensees).
- Include dialogues in smaller groups and in plenum.

4th step
- Undertake a descriptive analysis of material collected from both the snapshot study and the forum.
- Present the identified national attributes, based on the analysis of results, and their manifestation in organisational behaviours.

5th step
- Produce the report.
- Include explorative questions intended to inspire self-reflection, and determine nuclear safety implications and any follow-up proactive actions.

In preparation for the forum, a joint NEA-SSM team conducted a snapshot study in the form of interviews and focus groups. This activity was performed during 2017 to develop an appreciation of Swedish national attributes relevant to nuclear safety culture. Personnel from the nuclear authority, nuclear power plants and owner organisations, as well as licence holders, took an active role in these interviews and focus groups. The method applied for the snapshot study was inductive with semi-structured questions. Three levels – the macro-society/national, the meso-organisational and lastly, the micro-group level – were used to cover various cultural dimensions. Interviews and focus groups were introduced with questions about what behaviours are generally

considered "typically Swedish," and this was followed by questions regarding specific areas. The participants' active involvement enhanced the material considerably.

The results of the activity were used to inform a role play scenario based on a scenario provided by WANO. The scenario was further developed by the team to reflect the Swedish context.

The forum was convened in Stockholm in January 2018. The programme ran over a period of one and half days. The following Swedish nuclear operators and nuclear installations were invited: Westinghouse Electric Sweden, Svensk Kärnbränslehantering (the Swedish Nuclear Fuel and Waste Management Company), Ringhals NPP, Forsmark NPP, Oskarshamn NPP, Vattenfall and Uniper Sweden. Five to seven individuals from each organisation took part in the forum. In addition, seven international guests were invited to contribute their perspectives. The forum was held in Swedish with simultaneous interpretation in English.

The forum was kicked off by the Swedish author and comedian Fredrik Lindström, who provided a humorous and culturally insightful monologue. Participants were then divided into seven groups, with each group consisting of representatives from participating organisations. These groups explored Fredrik's dialogue and started to distil a set of cultural traits – the Swedish "national attributes".

The matter of cultural aspects was placed in a nuclear safety context by the Deputy Director-General of the SSM, Fredrik Hassel. This context provided insights into the subsequent role playing. The sessions were designed to provide reflection and cross-organisational dialogues. Each group included a designated facilitator and note-taker. The facilitators were from the Swedish licensees and the note-takers were from the SSM and the NEA, to help create an open and inviting atmosphere in the groups.

The next stage of the forum consisted of a series of role plays, where several participants became characters in a "real-life" situation in a nuclear power plant. There were seven scenes divided into three acts. Each scene was part of a story of how decisions made and attitudes projected by the company head office impacted the power plant refuelling outage, which, ultimately, resulted in a significant nuclear event. The role plays were anchored in the Swedish context, which increased their relevance and resonance with the participants. After each act, the participants broke into the seven smaller groups to converse, in order to try to understand how the Swedish national context may have influenced the role play either in a positive or negative way.

Eight rounds of group and plenary dialogues were conducted. All dialogues were recorded in writing. This report is based on these recorded notes and on the focus groups and interviews carried out in 2017.

Participants have indicated that they found the forum to have been a great success, with all of the role players and participants taking an active part in the discussions. All were open to the idea of reflecting on safety culture from the Swedish perspective regardless of their different positions and organisational

affiliation. Participants in the focus groups and interviews were so engaged that it proved difficult to end the exercises at the scheduled time. The same enthusiasm was demonstrated at the forum where several groups continued their conversations during the breaks. All participants openly reflected on their experiences and shared their views of aspects that are positive and those that are less so.

Analysis

A qualitative thematic analysis of the material was conducted. The analysis consisted of three iterative steps as follows and described in Figure 2:

- examination of data, collection of the material from interviews and focus groups, and identification of cultural traits;
- thematic analysis of cultural facts;
- establishment of an overall picture of national cultural aspects.

Figure 2: **Snapshot study analysis process**
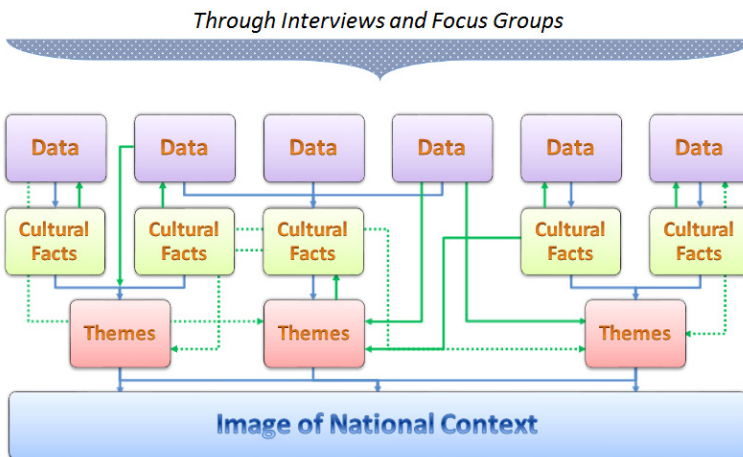
The data collection and analysis were conducted by describing the observations without ranking or comparing them. The snapshot study and its analysis revealed a picture consisting of national attributes and organisational behaviours that established what is referred to as the "Swedish context" for the purposes of this report. The material from the forum was analysed with the data from the snapshot study in the same manner. A more complete analysis of this information is presented in the report.

A matrix was developed to provide questions to help explore further how the national attributes study and forum findings – along with the matrix of questions intended to provide further reflections – are included in this report.

Safety culture in a national context

Background on safety culture

High levels of safety are not only a goal but an expectation of the nuclear energy community. Although this expectation has been a driver in continuing improvements in nuclear safety, the improvements have not been sufficient to prevent all accidents. Analysis of accidents at Three Mile Island, Chernobyl and Fukushima Daiichi has revealed that human and organisational factors played a significant role in each of these events. The interplay between human, technical and organisational (HTO[1]) factors has today become a concept for a systemic approach to safety. Safety culture is an essential prerequisite for an effective HTO system. To summarise, the cultural context influences the conditions for the human and organisational factors that contribute to nuclear safety. It is the people within organisations who direct and manage activities, make decisions, write laws and rules, develop the design, etc. It is therefore critical to assure safe nuclear operations within the context of specific human, organisational and cultural factors.

The broad consideration of nuclear safety culture stems from the Chernobyl nuclear accident in 1986 in the former Soviet Union. During the 1980s, the concept of organisational culture and its importance for business success was booming: books such as *Theory Z, Corporate Cultures* and *In Search of Excellence* were best sellers in management literature. It was not a coincidence that the concept and understanding of the importance of such issues in the aftermath of Chernobyl thus became known as "safety culture". These concepts were highlighted by the International Atomic Energy Agency (IAEA) International Nuclear Safety Advisory Group (INSAG), which was created following the Chernobyl accident. The group investigated the reasons why the accident had happened. One of the pivotal findings was the realisation that the accident had not been caused by solely technical factors. The most important factors that contributed to these accidents were related to safety culture issues, both in the main control room and in the organisation as a whole.

In its essence, culture is about how behaviours are shaped as a result of people's interactions and the information that is collectively shared in people's minds. In other words, it is a shared phenomenon. Although safety culture can be influenced by individuals – such as those in leadership roles, it is not an

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1. Swedish organisations more commonly refer to "MTO (man-technology-organisation)" factors.

individual concept in the sense that while one person can exhibit problematic behaviours, one person cannot have a weak safety culture. The outcome of what culture creates, however, can influence a single person's behaviour. Safety culture is a concept, a lens used to understand organisational thinking and behaviour, as well as an understanding of how a culture functions with regards to safety. When safety is used as a qualifier for culture, it becomes a concept with a normative function. Assumptions, values, ways of thinking and behaviours contribute to, or detract from, safety.

In nuclear safety, there are many written frameworks concerning what type of behaviours and values are required to safely operate a system, and these are generally well understood. People working in the nuclear safety area around the world have spent a great deal of time thinking about and creating normative frameworks and defining safety culture. In this regard, the nuclear sector is at the forefront of understanding the importance of culture as well as how and what cultural factors influence nuclear safety.

Awareness of the cultural aspect of safety started to grow after the Chernobyl accident, and the Fukushima Daiichi NPP accident brought a new impetus to the field of safety culture. The 2011 accident led to developments in the understanding of the regulators' role in safety culture, which have included a better understanding of the interaction between the regulating body and licence holders, as well as the safety culture of an effective regulating body.[2] Moreover, the understanding of the systemic nature of culture and its deeper aspects, such as the dynamics of how values and assumptions influence behaviours, has significantly evolved in the seven years since the accident.

National culture

The national cultural context has also gained more attention worldwide. Dr Kiyoshi Kurokawa, Chair of the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (Diet Report), took the bold step of specifically addressing national cultural aspects. Dr Kurokawa's statements about the contribution of Japanese cultural aspects in the foreword to the Diet Report were presented to the media in 2012. While his comments that the Fukushima Daiichi accident was "made in Japan" have been the subject of considerable debate, they drew more attention to the subject of how a national context might influence safety culture.

These concepts became an active area of discussion in fora associated with the Nuclear Energy Agency (NEA). While the conversation grew out of post-Fukushima Daiichi considerations, it was quickly recognised that no culture is better than another when it comes to achieving a high level of nuclear safety; however, cultures do have different attributes. Different attributes may, at

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2. For more information, please see the NEA green booklet, *The Safety Culture of an Effective Regulatory Body* (NEA No. 7247, OECD 2016).

times, reinforce safety culture and at other times not reinforce it. Therefore, looking at a national culture is not a matter of judgement or comparison; it is a matter of exploring, in a descriptive manner, which aspects support safety culture and which aspects should be considered when enhancing safety culture through discussion and training. The Country-Specific Safety Culture Forum (CSSCF) methodology was developed with this aim in mind – with the goal of providing a forum for a country to help organisations reflect on their national attributes and identify what could be done to enhance safety culture.

International normative frameworks

The nuclear community has defined what a sound safety culture looks like in normative frameworks. The World Association of Nuclear Operators (WANO) has developed their Traits of a Healthy Nuclear Safety Culture, with ten traits, their corresponding attributes and behaviour examples. The IAEA has arranged similar standards into a framework of 5 characteristics and 37 underlying attributes. The NEA has developed a normative framework for an effective safety culture in a regulatory body. The NEA framework is organised into 5 principles and 21 attributes.

While these normative frameworks provide a baseline, the national context must be taken into account. For example, in some countries, such as in Sweden, it is part of the culture for people at all levels of an organisation to question decisions made at high levels. In other countries, it is more difficult to question higher-ranking individuals or authorities. There is therefore a need to adapt. In the airline industry, for example, where some national cultures led to communication difficulties with respect to hierarchy in the cockpit (i.e. it was hard for the co-pilot to question the captain's decisions), a solution that proved helpful to overcome these barriers was to switch to English in the cockpit when it became necessary to question authority.

In any example, international normative frameworks provide a baseline that describes effective safety culture. The challenge is to find approaches that allow those frameworks to be applied within the context of a local culture, rather than against it.

The Country-Specific Safety Culture Forum originated in this context. The NEA Director-General, William D. Magwood, IV, and the WANO Chief Executive Officer, Peter Prozesky, shared the view that the sensitive and important issue of national context needs to be addressed. Accordingly, the decision was made to create a forum to support member countries in exploring their own local cultures and other national contexts through the lens of safety culture. The NEA Division of Radiological Protection and Human Aspect of Nuclear Safety (RP-HANS) was designated to lead the project. The Swedish Radiation Safety Authority (SSM) was asked to become an active partner in co-creating the methodology and pioneering the first Country-Specific Safety Culture Forum held in Stockholm on 23-24 January 2018.

General observations related to culture in a national context

Examining national aspects relating to culture is not an absolute science. For many reasons, it is difficult to precisely determine what behaviours are typical for one country. For example, there may be major differences from one region to the next within the country. There may also be differences between rural and urban regions. It may be hard to distinguish cultural aspects between the national (macro), organisational (meso) or group (micro) levels. There are cultural differences between various groups in society, e.g. based on social class, ethnicity, political orientation or profession. There are cultural differences at the meso level, between organisations, even if they are working in the same type of industry.

Another dimension is the contextual connection of culture, which shifts according to the situation. A person may thus behave differently according to the cultural context. A person may be willing to take risks when practising his or her racing hobby together with others, but this same person may be very conservative, for example, when he or she is facing risks as a nuclear reactor operator. Most of the time, people adapt to the cultural context without thinking about it. In other words, culture is multidimensional and complex, which makes it difficult, and perhaps even impossible, to precisely define national culture. Furthermore, it was not the ambition of the snapshot study or of the forum, which were conducted with a small representation of the Swedish nuclear community, to define the Swedish culture. The analysis of the data that was captured throughout the activities nonetheless shows that there are some common cultural aspects that can be called national attributes.

The Swedish cultural context

This section of the report intends to give some context for the reader by providing a brief glimpse of Sweden and the history of its nuclear industry.

Facts and figures

With an area of 447.4 km², Sweden is one of Europe's largest countries. It had a population of 10.1 million in 2016, which corresponds to an average of 24.4 people per square kilometre, the second lowest population density among European Union member states (World Bank, 2018; Eurostat, 2018). Life expectancy in 2015 was 82.2 years, which is 7 years more than it was in 1980 and 2 years more than the average life expectancy of the Organisation for Economic Co-operation and Development (OECD) member countries (Eurostat, 2015; OECD, 2014).

Equality is a core value that extends throughout Swedish society and working life. Compared to other countries, Sweden is highly egalitarian. In 2017, the Global Gender Gap Report[1] ranked Sweden as fifth for its success in eliminating gender gaps in society (World Economic Forum, 2017).

Swedish citizens have some of the highest levels of trust in the state and institutions in the world. Data from the European Union and the World Value Survey demonstrates that interpersonal trust in Sweden is not only high (see Figure 3 below), but has also remained stable for decades (Ortiz-Ospina and Roser, 2018).

Between 1850 and 1930, 1.43 million people, a fifth of the population, emigrated from the country. Most went to the United States while employment conditions were favourable there, and attributed by some due to the concurrent difficult living conditions in Sweden resulting from food shortages, harvest failures, high unemployment, a lack of housing, and widespread poverty (Quigley, 1972). This massive emigration meant that Swedes benefited from an exchange of new ideas in the form of the so-called "America letters", which brought new ideas and an increased political awareness in the population (Barton, 1996; Runblom & Norman, 1976). The influence of citizens had already increased during the industrial revolution in the 19th century, but by

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1. The Global Gender Gap report benchmarks 144 countries on their progress towards gender parity across four thematic dimensions: economic participation and opportunity, educational attainment, health and survival, and political empowerment.

the beginning of the 20th century, various popular movements grew stronger, including the labour and the women's movement (Sweden.se, 2018). While unemployment increased, inflation skyrocketed, and the 1918 Spanish flu wreaked havoc,[2] the demand for social and economic reforms grew. The Nordic countries were the first in Europe to gain universal suffrage and non-proportional voting rights and, in Sweden, the law on universal and equal suffrage for both men and women was approved in 1919 (Riksdag, 2018).

Figure 3: **Interpersonal trust**

Mean average, on a scale from 0 (you do not trust any other person) to 10 (most people can be trusted), 2013
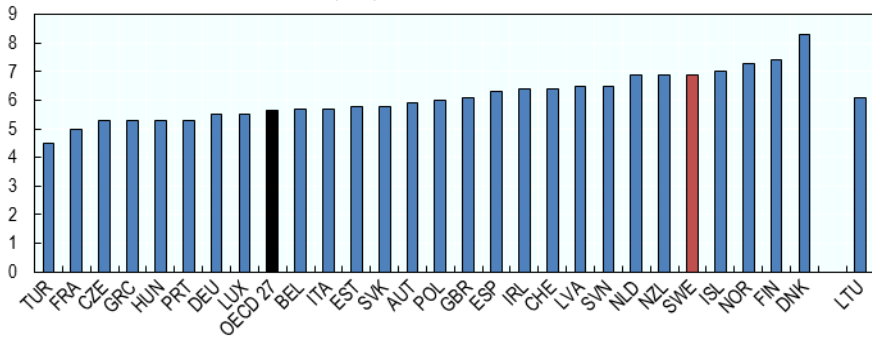
Note: The OECD average is population-weighted; it excludes Australia, Canada, Chile, Israel, Japan, Korea, Mexico and the United States

Source: European Union Statistics on Income and Living Conditions (EU-SILC), Statistics New Zealand.

Sweden took a series of societal enhancement measures in the middle of the 19th century, such as those to fight corruption, ensure freedom of the press and fair access to all professions. Recruitment in the public administration began to be based on merit rather than lineage, and the abolition of the guild system allowed more people to gain access to various areas of professional life. Early adoption of patent legislation, along with the banking system, which created a market for venture capital, contributed to considerably accelerated innovation in the country (Schön, 2012). These conditions contributed to the advent of many inventions, including dynamite, the primus stove, safety matches and the tetra pack (Sweden.se, 2018a).

However, the real economic upswing occurred after the Second World War. As the country remained neutral through the war, its undamaged industrial infrastructure and very strong post-war development contributed to making Sweden one of the richest nations in the world on a per capita basis in 1970 (Sweden.se, 2018, United Nations Data, 2018). The exceptional economic development lasted until the 1970s oil crisis, when the country's trade conditions began to resemble those of the rest of the world (OECD, 2007).

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2. At least one-third of the Swedish population (at the time 5.8 million) were infected, over 34 000 people (5.9 per 1 000 people) died in 1918 alone (Holtenius and Gillman, 2014).

Swedish nuclear programme

In 1947, the Swedish government established an atomic energy research organisation, AB Atomenergi. Initially, the objective of this action was to create an organisation as a basis for a nuclear weapons programme. However the plan to develop nuclear weapons was abandoned in the late 1960s. Sweden signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1968 (Jonter, 2016).

Sweden's nuclear knowledge base was then shifted to nuclear energy production. But instead of buying designs that had already been developed overseas, Sweden decided to use its competence and industrial production capacity to develop its own nuclear reactors. This led to the order of the Oskarshamn 1 from ASEA in 1966 – the first western light water reactor designed and built without requiring a technology from US vendors (WANO, 2018). The reactor started up in 1972. During the next 12 years, 11 more reactors were commissioned, of which 9 were of Swedish design.

After the Three Mile Island (TMI) accident and the subsequent investigations, the nuclear regulator in Sweden at the time hired its first expert in behavioural sciences. A Man, Technology and Organisation (MTO) section was later established. The need for this kind of competence was underpinned by the investigations of the Chernobyl accident. The development of this section has continued and has grown continuously over the years. The section now employs 12 behavioural scientists who conduct oversight in the human factors field and contribute to the drafting of rules as well as supporting the authority's internal organisational development (Ministry of the Environment, 2017).

In 2006, the Forsmark unit 1 had an incident caused by a short circuit in the 400 KV power supply. The complex situation that followed was handled by the operators. The Swedish Nuclear Power Inspectorate (SKI) classified the incident as an INES 2 incident (SKI, 2007). The Forsmark incident offered insight within the regulator regarding the need to act more proactively when there are indications of a decline in the safety culture of an operator/licensee (SSM, 2009). This knowledge has resulted in further actions to strengthen the proactive actions taken by the regulator twice since 2006 (Ministry of the Environment, 2013).

After a long and successful operation of the 12 reactors, the decision to phase out the first two reactors, Barsebäck 1 and Barsebäck 2, was taken by the Swedish government. Barsebäck unit 1 was closed in 1999 and unit 2 in May 2005 (Ministry of the Environment, 2017). In 2015, it was decided by the licensee, for economic reasons, not to complete upgrades to Oskarshamn 2 and to declare it permanently shut down (WANO, 2018). In 2017, Oskarshamn 1 was taken out of operation and permanently shut down. Vattenfall is the main owner of Ringhals NPP, and the NPP licensee, Ringhals AB, announced in 2015 that they plan to end operation of Ringhals 1 in 2020 and Ringhals 2 in 2019 for economic reasons (WANO, 2018).

The Swedish Radiation Safety Authority (SSM) was founded in 2008 through a merger of the SKI and the Swedish Radiation Safety Institute (SSI). The authority has, as its mandate, to work "…proactively and preventively in order to protect people and the environment from the effects of radiation, now and in the future" (SSM, 2018). As such, it has overall responsibility in the areas of radiological protection, nuclear safety and nuclear non-proliferation (Ministry of the Environment, 2013). The authority currently employs about 300 people with skills in areas such as technology, the physical and behavioural sciences, law, economy and communication (Ministry of the Environment, 2017).

Safety culture in the Swedish context: Observations from CSSCF Sweden

Introduction

The snapshot study and the Country-Specific Safety Culture Forum (CSSCF) provided information regarding national attributes. These national attributes are common themes that may manifest in various organisational behaviours.

> CSSCF Sweden should be viewed as inspiration for further reflection rather final conclusions.

As noted earlier, the outcome of CSSCF Sweden does not represent a comprehensive study of the Swedish culture; it is a consideration based on focused exercises reflecting approximately 100 people's perceptions about Swedish culture in a nuclear safety context. The results will thus entail some observations (and, inevitably, some overgeneralisations) that we hope will spark a continued dialogue on how these identified cultural features can influence nuclear safety.

The scenario used for the role play during the forum was an operational event that takes place in a structured environment with, for example, meetings and conversations related to operations. This role play fuelled conversations during the forum in which participants asked themselves what behaviours are typically Swedish and which are specific to the nuclear industry. Most participants felt that the organisational culture differs significantly between operations and other parts of a nuclear organisation – although the culture is considered to be most nuclear industry-specific within operations. Decision making, communication, leadership, follow-up, feedback and accountability

> Several participants felt that plant operations were less influenced by the national context than by other elements of a nuclear organisation.

were considered to be managed to a greater extent using formalised processes in the conduct of operations. Participants engaged in several conversations regarding the distinction between industry-specific characteristics and those considered to be typical Swedish organisational behaviours. It should also be noted that the discussions and reflections made during the forum were in the context of normal operations and day-to-day management, not under accident conditions.

Swedish national attributes highlighted during CSSCF Sweden

To label a thematic cultural phenomenon is to make the feature explicit and conscious. Much of any cultural feature "is under the surface" and unconsciously influences organisational behaviour. It is therefore helpful in clarifying the discussion to label cultural features to enable an exploration of the underlying drivers. It must be noted that national attributes are not definite and those discussed in this report may not be unique to Sweden and may well exist in other countries. This report reflects the attributes that emerged throughout the snapshot study and the CSSCF, and, for the purpose of this report, two deeply rooted Swedish cultural themes have been labelled as samskap and allskap.

Samskap

The attribute samskap has been designated in this report to represent the central Swedish cultural aspect of being in unity and the will to take a collective accountability for well-being and harmony. The snapshot exercise highlighted that a tendency in working life is often centred on working in a group to solve a given task. Two examples where samskap is a key to a transparent and inclusive way of dealing with tasks and providing for an efficient and well-informed process are problem-solving and decision making. Sweden is a country where collective processes are emphasised. Indeed, there is no single word in English equivalent for the Swedish term *sams* (which is described as "being in unity," "being in agreement," and/or "keeping good relations"). However, there are similarities in other countries that have a more societal collective approach. Japan is such a country, where the word "wa" is a central cultural notion that is similar to some extent to *samskap*. "Wa" is a cultural concept or value that can be translated in English as meaning "to stay in harmony", avoiding the creation of friction in relations and being mindful of the social context.

Language is an important cultural vehicle with many words in Swedish containing *sam*.[1] It seems that being in unity (*sams*) and collaborating (*samverka*) produces some sort of sought-after harmony. In both the snapshot study and the forum, it was revealed that not to be in unity (the opposite of *sams*, or *osams*) or to challenge unity is something that is avoided. Often, it appeared as if avoidance of conflict was a common behaviour. Participants in the focus groups and small discussion groups discussed fear of conflict, which can be expressed in the unwillingness to correct an inappropriate behaviour and to provide feedback. "Clenching your fist in your pocket" was another subject of discussion (a Swedish expression meaning to be seething inside), or not wanting to speak out during meetings in order to avoid creating dissension.

It may be that some believe avoiding conflict leads to a greater degree of empathy and consideration for social aspects. It was mentioned both in the

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1. The prefix is similar to "co" in English, but has another connotation as *samskap*, which has a deeper sense of unity and striving for harmony.

study and in the forum that it is important to show consideration for others and avoid hurting them. Being in unity (*sams*) and collaborating (*samarbeta*) is more demanding on individuals who should not only be empathetic with each other but should also adjust their behaviour to each individual situation. This is in contrast to cultures where, for example, a highly polarised discussion is a natural part of relations and is viewed as a "healthy debate" rather than a disagreeable conflict. Several managers said that leadership training taught them that one way of creating well-being at work is to give directives by asking questions; a coaching leadership style is considered to minimise conflict among employees and at the same time increase their understanding of the task at hand. Of course, heated discussions do occur in Sweden and different views about a factual matter may be exchanged in meetings. This is especially the case in nuclear operations and in matters related to safety. When functioning well, combining consensus with openness means that an issue will be highlighted and anchored before a decision is made. This is because everybody's – not just the manager's – knowledge is used when the decision is made. In addition, feeling good in relations with others at work is something that is valued. Employees want to feel appreciated at work; and feel as if everyone's opinion is worthwhile and must be respected. These are important factors for people to want to remain in their positions or in their teams. During the forum, it became apparent that *samskap* may even outweigh the importance of the issue at hand at times.

From the snapshot study, it was said that problems were more often viewed as something needing a solution and not as something negative or requiring punishment. The attitude is rather more focused on finding a solution. The tendency is to attempt to demystify problems, even controversial problems, which are discussed openly. One example is the handling of final storage of nuclear fuel and the transparent and open communication about the problem of nuclear waste. With regards to the storage of nuclear fuel, the high level of inclusion of the community in the process has led to a high degree of acceptance in society. It was almost a competition between the two selected communities to have the final storage in their neighbourhoods. It was also mentioned that, on most occasions, problems are often raised to the collective or at the management level and that people work together to find solutions. So, the desire for *samskap* can also be found in this regard.

Allskap

Another deep-rooted national attribute in Sweden is related to *samskap* and has been labelled allskap for the purpose of this report. It relates to the idea that everyone should have the same rights and that all things should be fair. Typical examples of this are the Swedish welfare state ("svenska folkhemmet"), everyone's right/freedom to roam ("allemänsrätten") and the Co-determination Act ("medbestämmandelagen") intended to promote employee participation in decision-making on employment and working conditions (Eurofound).

Equality and justice can be viewed as central in Swedish culture. It may be that this striving for equality has sprung out of *samskap*. Consensus was a topic that was mentioned many times in both the forum and the snapshot study, and

its relation to the Law of Jante[2] ("Jantelagen") and to the Swedish concept "lagom"[3] as well as its role in the shaping of conformity. Participants stated that ranking, distinguishing between groups or being highly hierarchical are not aspects of Swedish character.

Conformity was a topic mentioned several times in the snapshot study and it was said that it is not "Swedish" for someone to stand out from a crowd. The football player Zlatan Ibrahimovic's attitude of being outspoken about how good a football player he is was an example used in the forum of a person that broke against what is typically Swedish. Stating that one is incredibly good, to stand out or be outspoken without taking others into consideration is unwelcomed and considered rude. Paradoxically, Zlatan Ibrahimovic has become one of the most admired Swedes during the last decade.

Another aspect of *allska*p that appears in both the snapshot study and the forum is the aim for common understanding. For example, it seems that in Swedish culture, all participants in a meeting are expected to have the same understanding. In fact, one of the reasons why some meetings are not documented is that all are expected to come out of them with the same comprehension of what has been said and of what needs to be done. To illustrate this, the example of an average meeting was given, which usually ends with the chairperson asking whether everyone has understood, and all participants in the meeting answering yes. However, there is no verification that everyone really had the same understanding.

In both the snapshot study and the forum, it was emphasised that openness and transparency regarding information are highly valued. There are even laws to regulate openness and transparency. An example would be the principle of public access, which includes public access to most official records. All must have the same rights to information, particularly in the case of work-related information. It is often said that information is power, and it may be that *allskap* eliminates these power dynamics to a certain extent.

The natural behaviour of inclusion was also addressed. A clear example underlined was that of feeling better to include than to exclude people from a meeting. Several people may therefore take part in a meeting even though they do not have a formal role in or are not concerned by the issue at hand. "Play-on-word" jokes are made about "tekniker", which means technicians, and "tycknicker" which is someone who only has opinions ("tycka" means to have an opinion). There is too often a tendency to believe that everyone has the right to take part and give their opinion.

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2. Law of Jante (Jantelagen) are ten social rules written by Aksel Sandemose to describe a homogeneous pattern of group behaviour in the Nordic countries. The core of the rules can be shortened into, "You are not to think you're anyone special or that you're better than us". The Law of Jante may be less prevalent today in larger Swedish cities.

3 Lagom is a word for just the right amount – not too much, not too little. It is to be in the middle, in moderation, in balance and not be excessive.

Finally, a semantic observation about *allskap*: in Sweden, titles or last names are rarely used in the working environment as may be customary in many other countries. All people are at the same level; with people even addressing the topmost executive by his or her first name all the while respecting each other. Clearly stating hierarchies or rank is not typical Swedish behaviour. Several managers in the forum and in the snapshot study stated that being a manager could be double-edged. In some instances, it has been stated that managers could not always act as executives, i.e. take up too much space or skip the process during which everyone is given an opportunity to voice their opinion before decisions are made, but that, on the other hand, they must always set a good example in their day-to-day activities. They must also be understanding and empathetic on a human level.

It was noted during the forum that, when *allskap* works well, the decisions are not only well understood by everyone involved, but all those that have a responsibility to implement a decision are committed to doing so. When *allskap* does not work well, the decision-making process can be very time-consuming, and there can be different interpretations of a meeting's or decision's outcomes.

Security and trust

From a cultural perspective, the core values of *samskap* and *allskap* appear to permeate the society. Public policies that emphasise equal right to education, health care, retirement and senior care are examples. In both the snapshot study and in the forum, it has been shown that these cultural values have an effect on the workplace. It was also highlighted that there is generally great trust in governmental authorities, the state, colleagues, co-workers, managers, processes, rules and systems, and it is assumed that people take responsibility and do what has been agreed in a safe and efficient manner. It is not always considered necessary, for example, to check the work of others or how they have carried out their tasks. This would simply be considered impolite as it would be viewed as a breach of privacy or a lack of trust. It can go so far as to assume that co-workers who work without protective equipment must have a good reason for not following instructions, and therefore not questioning their behaviour[4].

Also mentioned in the snapshot study was the Swedish tendency to feel secure and to trust that the system works correctly, which may explain why Sweden has remained at the top in terms of anticorruption according to Transparency International's Survey of Corruption Perception Index. Several people stated in the snapshot study that they view other Swedes as honest and transparent. This assumption makes it possible to trust each other to a greater extent and may increase efficiencies in getting the job done. Honesty and transparency were also exemplified by the fact that external reviews were

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4. While this behaviour clearly has safety culture implications, it was not examined in detail in this particular exercise. It would, however, be appropriate to address this factor in future efforts to enhance safety culture in Sweden.

invited from the World Association of Nuclear Operators (WANO) under their peer review programme and the International Atomic Energy Agency (IAEA) under their Operational Safety Review Team (OSART) programme. Several believed that it was typically Swedish and that in other countries there is not such a great willingness to "hang out the dirty laundry".

Freedom

It was found that the degree of freedom in working life is essential. Most participants perceived the attribute of being "bossy" as inappropriate. Staff expect to be provided with frameworks for work rather than to be micromanaged, as it gives the necessary freedom to solve tasks by oneself based on skill. Sweden is a country that has a high level of innovation capacity. The Global Innovation Index 2018 ranks Sweden at second place in the world. The freedom to make use of one's own thinking and have an influence on how work is to be carried out was said to stimulate innovation. Participants also expressed that a major motivational factor is to be free to be creative. Managers also expect employees to bring new ideas and solutions regardless of their status or position.

Freedom in the form of time off work was highlighted as something almost non-negotiable. It was pointed out that it should be avoided as far as possible to contact a co-worker who is on leave. Examples were provided where decisions or tasks sometimes were postponed deliberately because the person responsible for the matter was on leave and had no chance to provide input. However, it was also underlined that it is becoming more common, when there is a good reason, for people to be contacted on their free time. If there is a question concerning safety that requires a quick action or a question of operations, the person in charge would be contacted regardless of whether they are on leave or not.

Complacency/national pride

One topic that was brought up in the snapshot study and in the forum was the tendency to think that "Sweden is best" or that anything "Made in Sweden" is great. The conversations reflected a national pride that a country with such a small population managed to become one of the best in the world in several respects. Aside from the social perspective mentioned above, successes in various industries such as Atlas Copco, ABB, Ericsson, Astra, SAAB (fighter planes and cars), Volvo (cars and trucks), Scania (trucks), IKEA, H&M, Spotify and Skype, must be mentioned. One discussion group during the forum reflected upon the fact that the media likes to convey an image of Sweden as being a world leader.

On the one hand, this pride and the confidence that comes along with it gives Sweden possibilities to do more than what can be expected from a country of this size. On the other hand, it could lead to complacency.

The 2017 terrorist attack in Stockholm was given as an example during the forum to illustrate national complacency. The event was something some of the participants never believed could happen in Sweden. It was even justified

as being somewhat of an isolated case, and this despite the fact that Stockholm had already been a target at least once before. It was also mentioned that people have become humbler and have started to realise that Sweden may have been left behind in some areas, such as the educational system.

Certain cultural aspects in the role play were sometimes brushed aside, but later in the group conversations participants admitted that behaviours such as those displayed in the scenario do indeed occur. It was even mentioned on several occasions in the plenary dialogues that care should be taken not to fall into complacency. One example that was provided was that all three nuclear power plants have been under special regulatory oversight because of weaknesses in the leadership and management of safety.[5]

A drive towards shared understanding

Another theme that arose was that of "the driver" of shared understandings in working life. All focus groups agreed that giving orders and blindly following them would not be a way to achieve success in Sweden. Participants further agreed that it is important to create a shared understanding for successful implementation. If one does not understand why a job must be done in a certain way, according to decisions or rules, there is a tendency for people to do as they think is best. Managers therefore have an important role to play in explaining the rules so as to bring about shared understanding. The term "pedagogical approach" was used to describe this cultural expression. However, respect for and adherence to procedures was said to be strong in operations.

During the forum, the participants reflected upon the idea that it can be risky to assume that everyone has the same understanding. The logic is that understanding drives action, and as a result, there is a risk that things do not turn out as intended because of divergent understandings. Furthermore, it was often brought up during the snapshot study and the forum that people too often feel they have a preferential right of interpretation of the decision.

Skill and extensive experience are highly valued in Sweden. During the forum, it was highlighted that a person with extensive experience can achieve a "guru" status as an informal leader in the organisation. The latter's opinion weighs heavily on decisions or discussions. It was further underlined that to have gone the long way, either by holding a number of different positions or by having held the same position for a long time, almost gives one an "unchallenged" status. Executives expressed that it may be difficult to oppose the opinion of informal leaders, which tend to automatically be assumed to be right.

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5. If the regulator in Sweden has observed weaknesses in the leadership and management for safety, the licensee will be under special regulatory oversight, with increased numbers of inspections and heightened surveillance.

Typical behaviours in Swedish nuclear organisations identified during CSSCF Sweden

The national attributes described above manifest in various organisational behaviours. Consideration of the discussions reflected in CSSCF Sweden identifies the following five principal areas:

- employeeship/leadership/management;
- decision making;
- accountability;
- feedback;
- learning.

A description of how these national manifestations appear in Swedish nuclear organisations follows, but it should be kept in mind that these reflections are not absolute truths and should rather be viewed as inspiration for further reflection.

Employeeship[6]/leadership/management

The information collected from the analysis of the snapshot study and the forum shows that the dynamics between employees, leaders and managers are permeated with all of these national attributes. Regarding the attributes samskap and allskap, it was unanimously agreed that a manager must be good at establishing a collaborative and fair working environment. In both the snapshot study and the forum, it was found that leadership should have more of a coaching style, as mentioned earlier, with a pedagogical approach so as to foster samskap through shared understanding. Asking questions, instead of giving orders, is a winning concept according to the participants in both the snapshot study and the forum. Several people used the word "soft" to describe Swedish leadership, which may relate to the leaders showing flexibility and adaptability. It was emphasised by participants that it is the leader's duty to motivate and inspire employees, with several groups underlining the negative connotation of "bossy" characteristics. A manager is expected to be more of a colleague than a superior, and avoid "stating the obvious" as the majority expressed. Managers should also avoid taking offence (samskap) and need to earn the respect of their co-workers in order to gain a hearing. In one of the focus groups, one person expressed it as follows: "I would never want to be a manager because you need to earn everyone's respect to make it work."

The cultural attribute of *allskap* evidently has an influence on leadership, toning down how authority is exercised and demonstrated in the organisation. Considering the impact of *allskap* and *samskap*, there is a tendency to strive for equality in the workplace. Several participants indicated that Swedes may not

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6. **Employeeship** (or ***Medarbetarskap*** in Swedish) is an approach to developing a culture of ownership and responsibility in an organisation. The philosophy has been adopted and researched most notably in Sweden.

have the same respect for authority as in some other countries. In both the snapshot study and the forum, it was said that co-workers have little inhibition about questioning and challenging authorities and managers. The participants thought that this was a result of job security, as well as the norm stipulating that everyone has the same value. Because it is important that everyone's opinion be taken into account, and particularly differing opinions and perspectives, this was said to have a positive influence on nuclear safety. It is also in line with the international normative frameworks, which emphasise the importance of having a questioning attitude, of ensuring a reporting culture, and of encouraging openness without fear of retaliation.

One topic that several focus groups reflected on was the nature of Swedish leadership as it can often be ambiguous in nature: regarding roles and responsibilities, decisions, follow-up on decisions and feedback. Most participants indicated that they would like to have clearer leadership, but not at the expense of *samskap* or *allskap*. This particular element was underlined in the snapshot study as well – that Swedish leadership style could be combined with greater clarity.

Employeeship in the Swedish context is characterised by having a high degree of freedom to work "as one sees fit". It is expected that managers will not micromanage, as micro-management is not perceived to be acceptable. The example was provided of when an authoritarian and micromanaging manager had brought about such a high degree of dissension within an organisation that more than half the employees had quit or moved to other departments.

The material from the forum and the snapshot study thus show that the social aspect of the workplace is of utmost importance. *Samskap* and *allskap* have a strong influence on organisational behaviour with respect to the dynamics between managers, leaders and employees.

Decision making

Decision making in Swedish nuclear organisations was described from several perspectives during this project. The focus groups were unanimous in considering the decision-making process in Sweden to be unique. Decision making is characterised by involvement of everyone and striving for consensus. Once again, samskap, allskap and understanding of the background and reasoning for a decision have an important role in the Swedish context. Giving one's opinion and being able to influence a decision is considered to be a right. As mentioned earlier, it is viewed as necessary that a person who is to take part in implementing an action must understand the decision for the action and its basis. It is also imperative for Swedes to feel that they were involved in the process and given an opportunity to voice their opinion. It can otherwise result in the decision not being adhered to or that sub-optimisation occurs and the person in question does as he or she feels would be best. Some of the focus groups considered that not following this approach could result in deviations as a result of the fact that the person does not know the greater perspective. Another interesting aspect related to implementation of decisions is that if a person does not implement the decision accordingly, it could be explained by the fact that the

person did not understand the decision. In such cases, it was considered to be a systemic error rather than misconduct by the individual.

Examples were given showing that if the person does not feel involved in the decision or the decision is vague, there is room not to follow the decision. The focus groups were unanimously convinced that a high degree of involvement is valuable. They believed that this provided all-around insights and helped achieve shorter implementation times. In the scenario, it was recognised that new employees may freely express their opinions. It is even welcome. In most cases, even challenging the manager is acceptable. In this context, it was emphasised that experts, on the other hand, are rarely challenged.

Participants reflected on the social aspect sometimes taking the upper hand in decision-making meetings, with one focus group joking that the only missing element in meetings was the cinnamon rolls. Due to the importance of *sams*, in some situations, a divergent opinion can be perceived as a source of conflict, and this may cause "lobbying" for their cause ahead of a meeting to guarantee that potential opponents support the desired decision. The social aspect was also accounted for through the influence given to informal leaders, largely as a result of their extensive experience or as a result of the local social structure. Several of the organisations are located in smaller communities, and people know each other privately. This may unconsciously weigh in on behaviour since one does not want to offend someone and thus avoids voicing a view if it goes against the proposal. It should be added that all focus groups called attention to the fact that, when decisions regarding operation are concerned, the process is different and closely managed. Participants believed that the practice in nuclear organisations of placing safety first would override the social aspects in crucial decisions regarding safety.

Some discussion took place on the informal aspect that pervades decision making. Decisions are sometimes taken outside the decision-making forum, for example in preliminary meetings, at the coffee corner or in other informal situations. This organisational behaviour would benefit from further exploration so as to identity what impact it may have on nuclear safety.

Participation in decisions was discussed in terms of it being fairly common for many people to take part in decision-making meetings. It may happen that people take part because they have an opinion but no actual formal role in the decision-making process. It was mentioned that decisions may even be taken in an informal forum with people who do not have a formal role to make decisions. Examples were given of people who do not really have anything to do with the decision but still may sometimes play a central role in the process.

In the snapshot study, and to a certain extent during the forum, the so-called "interminable delays" that occur because of *allskap* and *samskap* were discussed. In some cases, it can take years for a decision to be reached, e.g. complex technical issues at NPPs that have no imminent impact on safety. Examples were even given of instances where it took so long that when the decision was finally made, it was no longer relevant. Again, decision making within operation was said to differ in that there is a highly structured procedure, having clear roles of responsibility.

It was highlighted both in the snapshot study and during the forum that the assumption of a common understanding became particularly clear in meetings with other countries. A participant gave a telling example of this, when during a meeting between top executives from Sweden and another country, the Swedes reported back that it had been a very productive meeting and that many decisions had been made, whereas the other party's feedback stipulated that no decisions had been made.

A common observation during conversations related to the "woolliness" of the decision-making process. Decision-making meetings were described as unclear with regard to the basis of the decision, the meeting participants, the person responsible for making decisions, the desired outcome of the decision, the implementation of the decision and how follow-up should be carried out. This woolliness can be interpreted as a freedom to do as one sees fit, with the lack of clarity used in a strategic manner.

The lack of follow-up was attributed to work not being micromanaged and people being reluctant to "dig around in the work of others". While there is trust that what has been agreed will be done and that individuals will report any problems that may arise, the discussions reflected the concern that decision-making meetings could end with a lack of clarity and that individuals could emerge with differing views as to what was agreed and what next steps were to be pursued. It was considered that meeting best practices could be shared as a way of addressing such concerns, such as having managers ask participants to summarise their understanding of next steps at the conclusion of the discussion.

Accountability

In discussions about accountability, it was highlighted that very often Swedes like to take on responsibility and to feel accountable, but they also often shift responsibility to the collective or to the system.

Based on comments made during the forum, it seems that if people are willing to take on responsibility and do take this responsibility seriously then they generally set high expectations for themselves. For example, they may take on additional responsibilities when they see an opportunity to improve a skill or gain knowledge. Employees are considered to be the driving force in an organisation, taking on the responsibility for carrying out the work in consultation with the manager. Occupational burnout was discussed as a consequence of people taking on too much responsibility and a lack of clear frameworks for such responsibilities. The focus groups also mentioned that it is common for formal job descriptions to be missing or generally unclear. Several examples were provided concerning employees taking on more responsibilities than had been formally agreed. This particularly applied to questions of who is responsible for safety. Several focus groups said that they acknowledged responsibilities for safety at the employee level, and all focus groups agreed that there was no lack of emphasis on safety in terms of the responsibility of the plant manager.

Both in the snapshot study and during the forum it was noted that there exists a tendency to shift responsibility to someone else. This may happen when people rely on the system to take care of the issue. The system may for example consist of the review process, the hierarchy, the rules and the exercise of authority. Responsibility is preferably taken jointly, which results in responsibility resting with several people. The attributes *samskap*, *allskap*, security and freedom manifest themselves in this behaviour. It is perceived as more secure to share the responsibility, and there is more individual freedom as there is less impetus for a manager to follow up individually, which could be perceived as micromanaging as outlined earlier in this report.

As described above, the decision-making process was said to be ambiguous in some regards and may lead to decisions with considerable space for interpretation. Such ambiguity has an influence on an individual's responsibilities.

Another aspect regarding responsibility that was discussed concerns the unwillingness of people to get involved in the responsibility of others even if one notices something that has gone awry. Several focus groups used the example of when someone observes a person who is not using the required safety helmet but does not want to call attention to this fact, revealing a tendency to try to avoid offending others. The same desire to not cause conflict from a manager to his or her subordinate exists between peers who similarly do not want to be perceived as interfering in their colleagues' areas of responsibility.

The question of the amount of time it takes to get things done was also discussed in both the snapshot study and the forum. Several examples were raised by participants that there is usually no consequence if a person does not deliver on time on less pressing issues. In many cases, an acceptable excuse is that the person "did not have time to complete", which generally is driven by the desire to take the time needed to achieve high quality results. It was also noted that important and high priority issues, for example linked to operations, are addressed on time, and, if not, there will be consequences.

Several of the forum discussion groups noticed the absence of the safety department's presence during the role play scenario. Participants were told to assume that the fictional nuclear power plant in the scenario had developed a culture in which staff had become accustomed to not contacting the safety department first, but instead directly calling the regulatory authority. This scenario triggered a conversation both in the forum discussion groups and in the plenary on the responsibility for safety and the authority's role. The opinions diverged with regard to how common it is for staff to informally contact the authority. Some felt that this happens "all the time" and others felt that it was extremely rare. Opinions were also divided about how contact occurs.

While whistle blowing is unusual, talking to the authority informally to voice one's views on a particular issue is more common. Sometimes, a more informal approach may be used to get an issue across, for example by simply bypassing the formal internal path. The reason for using such an approach may result from different factors, including a desire to have a decision approved more quickly, to avoid internal resistance, to have one's voice heard regarding a particular

question or to appease the concerns of a person who has a strong feeling of responsibility about safety. It was, however, considered disloyal to turn to the media or to go to the regulatory authority without first trying to go via formal internal channels. According to the participants, there is generally a strong sense of loyalty when it comes to safety in Sweden, and people take their personal responsibilities seriously when it comes to safety.

This particular style of open dialogue between licence holders and the nuclear regulator was said to belong to the Swedish model of nuclear regulation through self-supervision and to suit the particular Swedish culture.

Feedback

It was stated both in the snapshot study and the forum that people in Sweden are called upon to be critical and to question things. Because it is easy to talk with managers at all levels and to call things into question, the focus groups believed that information flows faster in Swedish organisations.

It appears in the material from both the snapshot study and the forum that it is generally easier to provide upward feedback in a Swedish organisation than downward. Most managers said that it can easily become problematic to provide feedback to employees. Words such as "silk gloves" and "restraint" were used to describe the sensitivity of feedback. According to responses provided in the snapshot study, criticism is difficult to give, and everything should be presented in a positive manner. Someone reflected upon the fact that society has become largely based on everything being positive, especially in schools, where positive reinforcement is used. It has thus become difficult to accept criticism and a kind of hypersensitivity has developed in Sweden, which could explain why following up and providing feedback goes against the grain.

Sensitivity to feedback and differences in communication styles between Swedish and foreign cultures were also discussed during the forum, particularly with regard to interactions with several international organisations. Some concern was expressed about the risk of a message not getting through because of cultural misunderstanding. On the surface, it appears as if a consensus has been reached, but it later turns out that the situation has been interpreted or understood in different ways. During the focus groups and interviews, a couple of people with foreign backgrounds who had been working in Sweden for many years gave examples of such cases, with one person saying, "In Sweden, you have to keep restraining your feedback and, even when I really think I'm being careful, it unleashes a strong backlash."

Learning

The material from both the snapshot study and the forum reveals a paradox in how self-perception is handled. On the one hand, there may be some insecurity and, on the other hand, there is a sort of self-satisfaction in that Swedes see themselves as very capable. The "Swedish Model" was mentioned as an example of how to achieve success with regard to industrial and social development, given that Sweden is a small country that holds its own at the international level. There is perhaps some complacency, therefore, when it

comes to the collective level and a tendency to feel greater insecurity at the individual level.

Several focus groups felt that this Swedish complacency works against a willingness to accept criticism. The attitude was said to be, "we know our facilities better than outside people (WANO/OSART) and other industries". The spirit of this statement was discussed in several forum discussion groups and during the focus groups. It was stated that results from international peer reviews may be difficult to accept without considering the national and technical context in Sweden. One illustrative example was given in which a WANO support mission to one of the nuclear power plants had resulted in a large number of points noted that needed improvement. After a number of internal discussions, it was decided that only a handful of points remained to be improved.

The issue of accepting criticism and learning from something was discussed in the focus groups, interviews and during the forum. The focus groups felt that external reviewers could be insensitive to cultural differences. As mentioned earlier, it is easier for Swedes to openly report shortcomings among themselves, which is in contrast with the reception of international/external feedback. While openness to accepting international feedback has been growing, the dilemma regarding cultural differences in relation to communication between external audits and Swedish culture remains.

Feedback is an important factor for learning. Considering that Swedes may have difficulty with managing feedback, this may lead to learning not fully taking place. However, employees pursue their skills development by taking personal responsibility for their improvement. This leads to both individual and organisational learning, but, if done in isolation, there is a missed opportunity to gain valuable external feedback to contribute to further learning.

Reflections on safety culture in a Swedish context and paths forward

Characteristics of national attributes

National attributes are neither good nor bad, but could have positive or negative implications depending on the context. An attribute has the potential to manifest itself in an organisational behaviour in a way that leads to a stronger safety culture, but it also has the potential to counteract a sound safety culture. The results of the forum and of the snapshot study showed that all national attributes generate organisational behaviours that can be positive and less positive. The next step is to put these in the context of nuclear safety.

International normative frameworks such as those advocated by the Nuclear Energy Agency (NEA), the World Association of Nuclear Operators (WANO) and the International Atomic Energy Agency (IAEA) provide a description for what a sound safety culture entails. These frameworks can be helpful to compare and to use as references to frame the Swedish context. However, in making such a comparison, the international frameworks have to be interpreted and applied respecting the national context, and should be used as guidance and not as absolute norms.

This is an invitation to the Swedish nuclear community to further explore, through dialogue, how the identified Swedish attributes and their manifestations in organisational behaviours may influence nuclear safety. The findings of this report could be used to further explore the questions below, to determine strengths and to address aspects that should not be neglected.

Potential influence of Swedish national attributes on nuclear safety

The attributes referred to as allskap and samskap in this report appear to be two fundamental and major driving forces that emerged from the snapshot study and the forum. The CSSCF participants seem to support the view that collaborating harmoniously, including everyone in decisions and giving everyone equal terms is a good model at the macro (societal/national), meso (organisational) and micro (group) levels in Sweden. The positive aspects from a safety culture perspective could be a high degree of participation, transparency in the decision-making process, a freedom to address problems and a high degree of collaboration to devise solutions. Problems and misconduct tend to be addressed by solution-oriented approaches and are addressed using a human, technology and organisation systems perspective. It

also seems as if the leadership style generates motivation, open communication and encourages a questioning attitude. Information is shared openly and freely within the organisation, i.e. blocked to a lesser extent by hierarchy.

All of the above aspects promote a sound safety culture in accordance with what WANO, the NEA and the IAEA normative frameworks prescribe. Other aspects of Swedish culture that should be analysed with caution are when samskap affects the willingness to challenge decisions or opinions, to express one's own opinion, to follow up or to provide feedback because it might result in a disagreement that could potentially disturb the unity (a condition known as "osams"). It is also possible that allskap may result in a "false consensus" where dissenting views are withheld in order to avoid a potential conflict. On a generic level, there may be agreement, but on a more detailed and specific level there may be disagreement. To stay on the generic level might be a way to remain within samskap and remain united, without the risk of becoming "osams". On the other hand, the model to reach consensus in the decision making and create full understanding of what needs to be done in the implementation phase can be a very powerful tool for effectiveness and efficiency.

Once again, it is important to bear in mind that a national attribute is not inherently good or bad. The challenge of examining attributes in a specific cultural context is to be aware of and handle such aspects that might negatively affect sound safety culture, while at the same time preserving and encouraging the more positive aspects.

Enhancing safety culture in a national context

National attributes are difficult – if not impossible – to change rapidly. For an organisation, however, change may be possible by examining the driving forces of organisational behaviours and their effects. This can be achieved by better understanding the inner workings of the national attributes and their influence on organisational behaviour. With such insight, it may be possible to encounter deeply rooted cultural behaviour that may have negative impact on safety culture.

A theme that emerged from the snapshot study and forum reveals that *samskap* is a basic assumption that may be taken for granted. *Samskap* produces values such as the importance of social aspects at work, for example being compassionate and showing consideration. These values may manifest themselves in a willingness to become involved, openness about problems, motivation, teamwork, etc. Such values form a good basis for a sound safety culture, by creating opportunities for open-minded group discussions about self-reflection. The forum discussions were a perfect example of this. These values can also manifest themselves in not wanting to offend and create discord, which can result in conflict avoidance. Because of the importance of the social aspects and showing consideration for others, avoidance of follow-up can thus become a norm without any further thought. One option to become conscious of this behaviour and start taking action is to be faced with a

proactive intervention, for example a new insight as a result of a safety culture assessment or as a result of self-reflection. Such insight would require structural organisational support and shared understanding to sustainably change the organisational behaviour. In this particular case, introducing an organisational initiative that fosters non-confrontational follow-ups, such as coaching sessions on how to ask open questions, could be explored.

Further considerations

It is important to underpin that the Swedish nuclear programme has shown good results regarding safety and the capacity to take proactive safety decisions.

Swedish leadership is one subject that was discussed by all groups in the forum. Analysis of the material from the snapshot study and forum have shown that leadership challenges and advantages should be further explored. Since managers play a key role in influencing the culture, further exploration of how the Swedish context affects leadership in the nuclear field would be valuable. The snapshot study and the forum presented many views on leadership, employeeship and management. There was unanimous agreement that exercising leadership hierarchically, micromanaging or being bossy are not successful approaches. When this is combined with assumptions about freedom to do as each individual believes is best and a lack of clarity in decision making, there is a risk that the manager could lose their overall view and the ability to direct employees.

It was also consistently stated that a manager should not be "digging around" in others' work. Managers and employees alike indicated that following up and giving feedback posed challenges. As international frameworks emphasise the importance of clarity in leadership in decision making, in roles and responsibilities and for ongoing follow-up and feedback at the individual, micro, meso and macro levels in order to ensure safety, these challenges could be explored further. Posing exploratory questions to tackle these challenges appears to be a method that fits well with the Swedish leadership style; for example posing questions will not only help explore how to address challenges but can increase common understanding. Furthermore, if the questions are further focused on the underlying factors, such as values and assumptions, this can help depolarise any antagonism.

Suggestions for paths forward

There is an opportunity for nuclear organisations in Sweden to build on the findings of the CSSCF and explore ways to support the continuous improvement of their safety culture. Exploratory questions could be used to work with the Swedish national attributes and their manifestation in organisational behaviours. This could help pave a way forward that takes into account opposing views and thus provides a better understanding of different perspectives, all the while encouraging organisational learning. In this spirit, a

set of exploratory questions is proposed in Table 1 to inspire the Swedish nuclear community for further reflection and dialogue. For example, organisations could use these questions in their training and employee engagement activities, with intact teams or open to all, to start a dialogue on national attributes and how they impact behaviours at work. The discussions could focus on identifying those that positively impact safety and should be reinforced and those that may distract from safety and find ways to work with or around them.

Table 1: **Exploratory questions**

| National attributes | Organisational behaviours | | | | |
	Employeeship/ leadership/ management	Decision making	Accountability	Feedback/ follow-up	Learning
Samskap	How might *samskap* influence relations between manager-employee, manager - manager, or employee-employee?	What might be the safety implications of striving for consensus in decision making? What types of decisions result from *samskap*?	What might be the safety implications of *samskap* in relation to accountability?	How can *samskap* influence the provision of feedback and follow-up of activities?	How can *samskap* support or counteract learning?
Allskap	What might the safety implications of *allskap* be in relation to employeeship? To leadership?	What might be the safety implications when all opinions are taken into account?	What might be the safety implications of *allskap* in relation to accountability?	How can individual feedback be provided, which ensures safety in the long term?	How might the aspect of equality influence organisational learning?
Security and trust	How might a high level of trust and security influence safety?	How might trust and verification impact the outcome of decisions taken?	What might be the safety implications between trust and accountability?	What is the relation between providing regular feedback and trust?	What safety implications might trust have on learning?

Table 1: **Exploratory questions** *(Cont.)*

National attributes	Organisational behaviours				
	Employeeship/ leadership/ management	Decision making	Accountability	Feedback/ follow-up	Learning
Freedom	How could a high degree of freedom influence leadership for safety?	What is the right balance between informal and formal decision making in relation to safety matters?	How might the factual accountability be made more explicit to ensure safety?	What is the relation between provision of feedback and a sound level of freedom?	How can freedom motivate people to learn and improve safety?
Complacency/ national pride	What role does a leader play in avoiding complacency? An employee? How can one counteract complacency?	How can complacency in decision making influence safety? How can it be avoided?	What does it mean to take responsibility for complacency?	What mindset is appropriate when receiving critical feedback?	How does one maximise and integrate learning from external feedback?
A drive towards shared understanding	How can managers ensure that the team has the same assumptions about safety matters? What questions can reveal if you have or do not have a shared understanding?	What safety implications can the aim for shared understanding have on decision making?	In what way could sharing understanding contribute to accountability?	How can shared understanding impact feedback?	What are the learning possibilities of shared understanding as a driver for safety culture?

Conclusions

Conducting the Country-Specific Safety Culture Forum (CSSCF) in Sweden proved to be a valuable effort appreciated by the participants. The decision to choose Sweden as a partner for developing the methodology and as a pioneer for the first CSSCF was well-founded. The curiosity, commitment, openness and flexibility of Swedish participants were notable from the beginning to the end. Teams from the World Association of Nuclear Operators (WANO), the Swedish Radiation Safety Authority (SSM) and the Nuclear Energy Agency (NEA) collaborated to develop and implement the CSSCF. Participants in the snapshot study and in the forum were highly engaged and active contributors to the process.

Participant appraisals show that the concept worked beyond expectations. In addition to the topic itself, the role play and the ability to talk freely about common challenges across organisational boundaries were especially appreciated. The conversations were characterised by a high degree of openness, and opinions were expressed without reservation or self-censorship. Both national aspects that are perceived as positive and those that are perceived as having a less positive impact on nuclear safety were discussed without constraint.

Judging from the results from the conversations in the snapshot study and in the forum, the CSSCF contributed to greater insight into how national attributes may be reflected in organisational behaviour, which can in turn favour or counteract a sound safety culture. Some national attributes, such as *samskap*, *allskap*, freedom, common understanding and trust, may reinforce a sound safety culture. The difficult question remains of what successful leadership looks like in the Swedish context. What could be modified to further enhance safety culture while ensuring that the positive aspects of the national attributes are taken into account and not lost in the quest for continuous improvement?

In the latest research on safety culture, human, technology and organisation approaches, dialogue, openness, trust, common understanding and collaboration are put forth as being more successful than traditional, rules-based leadership (command and control). Research also shows that the socio-technical system is so complex that collaboration, good relations, trust, openness and the desire for common understanding are decisive in preventing risks. This is also true in crisis situations, when issues in an existing culture may be reinforced. For example, if communication and collaboration are already weak, there is a greater risk that things will go poorly.

A learning organisation that strives to continuously improve safe operations regularly reflects on its organisational behaviours and their underlying core values and deeply rooted assumptions. The hope is that this first CSSCF is only the beginning of a process that will continue in Sweden and that will also arouse the interest of other member countries, ultimately inspiring them to start their own journey into better understanding their national context and its relation to safety culture.

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Country-Specific Safety Culture Forum

Sweden

One of the many important lessons learnt about nuclear safety over the years has been that human aspects of nuclear safety are as important as any technical issue that may arise in the course of nuclear operations. The international nuclear community can work together to identify and address issues associated with components and systems and compare operational experiences, but identifying how human behaviour affects safety and the best approaches to examine this behaviour from country to country remains less common.

Practical experience has nevertheless shown that there are important differences in how people work together and communicate across borders. People's behaviours, attitudes and values do not stop at the gate of a nuclear installation, and awareness of the systemic nature of culture and its deeper aspects, such as the dynamics of how values and assumptions influence behaviours, continues to evolve.

The NEA safety culture forum was created to gain a better understanding of how the national context affects safety culture in a given country and how operators and regulators perceive these effects in their day-to-day activities. The ultimate goal is to ensure safe nuclear operations. The first NEA safety culture forum – a collaborative effort between the Nuclear Energy Agency (NEA), the World Association of Nuclear Operators (WANO) and the Swedish Radiation Safety Authority (SSM) – was held in Sweden in early 2018. This report outlines the process used to conduct the forum, reveals findings from the discussions and invites the nuclear community to further reflect and take action.