



The Nuclear Sector's Response to COVID-19

Lessons Learnt from a Human and Organisational Factors Perspective

Introduction

The COVID-19 pandemic was a global crisis of exceptional impact and duration that tested the ability of organisations and people to adapt to rapidly changing conditions and to learn and improve in real time.

The Nuclear Energy Agency (NEA) stressed since the beginning of the pandemic the importance of learning from this historical event. When the world was in the middle of the crisis, it was clear that its ultimate impact on the nuclear sector would only be visible some years later, when the disease was brought under control.

These considerations prompted the NEA to launch a new activity under the Working Group on Human and Organisational Factors (WGHOFF) that aims to study the resilience of the nuclear sector during the pandemic and to learn from the experience of other sectors. The past or planned initiatives undertaken by the industry and the regulators were considered key to better understand the resilience of the nuclear industry during the pandemic and to be prepared for future crises.

The working group plans to compile and put into perspective the experiences made during the pandemic

and to identify the lessons learnt and guidance for the future. This will involve discussing how organisations coped with the challenges of COVID-19 and the long-term implications. In particular, the work focuses on:

- operating and regulatory experience in managing the pandemic from an organisational and human perspective, including the experience from decommissioning activities;
- lessons learnt, observations and conclusions, in particular on organisational adaptability and resilience, and including the long-term impacts and future challenges that may occur as a result of response and adaptation over the long term;
- good practices, new potential risks and safety issues that the pandemic has introduced and need to be addressed by new research;
- information and lessons learnt relevant to the nuclear industry, including from non-nuclear industries.

This document provides the preliminary outcomes of this WGHOFF activity and sets the stage for a future workshop to analyse fully the lessons learnt.



Methodology of information collection

Key information was collected and consolidated from stakeholders both in the nuclear sector and other industries such as the aviation and medical sectors. During the pandemic, one of the challenges facing this work was the limited amount of literature published.

Contributions in various forms on the impact of the pandemic were collected from the participating countries, and reflections mainly concerned the first year of the COVID-19 pandemic. The contributions were on a specific aspect of the pandemic, related to a particular period of the crisis or related to the experience of other industries. The typology of contributions was not limited to peer-reviewed, published material, but included, for example, practices, organisational experiences, opinion papers,

press reviews and presentations from nuclear safety authorities and national research centers.

All this contributed to creating a forum of dynamic exchange that developed collective knowledge on the subject. The material was analysed and organised into three main parts:

- Contributions concerning the COVID-19 pandemic experience in the nuclear sector;
- Contributions related to the experience of COVID-19 in other sectors (chemical, civil aviation, healthcare sector);
- Contributions having reference to international initiatives exploring the COVID-19 issues.

Insights from analysis of the collected information

Resilience of organisations in the nuclear sector

The resilience of a system depends on several types of assets: physical, human, organisational, financial and political. Based on the numerous lessons learnt, the nuclear sector is expected to strengthen its overall resilience (from utilities to regulators) and improve its capacity to overcome future pandemics.

An important factor in resilience is the anticipation of threats. The nuclear industry reacted quickly during the first weeks of the pandemic, defining and implementing new ways of working. This adaptability traces back to the industry's preparedness for large crises, and may stem from:

- The existence of a regulatory framework giving an "essential service provider" status to utilities;
- The existence of business continuity plans (BCPs);
- The nuclear industry's history, which has helped shape a culture of handling emergency situations;

- The existence of strategies and specific actions to secure workers' availability at different stages of a crisis (strategies may include, but are not limited to dedicated training, team redundancy, health protection and teleworking);
- The purchase of goods and equipment not in a continuous flow, but with stockpiles used as a buffer and through long-term contracts as in the case of spare parts, uranium supply, chemical substances, etc.

The workforce availability in the nuclear sector and in any essential activity sector contributed to managing risks and to ensuring continuity during the crisis period. What is reported highlights a specific characteristic that contributed to resilience. Maintenance or control activities in nuclear installations were adapted since the early phase of the pandemic. Indeed, their implementation depended on workforce availability and on a complex and periodical planification. Training activities needed to maintain competences, and skills were reduced as well. There is evidence, however, that these training activities have since recovered.



The primary findings showed that work conditions deteriorated in many nuclear facilities during the COVID-19 pandemic. Some sources noticed, for example, delays on the scheduled repair and upgrades or changes in internal inspection practices.

According to the regulators' experience, COVID-19 had only a minor impact on the scope and depth of their control and inspection activities (i.e. the activities were maintained but in an adapted manner or with additional constraints). The standard inspection methods were modified by adding new remote approaches. Safety authorities and their TSOs in several countries decided to halt site visits except in cases of emergency. Regulators generally have been pragmatic and flexible in their decision-making, and were willing to approve some of the understandable operator requests for exemptions, exceptions and deferrals.

Resilience of the nuclear sector in member countries

The NEA offers an opportunity to collect national experiences, exchange information among peers and learn from each other. This approach has led to the identification of fundamental aspects of resilience and ways to face long-term challenges. These include:

- **The role of socioeconomic and political systems in crisis response.** The national socio-economic and political systems in which the nuclear installations operate have an influence on the resilience of the nuclear sector. An analysis of the long-term impact of the pandemic on the nuclear sector must therefore also take into consideration these systems at the local and national levels.
- **The national experience of managing risk and crises.** The response of a country is influenced by its previous experiences and lessons learnt, by the values of its society, expressed by its legal system, by its governance, and by the norms and behaviours of its people. In particular, the legal system is fundamental to a nuclear installation. Therefore, the existence of regional features in the response to the pandemic has been concluded.
- **The importance of case-specific factors.** When considering successful response approaches to a crisis, it is important to consider the factors that are unique to that crisis situation. Each crisis situation has specificities that will not be repeated exactly in the same way.

- **Learning capabilities.** Furthermore, although the ability to respond to an emergency situation benefits from previous experience and learning, there are limits since any crisis can provide unexpected challenges, and the learning is not always effective. To develop resilience, it is important to “learn how to learn”, to understand how to quickly incorporate new knowledge about a crisis into the response.

Resilience and experience from other sectors

As the context in which the nuclear sector operates is similar to that of other industries, because of the geographical impact of a pandemic, the WGHOF study also considered the response of other sectors, in particular high-risk sectors, with the aim of identifying the common elements and differences in the responses and to gain more comprehensive insight on resilience.

For example, important lessons were learnt from the response of the aviation industry and from the response and adaptation of the healthcare sector, the latter being the most directly engaged with the pandemic.

In the information gathered, the difficulty of framing the crisis was made evident. This is undoubtedly a characteristic of any crisis, but one which the COVID-19 pandemic illustrated particularly clearly. Difficulty in framing a crisis implies a difficulty in managing it. This was reflected also in delays in preparatory action when the first signals of the crisis were detected, when it was still only a localised epidemic.

Based on the analysis of the available experience from the different sectors (civil aviation, healthcare, chemical industries), some commonalities have been identified:

- **A loss of competencies and the lack of attractiveness** of certain professions exacerbated pre-existing fragilities in different sectors, particularly in the case of the pandemic.
- Even if the **healthcare sector** was the most exposed sector to the pandemic, it had plans in place to manage exceptional workloads and practices tested in the case of epidemic/pandemic situations. The **civil aviation and nuclear industries** were less obviously exposed to the impact of a pandemic and less prepared to deal with this specific crisis.



- **Existing or new plans.** The different measures implemented at first by various sectors were necessary and helpful, but not sufficient to explain their adaptation capacity. After an initial adaptation, new challenges appeared, such as fatigue for staff, limits on interpersonal relationships, disruptions of maintenance schedules and control methods (particularly in terms of safety and security), the postponement of activities and training, or the freezing of international co-operation.
- **The continuation of activity was possible thanks to the exceptional mobilisation of personnel and the adaptability of organisations.** However, the measures implemented by staff to adapt to daily constraints were achieved through intense personal commitment and at the cost of a high workload. Hence the question remains how to achieve a “sustainable resilience”.

Resilience and the role of management and leadership

The experience and information collected confirmed and underlined the important role of management and leadership. Management, among other things, looks at systems that combine staff skills and material elements to improve organisational performance. To learn from the COVID-19 pandemic and improve the management of future crises, management must look at what measures worked well, what functioned less well and what lessons can be drawn.

The experience of the pandemic in non-nuclear sectors, such as the healthcare sector, has shown that performance should not be viewed in a narrow, economic and financial sense. There are multiple ways to measure performance, and crisis management of the healthcare sector during COVID-19 illustrated this well: financial matters were not prioritised for several months, with the medical performance being the point of focus.

For management and leadership it is possible to extract from the cross-sector information on the pandemic response the following six central suggestions:

- Know how to anticipate and react wisely.
- Develop supportive management.
- Adapt collectively with effective teamwork.

- Encourage creativity.
- Establish partnerships.
- Be guided by oversight.

Three general qualities seem to be important for management: **anticipation, agility and performance**. On top of these **trust** between the actors that shape the response is also fundamental. Together, these four elements can be seen as contributing to the **readiness** of a system to respond to a threat.

Areas for future investigation

The NEA work already carried out within the WGHOFF has concluded to the necessity of learning from the experience of the COVID-19 pandemic. Future investigations are encouraged, especially covering a longer period of the pandemic crisis from at least three perspectives:

- **Consideration of the organisational configurations during the pandemic crisis.** A crisis has different phases and actors face them differently. This point became especially important because of the nature of pandemic COVID-19, its long duration and evolving features. The information gathered under the WGHOFF highlighted how the pandemic required handling the safety implications of various situations: from continuing operations to reducing/stopping operations and re-establishing them again.
- **Identification and management of medium-term and long-term risks.** More work is needed to identify the effects of adaptations and the new risks that appeared during the pandemic in the middle and long terms (including the related fatigue, limitations of interpersonal relationships, disruptions to maintenance schedules and control methods, and pressure to restore and revert to old production levels).
- **Development of a “systemic” approach to better learn from the pandemic experience.** To reduce the spread of the COVID-19 virus, governments around the world decided to impose severe restrictions on people and organisations. This was an exceptional situation that highlighted the importance of understanding the interdependencies between critical infrastructures.