The International Common Cause Failure Data Exchange (ICDE) Project – Recent Insights

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Abstract: Common cause failures (CCFs) can significantly impact the availability of safety systems of nuclear power plants. Since CCFs are rare events, it is necessary to combine operating experience from multiple countries to gain a comprehensive knowledge of CCF phenomena. For this reason, the International Common Cause Failure Data Exchange (ICDE) Project was initiated by several countries in 1994. Since 1997 it has been operated within the OECD NEA framework, and the project has been successfully operated over eight consecutive phases (the current ninth phase being 2022 - 2026). The ICDE Project allows countries to collaborate and to exchange CCF data with the aim of generating qualitative and quantitative insights into these failures.

So far, the ICDE Project has published twelve reports on the collection and analysis of CCF events of specific component types (centrifugal pumps, emergency diesel generators, motor operated valves, safety and relief valves, check valves, circuit breakers, level measurement equipment, control rod drive assemblies, heat exchangers, and batteries) and seven topical reports on different topics. Three additional topical reports on safety culture insights from the analysis of CCF events, guidance on CCF quantification using ICDE data and CCF due to aging are in preparation.

The ICDE Project has significantly improved the knowledge on CCFs. Many insights would not have been gained without combining information from many data sources. This includes, e.g., the finding that the dominant causes of complete CCFs are human actions as a part of component design or operation, rather than manufacturing deficiencies.This paper presents recent ICDE activities, lessons learnt from the data collection, and results of topical analyses including analyses of CCFs related to deficiencies in safety culture and guidance on CCF quantification using ICDE data and CCFs due to ageing.

Keywords: operating experience, common cause failure (CCF), probabilistic safety assessment (PSA)

1. INTRODUCTION

Common cause failures (CCFs) can significantly impact the availability of safety systems and other items important to safety of nuclear power plants (NPPs) even though CCF are rare events. Therefore, it is necessary to combine operating experience from multiple countries to gain a comprehensive knowledge of CCF phenomena. In many cases the national operating experience is insufficient for the quantification of CCF in probabilistic safety assessments (PSAs). For this reason, the International Common Cause Failure Data Exchange (ICDE) Project was initiated by several OECD Nuclear Energy Agency (NEA) member countries in 1994. Since 1997 it has been successfully operated within the OECD/NEA framework over eight consecutive phases (the current ninth phase being 2023 to 2026). The ICDE Project allows countries to collaborate and to exchange CCF data with the aim of generating qualitative and quantitative insights into these failures.

So far, the ICDE Project has published twelve reports on the collection and analysis of CCF events of specific component types (centrifugal pumps, emergency diesel generators, motor operated valves, safety and relief valves, check valves, circuit breakers, level measurement equipment, control rod drive assemblies, heat exchangers, and batteries) and seven topical reports on different topics including multi-unit failure events, CCFs due to external environmental factors, emergency diesel generator CCF events impacting the entire exposed population, CCFs due to plant modifications, improving testing as provision against CCFs, and intersystem CCF events and CCFs due to pre-initiator human failure events. Three additional topical reports on safety culture insights from the analysis of CCF events, guidance on CCF quantification using ICDE data and CCF due to aging are in preparation.

In this paper, the ICDE objectives and organization are described first. An overview over the technical scope of the ICDE activities is given and lessons learnt are presented, focusing on safety culture insights from the analysis of CCF events. Then, ongoing activities are described. Finally, conclusions are drawn.

2. ICDE OBJECTIVES

The ICDE Project pursues the main aims to collect qualitative and quantitative information about CCFs in NPPs, analyse the collected data and distribute the insights gained about CCFs and methods to prevent CCFs to the concerned professional audience. The objectives of the ICDE Project as expressed in the ICDE agreement are to:

- collect and analyse Common Cause Failure (CCF) events over the long term to better understand such events, their causes, and their prevention,
- generate qualitative insights into the failure root causes and the event root causes of CCF events which can then be used to derive approaches or mechanisms for their prevention or for mitigating their consequences,
- establish a mechanism for the efficient feedback of experience gained in connection with CCF phenomena, including the development of defences against their occurrence, such as indicators for risk-based inspections,
- generate quantitative insights and record event attributes to facilitate quantification of CCF frequencies in member countries, and
- use ICDE data to estimate CCF parameters.

The ICDE Project is based upon a broad international cooperation: The countries that participate in the ICDE Project operate 202 NPP units, which is about 48% of all NPP units worldwide. With a generation capacity of 201,230 MWe these units provide 54% of the worlds' total nuclear generation capacity. Pressurized water reactors (PWRs), boiling water reactors (BWRs), pressurized heavy-water reactors (PHWRs) and gas cooled reactors (GCRs) are included in the data collection.

3. ICDE ORGANISATION

The ICDE Project agreement, signed by the participating member organizations, outlines the rules for operation of the ICDE Project and the roles of the participants.

The central body of the ICDE Project is the ICDE Management Board (formerly called "Steering Group") in which each participating country is represented by its National Coordinator. The Management Board controls the project, assisted by the NEA Project Secretary and the Operating Agent. The Management Board meets twice a year. The ICDE Management Board has the responsibility to:

- ensure the financial (approval of budget and accounts) and technical resources necessary to carry out the project,
- nominate the ICDE Project chairperson, to define the information flow (public information and confidentiality),
- approve the admittance of new members,
- nominate project task leaders and key persons for the Management Board tasks,

- define the priority of the task activities and to monitor the development of the project and task activities, and
- monitor the work of the Operating Agent and the project´s quality assurance and prepare the legal agreement for project operation.

In most ICDE member countries, the data exchange is carried out through the regulatory bodies, with the possibility to delegate it to other organizations. To ensure that the data collection is performed in a consistent and comparable way in all participating countries, the Management Board has developed and approved coding guidelines, which define the format and extent of the collected information. The ICDE database is available to the ICDE signatory organizations.

The project is based upon the willingness of the participants to share their operating experience, encouraging the participating organizations with the prospect of getting access to the database by providing their own contribution to the data collection. The relevant criterion is not the total amount but the completeness of the contributed data. For example, if a country submits its operating experience with emergency diesel generators (EDGs) from 1990 to 2010 it will get access to the complete operating experience with EDGs during that period, irrespective of the number of NPPs that are operated in that country and the number of events observed.

OECD/NEA appoints the Project Secretariat, which is responsible for administering the project.

The Operating Agent is responsible for the database and consistency analysis. It verifies whether the information provided by the National Coordinators complies with the ICDE coding guidelines. Jointly with the National Coordinators, it also verifies the correctness of the data included in the database. In addition, the Operating Agent operates the database.

The responsibilities of participants in terms of technical work, document control and quality assurance procedures as well as in all other matters dealing with work procedures are described in the ICDE Quality Assurance Programme [1].

The project has successfully completed eight phases of three to four years. It is currently in phase IX, which covers the period from January 2023 to December 2026. Member countries under the current phase and the organizations representing them in the project are Canada (CNSC), Czech Republic (ÚJV Řež), Finland (STUK), France (IRSN), Germany (GRS), Japan (NRA), Sweden (SSM), Switzerland (ENSI) and the United States of America (NRC). The participation of additional countries is always possible and welcome.

4. TECHNICAL SCOPE OF THE ICDE ACTIVITIES

4.1. Scope of the Data Collection

The ICDE operates with a clear separation of the collection and analysis activities. Currently, the analysis results mostly in qualitative CCF information. This information may be used for the assessment of:

1. the effectiveness of defences against CCF events, and
2. the importance of CCF events in the probabilistic safety assessment (PSA) framework.

Qualitative and quantitative insights on CCF events generated are published as OECD/NEA Committee on the Safety of Nuclear Installations (CSNI) reports. The member countries are free to use the data in their quantitative and PSA related analyses.

The scope of ICDE is intended to include the key components of the safety relevant systems. Within the data collection, different types of safety related components are distinguished. Based on a generic coding guideline, for each component type an individual coding guideline is developed by the

Management Board which defines how the data collection for that specific component type should be performed. These guidelines are made publicly available as a CSNI Technical Note [2].
An overview of the component types currently[1] covered is shown in Figure 1. New component types may be added in the future if there is a sufficient interest of participating parties.

The data collection concerns two distinct entities:

- Events, and
- Observed Populations.

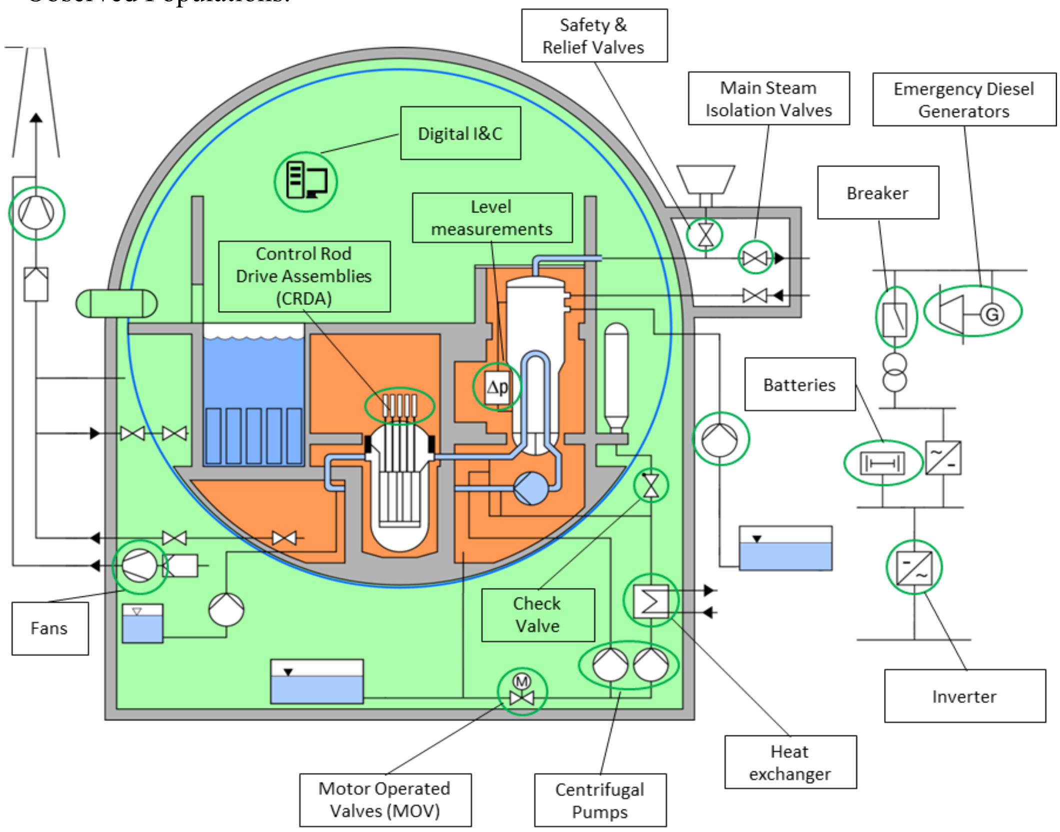

Figure 1. Technical Scope of ICDE Data Collection

4.2. Definition of Events

The event data comprise CCF Events and other ICDE Events. In the framework of ICDE, a CCF Event is defined as "a dependent failure in which two or more component fault states exist simultaneously, or within a short time interval, and are a direct result of a shared cause." ICDE Events are a generalization of CCFs that are commonly also denoted "potential CCFs." In the framework of ICDE, they are defined as "impairment of two or more components (with respect to performing a specific function) that exists over a relevant time interval and is the direct result of a shared cause." In this definition, an impairment refers to a complete failure of the component to perform its function, a degraded ability of the component to perform its function or an incipient failure of the component. A relevant time interval is defined as two pertinent inspection periods (for the particular impairment) or, if unknown, a scheduled outage period.

Information regarding the ICDE Events such as an event description, the failures and/or impairments of affected components, event causes, corrective actions etc. are included in the corresponding database records.

[1]as of March 30th, 2026

4.3. Definition of Observed Populations

An Observed Population is a set of similar components in the same system in the same plant that perform the same function.

Information regarding Observed Populations such as component type, size of the Observed Population, manufacturer of the equipment and a detailed description of the components, test interval and test scheme (staggered or non-staggered) and observed failure modes are included in the corresponding database records. These also include the observation times, i.e., the time interval(s) for which operating experience has been analysed. Furthermore, the number of independent component failures is included to allow for the quantification of CCF with the Alpha Factor Model.

4.4. Data Collection Overview

An overview of the database content with the number of CCF Events and the number of complete[2] and partial[3] CCFs for each component type is given in Table 1. Events are further analysed and categorized according to the ICDE failure analysis guidelines.

Table 1. Data Collection Overview

Component Type	Total CCF Event Count	Contribution to total CCFs [%]	Complete[2] CCF	Partial[3] CCF	Group Years
Centrifugal pumps	460	20.9	48	44	40242
Diesels	394	17.9	36	21	7259
Safety and relief valves	306	14.0	22	44	17437
Motor operated valves	200	9.2	10	37	32497
Control rod drive assembly	189	8.6	4	27	7780
Level measurement	178	8.1	10	32	11620
Check valves	124	5.7	15	26	25048
Breakers	121	5.6	7	29	26467
Battery	94	4.3	5	2	6363
Heat exchanger	59	2.7	4	1	16997
Fans	33	1.5	4	0	13366
Main steam isolation valves	14	0.6	1	4	3885
Digital I&C	10	0.5	5	0	59
Cross-component CCF	9	0.4	0	0	0
Inverters	6	0.3	2	0	407
Grand summaries	**2197**	**100**	**173**	**267**	**209430**

The participating countries are gradually extending the data with more observation time and events. The frequency of observing an ICDE event in an observed population (CCF component group) is approximately 0.010/year (or 1.18 E-06/h). This low frequency by itself justifies an international collaboration on this issue.

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[2] Complete CCF: A common-cause failure in which all redundant components are failed simultaneously as a direct result of a shared cause.
[3] Partial CCF: A common-cause failure in which at least two components, but not all components, are completely failed.

Two new event types have been included in the ICDE Project in recent years: digital instrumentation and control (I&C) CCF Events and cross-component CCF Events. The use of digital I&C systems in operating NPPs is expected to expand in the coming years. Also, digital I&C systems are expected to be important for new and advanced reactor designs. The study of digital I&C CCF Events poses many challenges, including having only a small number of failure events that have been identified from operating experience. As the ICDE Project continues to collect digital I&C CCF Events, the members intend to focus on qualitative insights from the failures that can support developing lessons learned to assist designers, operators, and regulators in establishing the safety and reliability of these systems. The collection of cross-component CCF Events was motivated by a small number of identified events that involved subtle dependencies that contributed to failures of different component types. The collected cross-component CCF Events tend to involve electrical power systems, emergency diesel generators, or systems with cross-system piping connections. The modelling of cross-component CCFs can be expected to have a large impact on PSA results since multiple safety functions may be affected by such CCFs. This was quantitively demonstrated in a recent case study [3], [4]. Currently, the cross-component events may provide qualitative insights what cross-component CCFs should be considered in PSA studies. In the future, when more events are available, they also could be used to quantify such CCF.

Both digital I&C and cross-component CCF Events have unique aspects, which the ICDE Project intends to continue collecting and evaluating to develop qualitative insights.

The chronological sequence of the data collection is shown in Figure 2. The graph shows how new component types were added over time as well as the continuous data collection for the existing component types.

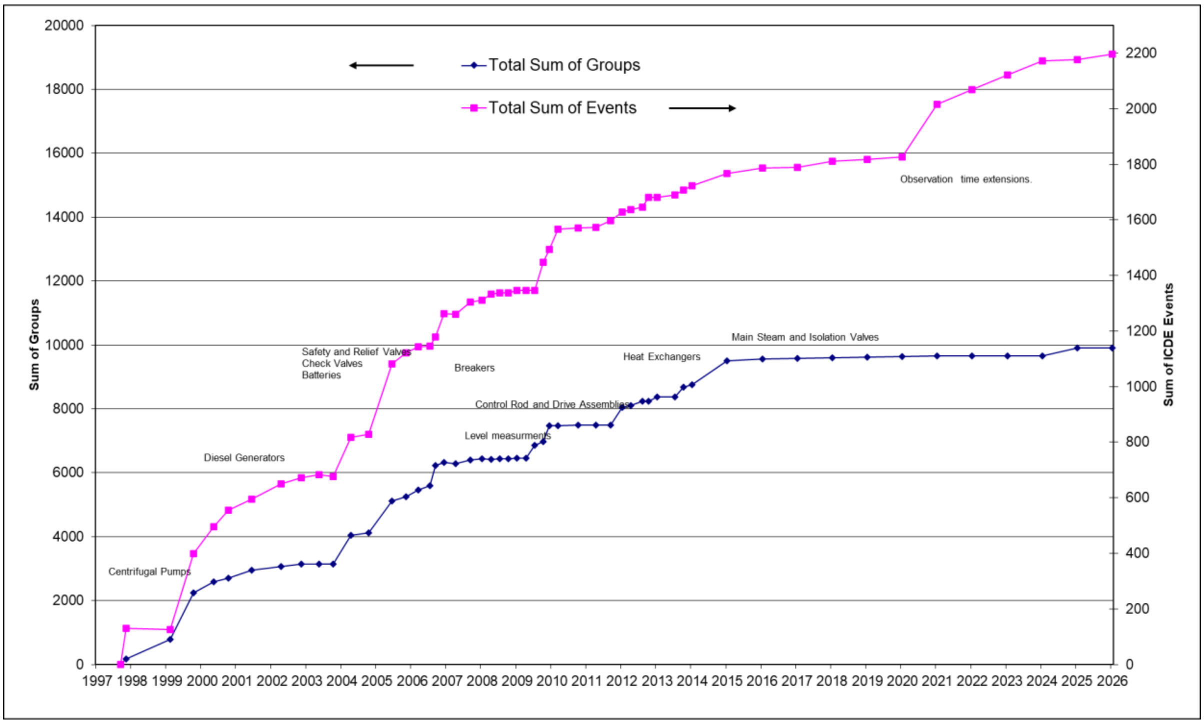

Figure 2. ICDE Data Collection Progress

In addition to plants in power operation, data is also collected for NPPs during decommissioning. In the first phases of decommissioning, several safety related components are still required, some of which are, however, operated differently than during power operation of the plant. This may include intermittent instead of continuous operation, different media or environmental temperatures, different test schedule or coverage and different monitoring. Furthermore, modifications are frequently carried out. Therefore, new CCF phenomena may occur. In the database, data pertaining to this phase carries a special code.

5. RESULTS

The ICDE Management Board prepares publicly available reports containing insights and conclusions from the analysis performed whenever major steps (i.e., the analysis of a dataset for a certain component type like check valves) of the project have been completed. The ICDE Management Board assists the appointed lead person in reviewing the reports. Following this, an external review is provided by the CSNI. ICDE reporting also includes submitting papers to suitable international conferences such as PSAM and ANS PSA, and to journals. The intention is to make the lessons learnt available to a large nuclear safety audience.

The ICDE time schedules define the milestones of data collection tasks for each component group analysed. The time schedule is reassessed and revised at each ICDE Management Board meeting. The work starts with drafting the guidelines, getting comments, making a trial data collection, approving the guidelines, making the data exchange, resolving the remaining problem cases, and reporting.

Generally, it takes between 1.5 and 2 years from the first guideline draft to commence the data exchange itself. Furthermore, after that it takes about 2 to 4 years to publish the final report. Thereafter, new exchange rounds (database updating) are possible.

The database contains general information about event attributes like event cause, coupling factor, detection method, and corrective action taken. As of April 2024, data analysis and exchange have been performed for centrifugal pumps, diesel generators, motor-operated valves, safety relief valves, check valves, batteries, level measurements, switching devices and circuit breakers, control rod drive assemblies, heat exchangers, fans, main steam isolation valves and digital instrumentation and control (I&C) equipment.

Public reports for centrifugal pumps, diesel generators, motor-operated valves, safety & relief valves, check valves, batteries, level measurements, switching devices and circuit breakers, control rod drive assemblies, and heat exchangers have been issued in the NEA CSNI series [5] to [14], [16], [22]. They are publicly available on https://www.oecd-nea.org/nsd/docs/indexcsni.html.

In addition, topical analyses have been performed for a number of topics, including CCFs due to external factors [15] (64 events), emergency diesel generator CCFs impacting the entire exposed population [15] (143 events), CCFs due to plant modifications [17] (53 events), provisions against CCFs by improving testing [18] (59 events), multi-unit CCF Events [19] (87 events), intersystem CCF Events [20] (25 events) and pre-initiator human failure (PIHFE) ICDE Events [21] (51 events).

The following section presents a detailed discussion of safety culture insights derived from the analysis of common cause failure (CCF) events. In addition, the objective, scope and status of the ongoing analyses are presented.

5.1. Safety Culture Insights from the Analysis of CCF Events

The results presented in this section are derived from the ICDE topical report entitled "*Safety Culture Insights from Analysis of Common Cause Failure Events*" which has been finalized and is currently undergoing the publication process. The report will be made available on the ICDE website upon publication.

ICDE reviews and workshops have found that many events are related to deficits in safety culture (SC). Therefore, such events were investigated in more detail. In the framework of this analysis, safety culture has been understood in a broad sense, i.e., it includes all formal aspects like a safety management system

or integrated management system and non-formal aspects like the safety attitude of employees or compliance to rules. ICDE data was screened for failures that give indication of degraded safety culture. The purpose for the investigation was to study which safety culture deficiencies occurred, their significance and their impact on safety. A Safety Culture Model (SCM) was adopted [23] to identify deviations from healthy safety culture or evidence of deficient safety culture. The framework resembles the existing WANO trait framework [26] and includes the IAEA characteristics [27]. It represents a comprehensive set of traits of good safety culture including safety management.
The original harmonized SCM attributes such as “Individual commitment”, “Management commitment”, and “Management systems” along with their sub-attributes were the basis for the first of three workshops conducted. During the first workshop, several aspects were identified which needed to be added. Between events, the quality and detailedness of information about safety culture aspects varies considerably. In order to apply the SCM attributes consistently, a measure to state the analyst’s degree of certainty in the event analysis was developed by the ICDE steering group which resulted in the integration of certainty codes, into the harmonized SCM framework to be used for the two subsequent workshops:

- **Explicitly stated:** Explicitly stated in the event description and supported by the event coding.
- **High:** Indirectly deducible from event description and coding. Not explicitly stated, but the expert is sure from the information in the description and coding that the attribute must have been present. It is not reasonably conceivable how this event could have happened as described (and coded) if the attribute was not present.
- **Medium:** Very likely, given information in description and coding. The expert rates the presence of the attribute as very likely, given her/his experience and prior knowledge, but another cause cannot be entirely excluded.
- **Low:** The presence of the attribute is somewhat supported by the event coding and/or description.

Weighting factors were assigned to each tier: 1 for “Explicitly stated” and “High”, 0.5 for “Medium” and 0.1 for “Low”. These weights give a quantitative measure of the certainty of a specific deficit having occurred in the event. The sum of the weights of all the coded attributes gives a score that measures the estimated total identified safety culture deficits in the event. A high number indicates that an insufficient safety culture manifested itself in multiple ways in the event.

From the total of about 2000 events in the ICDE database, the analysis included a total of 142 events, which represents about 7% of the ICDE events, emphasizing the role of SC aspects.

Insights from the workshops:

- Safety Culture events were distributed across many component types, however, centrifugal pumps represented about one thirst of the total events compared to 21% in the whole database. This indicates that pumps could be more exposed to deficiencies in the SC.
- CCF event causes “Human actions, plant staff” and “Procedure inadequacy” contributed to about 77% of the events.
- Between the years 1990-2000, about 7-12% of the reported ICDE events can be attributed to SC issues. After the year 2000, the overall number of ICDE events declined resulting in decrease of SC related events, from zero to a few events per year.
- Work planning (WP) dominates, followed by Individual Responsibility (IR) as the most common SCM attributes. This is true both for the counts and the sum of SCM weights.
- About 100 events had a SCM weight score above 0.7, indicating a high suitability for the topical report. For 12 events, the event assessment resulted in a SCM weight above 3.2, i.e., the events demonstrate deficiencies in safety culture with high certainty and involve multiple SCM attributes.
- The selection of SCM attributes by the analysts show, without consideration of the weighting, that WP was the most common attribute to be selected, followed by IR and Questioning Attitude (QA).

- From a CCF perspective, all components in a CCF group employ the same procedure and the procedure is often carried out by the same personnel, affecting all redundant components. This emphasizes that diversified plant personnel when performing test and maintenance can be an effective defence against events affecting all redundancies. Management systems that ensure adequate procedures may be equally as important.
- The analysis of the SC events with high scores revealed that CCF events can be influenced by various SC issues, especially in the areas of individual responsibility, work management, organizational learning, and leadership. These issues can affect the performance of the workers, the quality of the work procedures, the effectiveness of the corrective actions, and the commitment to safety.

It is important to identify and address these SC issues to prevent or mitigate the occurrence and consequences of CCF events. Understandably, some events are rare single occurrences and to confidently identify that these are related to safety culture issues, a systemic pattern must be seen. Findings of the analysis may benefit SC inspectors by pinpointing important SC areas and attributes susceptible to CCF.

5.2. Ongoing Analyses

5.2.1 Aging

ICDE Project has started the study of ICDE events where ageing has been identified as a CCF contributor. The aim of the work is to analyse ageing aspects that results in CCF events. Two workshops have been conducted till now. Initial work included the screening from a total of about 2000 ICDE events to identify events caused by ageing of components/equipment. To keep the data set manageable, 85 events were screened which represents about 4% of the total ICDE events.

Classification of the events was performed by developing an Ageing Coding Model (ACM) framework. The ACM is based on IAEA report [24] where 64 different ageing effects and 116 degradation mechanisms are provided. It was observed that the aging effects and degradation mechanisms provided in the IAEA report are not linked. Therefore, an attempt was made to categorize the ageing effects and the degradation mechanisms into broader categories to achieve a usable ACM. The broader categories include: Physical, Mechanical, Thermal, Electrical, Chemical, Irradiation, Biological, Other, and No Ageing.

The following basis were used to the event assessment:

- **Ageing classification:** Classification and interpretation of ageing were based on the ACM framework. The analysts were tasked with determining whether ageing can be observed and if so, identify the ageing processes, degradation mechanisms, initiators and the type of material affected by the ageing.
- **Failure mechanism description:** The failure mechanism is a history describing the observed events and influences leading to a given failure. Elements of the failure mechanism could be a deviation or degradation or a chain of consequences. It is derived from the event description and should preferably consist of one sentence.
- **Interesting event categories: I**nteresting event categories are defined and used as attributes to be added to event records in the ICDE database. Several attributes can be added to each record. This makes it easy to filter out events with one or several attributes for various analyses and interpretation, e.g., for the overall operating experience and use as input for the stakeholders to develop defences against CCF.

The preliminary analysis show that mechanical ageing dominates the total data set followed by electrical and chemical ageing. Additionally, it was observed that diesels were the most common component type in the event set, followed by safety relief valves, centrifugal pumps and motor operated valves.

5.2.2 Quantification

This ongoing effort, which commenced in phase VIII, aims at researching the use of ICDE data for quantification, i.e. for the estimation of CCF parameters for PSA calculations. As described above, the ICDE database contains all necessary information for the quantification of CCF, namely observation times and the number of failed and impaired components in the events observed. Furthermore, it also contains the number of independent failures, which is needed for the application of the alpha factor model. Since every participant is required to submit a formal completeness statement, this data may be expected to be complete and accurate.

To adequately use the provided operation experience data for the quantification of CCF probabilities or rates, however, different aspects need to be considered. including:

- It has to be checked whether component boundaries used in the PSA model are identical to those used in ICDE. ICDE events with failures outside the component boundary used in the PSA study have to be discarded. If the component boundary used in the PSA study contains additional equipment, a separate estimation of their CCFs is necessary
- A possible statistical inhomogeneity (i.e. different CCF rates/probabilities) of the components modelled in PSA with regard to the Observed Populations and between the different Observed Populations used in quantification has to be considered. Possible causes of an inhomogeneity may be differences in design, manufacture, quality management, operating, monitoring, maintenance, etc. These can be, especially, due to different regulatory frameworks, which are different in different countries. Also, different reporting criteria might contribute: Events with minor impairments might be reportable in one country and not reportable in another. Therefore, not applicable data regarding Observed Populations and Events has to be identified, an the uncertainty associated with the remaining inhomogeneity has to be considered.
- Several approaches for construction of impact vectors are available for analysts to choose from. All approaches require translation of qualitative event information and event coding into quantitative impact (i.e., numerical values). Numerical values have been discussed for component impairments, shared cause factor and time factor. Generally, values are sourced from [25], and this ICDE guidance finds no grounds to recommend alternatives for constructing impact vectors.
- If the method of mapping up (i.e., applying using events that occurred in an Observed population of smaller degree of redundancy) is used, the analysis needs to include an assessment if the event includes a lethal shock or not.
- Different methods for parameter estimations are currently used for quantification of CCF rates, probabilities, or alpha factors. CCF parameters for the Alpha factor method must be used with caution, especially when other sources are used to estimate the total failure rates.

Two exemplary applications were conducted for emergency diesel generators (EDGs) and centrifugal pumps (CPs) to demonstrate the applicability of collected ICDE data to obtain CCF parameters to be input to a PRA model. These example applications confirm that discarding non-applicable individual observed populations and events is necessary. Furthermore, a significant statistical inhomogeneity is present in some data sets. Estimated point values are similar to other published sources [28], [29].
The ICDE project will continue to carry out quantification application cases for different component types using ICDE data. Additional quantification cases will provide further assurance on the usability of ICDE datasets for the calculation of CCF parameters. Furthermore, an ICDE publication with guidance on quantification is in preparation. This quantification guidance is mainly intended for ICDE members on how to use ICDE data for quantification but could also be useful for PRA practitioners, in general.

6. CONCLUSIONS

The ICDE Project has significantly changed the view on common cause failures. For instance, the determination of the fact that the most common cause of complete CCFs is human action as a part of operation or design, rather than manufacturing deficiencies, would not have been possible without deep plant data collection and combining of information from many sources.

Maybe the most important generic lesson is that it is worth forming specialized data exchange projects like ICDE. This, however, requires first the will of several countries to form a critical mass by combining their operating experience efforts; second, it requires national efforts to collect lower level data than those made publicly available as LERs or reports of the Incident Reporting Systems for Nuclear Installations of the IAEA (IRS); third, it requires the forming of a legal framework to protect this proprietary data and, fourth, a long term commitment to consistently continue and develop the activity.

Currently, ICDE focusses on two topics: The first focus is the research of the use of ICDE data for quantification, i.e. for the estimation of CCF parameters for PSA calculations. Based on the results, user guidance on CCF quantification using for ICDE data will be developed. The second focus is CCFs related to ageing.

OECD/NEA and the Operating Agent, ÅF industry, have provided the means to run the international dimension of the ICDE. National efforts, however, are the key to the success of any project that relies on operating experience. The success of the ICDE resulted in further OECD/NEA Database projects including the Fire Events Records Exchange (FIRE) and the Component Operational Experience, Degradation and Ageing Programme (CODAP).

More information about ICDE may be obtained by visiting the CSNI report site (https://www.oecd-nea.org/jcms/pl_25090/international-common-cause-failure-data-exchange-icde-project) and on the Operating Agent website (https://projectportal.afconsult.com/ProjectPortal/icde).

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