SAFETY CRITICAL ELEMENTS AND PERFORMANCE STANDARDS

CAPABILITY STATEMENT
SAFETY CRITICAL ELEMENTS AND PERFORMANCE STANDARDS

• Asset-owners generally provide a technical integrity framework which constitutes the basis for Asset Integrity Management;

• In addition to asset-owners/operators requirements Regulatory Bodies (such as HSE in UK, PSA in Norway etc.) have requirements for management of safety barriers and asset integrity;

• Safety Critical Elements (SCE) and Performance Standards (PS) are fundamental parts of Asset Integrity Management (AIM);

• Effective SCE Management requires specialist knowledge in the following areas:
  – Technical risk- and safety management
  – Asset data management
INTEGRATED SCE MANAGEMENT SERVICES

• Keel Solution (Keel) and ORS Consulting (ORS) provide integrated services in the area of SCE Management.

• We offer our services as a complete package or in any of the following main areas:
  – **Area 1**: Development of Strategies and Guidelines for SCE Management Framework
  – **Area 2**: Development/Customization of SCE Registers and Performance Standards
  – **Area 3**: SAP Implementation and Configuration
  – **Area 4**: Start-up, Operations and Assurance activities

• Our integrated approach is presented in the next slide as **SCE Management Roadmap**
HIGH-LEVEL ROADMAP FOR SCE MANAGEMENT

AREA 1
- Development of SCE Management Strategy
- Identification of Equipment System/SCE Groups
- Preparation of SCE Register for assets

AREA 2
- Customization of Performance Standards
- Alignment of periodic test and maintenance activities
- Development of incomplete asset registers (if any)

AREA 3
- Configuration and classification of PS and SCE objects in SAP
- Implementing periodic test and maintenance activities in SAP
- Competence and Training

AREA 4
- Performance of test-and-maintenance
- Handling of test and maintenance data
- Assurance Checks
- Periodic Reliability Monitoring
WHAT IS A SAFETY CRITICAL ELEMENT?

• A SCE is classified as an equipment, structure or system whose failure could cause or contribute to a major accident, or whose purpose is to prevent or mitigate the effect of a major accident;
  – Examples include emergency shut down valves (ESDV), pressure safety valves (PSV) or similar.

• A systematic management of the identified SCEs is a continuous process, ensuring that the safety barriers are in place and effective, in alignment with the specific performance standards.
DEVELOPMENT OF SCE REGISTERS

• During the design phase of the asset development projects, the asset owners classifies the components as safety-critical or production-critical. These components are SCE in the asset registry or master equipment list (MEL);

• The asset registry/MEL is implemented and classified in SAP. The components that are classified as SCE are governed strictly with regards to preventive and corrective maintenance activities.
POTENTIAL AREAS OF CONCERN WHEN DEVELOPING THE SCE REGISTERS:

- Incomplete asset registers or MEL as a basis (*critical SCEs missing from the list*);
- The philosophy and methodology behind the classification of safety critical-and production-critical element are not made sufficiently clear (*with incorrect classification as a result*);
- Highly conservative SCE classification (*resulting in too many SCEs – a significant cause of distraction*).
HOW TO DEAL WITH INCOMPLETE ASSET REGISTERS?

• Due to increased industry regulations and documentation requirements, maintaining large industrial installation has become a challenge;

• Experience show that asset registers may be incomplete, missing critical components, potentially forming a part of a safety barrier;

• In order to complete the asset registers;
• We conduct on-site data collection on new- and existing assets;
• We use an advanced cloud-based multiuser asset data modeling tool (KeelBuilder) to enrich, structure and complete the asset registers, when requested by our Clients.
WHAT IS PERFORMANCE STANDARD?

• A performance standard is typically defined as a set of requirements that constitute the basis for assurance tasks for safety critical elements during design- and operations;
• This performance is required in order to manage the major accident hazards;
• Asset owners may have a set of generic performance standards available;
• The generic performance standards reflect the applicable standards and Corporate (Company) requirements, but not necessarily the local regulations or other operational considerations in different business units.
WHAT DOES A PERFORMANCE STANDARD CONTAIN?

• A performance standard normally contains the following information about a safety critical element:
  – Functional requirements;
  – Availability and reliability requirements;
  – Required utilities;
  – Roles and interfaces;
  – Survivability requirements.

• Assigning correct and auditable performance requirements is of paramount importance in order to carry out assurance and verification activities during Operational phase;

• Assurance and verification activities ensures that SCE meet their PS
PERFORMANCE STANDARDS: GENERIC OR ASSET-SPECIFIC?

• Project- or asset-specific performance standards are developed during the design phase, and are based on the generic performance standards;

• The asset-specific performance standards reflect the design of installations, local rules and regulations as well multiple other considerations from asset operations standpoint;

• Possible areas of concern:
  – Performance standards from the design phase are too generic (*limited/no use in connection with test and maintenance*);
  – Performance standards are not validated (*containing wrong, misleading or contradictory information*);
  – Performance standards developed without taking the Operations input into consideration (*does not fit to the Organization or the existing test and maintenance system*).
WHAT TOOLS ARE REQUIRED FOR SCE MANAGEMENT?

- Visualization and reporting of asset status
- Dashboard/Monitoring
- SCE Strategy and Management Document (s)
- SAP (or similar ERP)
- SCEs and PSs fully implemented
VISUALIZATION OF FACILITIES STATUS

• By having a configured SAP system with high quality data the Asset Organisation gets a real snapshot of the condition of their assets;

• Typically, dashboards and other visual indicators are created and made available both through company intranet and at various office/plant locations;

• External tools & software are also available to provide visualization of SCE / facilities status;
SUMMARY OF OUR SCE MANAGEMENT SERVICES:

• Identification and assessment of major accident hazards;
• Development of SCE Management strategies and guidance documents;
• Classification- and Development of SCE Registers based on Master Equipment List / Asset Register;
• Further development of incomplete asset registers
• Development of generic and/or asset-specific performance standards;
• Independent 3rd party validation of performance standards;
• Full implementation of SCE Register and performance standards in SAP;
• Customization of maintenance- and test procedures
• Assurance tasks for SCEs (during Operational phase);
• Competence and training modules for asset organization.
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