Second International Symposium on Nuclear Power Plant Life Management

Ageing Management at the NPPs of EnBW in Germany

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Introduction

› Identifying ageing phenomena relevant for safety by technical and organisational measures and to control them for plant life time

› Political decision of Germany is the absolute opposite direction of the world-wide-trend

Based on:

› RSK-recommendation “Management of ageing processes at nuclear power plants”

› Information of planned and unplanned operational activities

The Ageing Management Programm of the EnKK

Objective of this Programm

› Ensuring the high safety standard by applying standardized criterions and collimating information to analyse them systematically

➔ Fundamental is an integral approach

The Ageing Management Programm of the EnKK

Covered issues:

› AMP covers at the moment the technical issues

› mechanical engineering (most advanced issue)

› I & C

› structural engineering

› operating supplies

➔ all technical issues are treated in a similar way

➔ Differences in the grouping itself

➔ the non-technical issues are treated separately

➔ Base for the AMP is the knowledge base of the NPP

Grouping of systems and components in regard to AM

- SSC are classified on their relevance to safety
- Depending on the technical issue and the requirements which the SSC have to fulfil
- For mechanical SSC three groups are defined

→ AMP treats only Group 1 and Group 2

Grouping of systems and components in regard to AM

Group 1 mechanical SSC:

› Mainly passive SSC which are subjected to the integrity-concept (mainly SSC of the reactor coolant pressure boundary)

› Quality has to be ensured; malfunctions are not allowed

› These SSC are monitored and controlled as it is described by the integrity concept and accordingly (KTA 3201.4)

Grouping of systems and components in regard to AM

Group 2 mechanical SSC:

› Safety relevant SSC, which are not assigned to Group 1

➔ primary part of the outer systems

› Quality is, if possible, to be ensured and, if necessary, to be reconstructed; malfunctions are allowed in individual cases

› Ageing effects should be minimized; systematic failures should be excluded

› Quality is mainly ensured by preventive maintenance

Group 3 mechanical SSC – not reported in the AMP:

› All the other SSC, predominantly relevant for the availability of the NPP

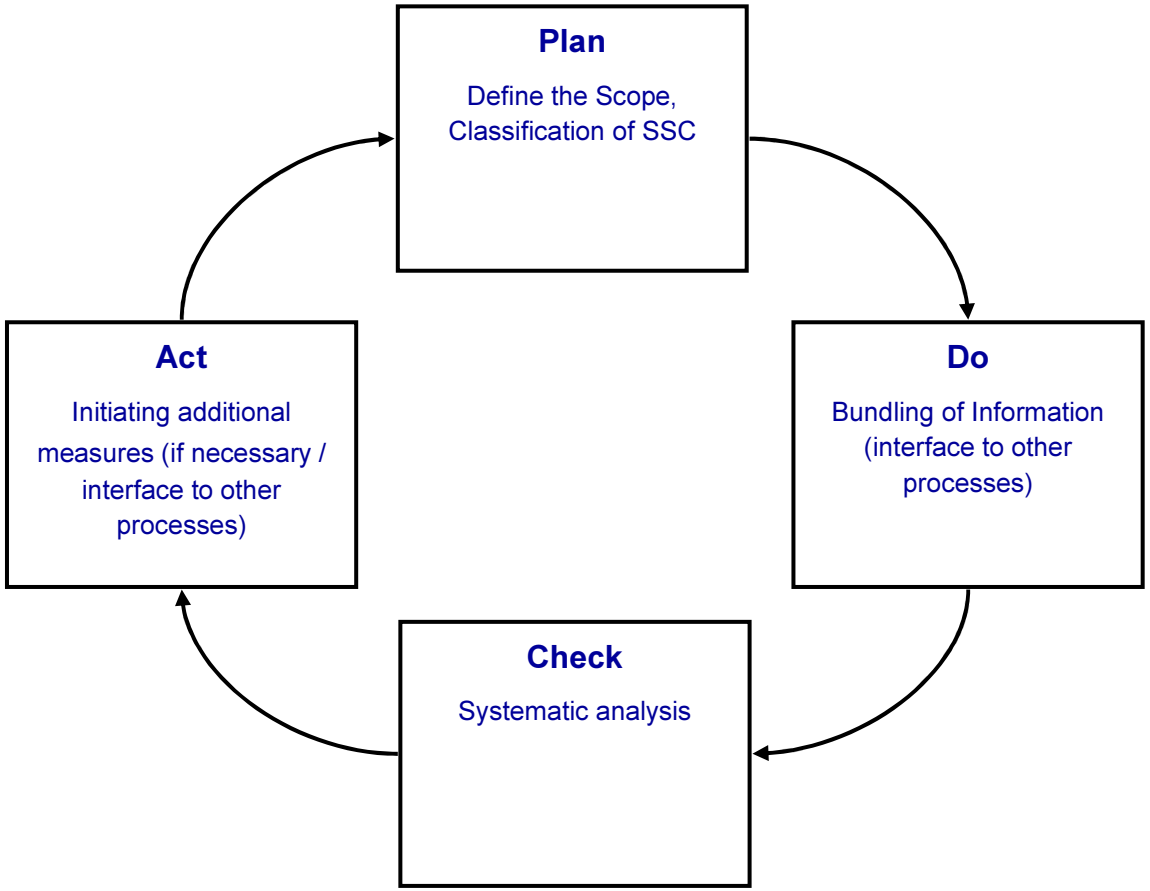
› SSC could fail and they are replaced after failure

The EnKK AMP procedure

- AMP is part of the management system
- AMP is attached to the different processes of the NPP
- AM-relevant information out of the relevant processes for countervailing ageing effects is bundled
- Information is systematically analysed in detail by experts again
- If the analysis and evaluation necessitates to further measures, these are communicated to the responsible person of the SSC and they are executed in the affected processes

→ realized in the PDCA-Cycle

The EnKK AMP procedure



PDCA-Cycle

Appliance of the EnKK AMP procedure

› Systematic and computer-assisted because of the numerousness of the SSC of group 1 and 2

› Collectives of components, which are e.g. identical in construction, size and stresses, were established

› Documentation and status-sheets were prepared for the collection of data

➔ three different types of documentation and status sheets exist, which include the relevant data for the analysis in the AMP

› These sheets are part of the knowledge base of the NPP-site

Appliance of the EnKK AMP procedure

A) Sheet of documentation – collective of the components
1) Description of the collective of the components
2) Technical data
3) Changes of requirements and regulations
4) Plan of inspections, preventive maintenance
5) Verifications (only for piping and container, SSC Group 1)

B) Sheet of documentation of the components
1) Description of the component
2) Monitoring systems
3) History of the component

C) Sheet of the status of the components
1) Component / Cycle
2) Events
3) Operating surveillance (surveillance carried out)
4) Discontinuous measures carried out
5) Results
6) Summerized assessment and measurements

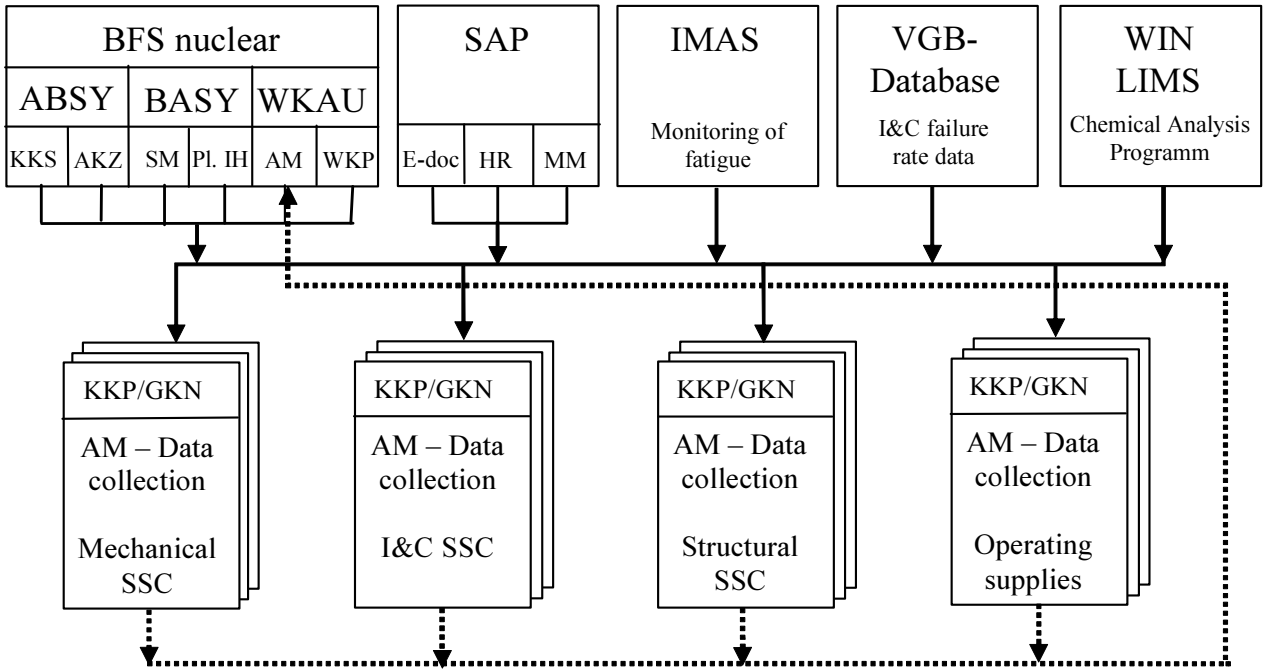
Example of documentation and status sheet

Appliance of the EnKK AMP procedure

- These sheets are elements of the computer-assisted procedure
- Information is flowing e.g. directly from the experience of the preventive maintenance in to the AMP to be analyzed
  - in a systematic,
  - reproducible way and
  - independent of individuals

Schematic illustration of AM data sources

Appliance of the EnKK AMP procedure



Schematic illustration of AM data sources

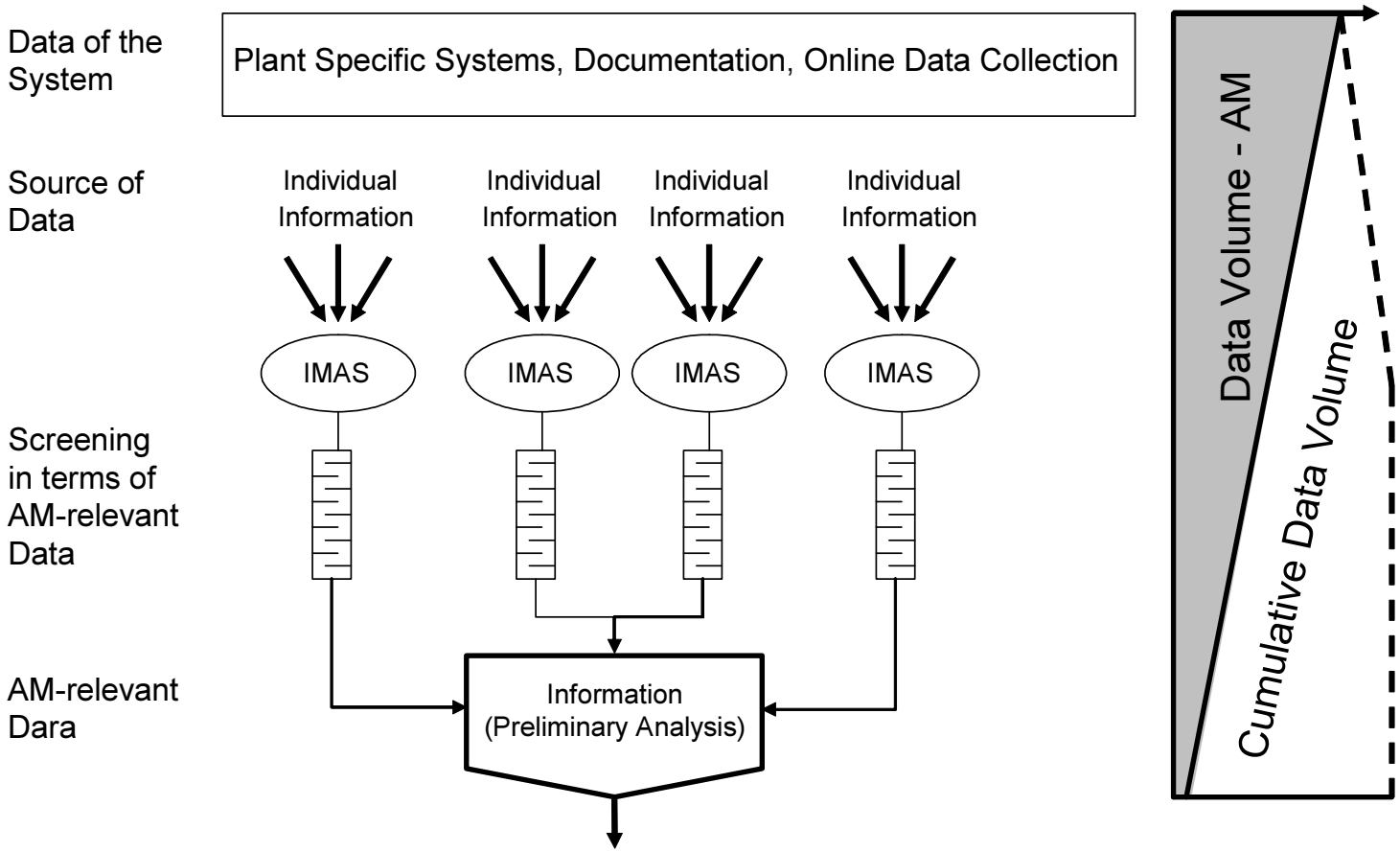
Procedure of the AMP at the NPPs of EnKK

- Advantages of this computer-assisted process:
  - systematic,
  - completeness,
  - traceability,
  - independency from individuals

➔ based on the knowledge base of the NPP site

- Source of data is BASY
- computer-assisted process leads to a reduced volume of information which could be assessed in more detail in the next step of the AMP

Procedure of the AMP at the NPPs of EnKK



Schematic procedure to identify AM relevant information

Procedure of the AMP at the NPPs of EnKK

› Malfunction messages and information about planned and unplanned operational activities are merged in BASY

➔ Based on this the reports are prepared

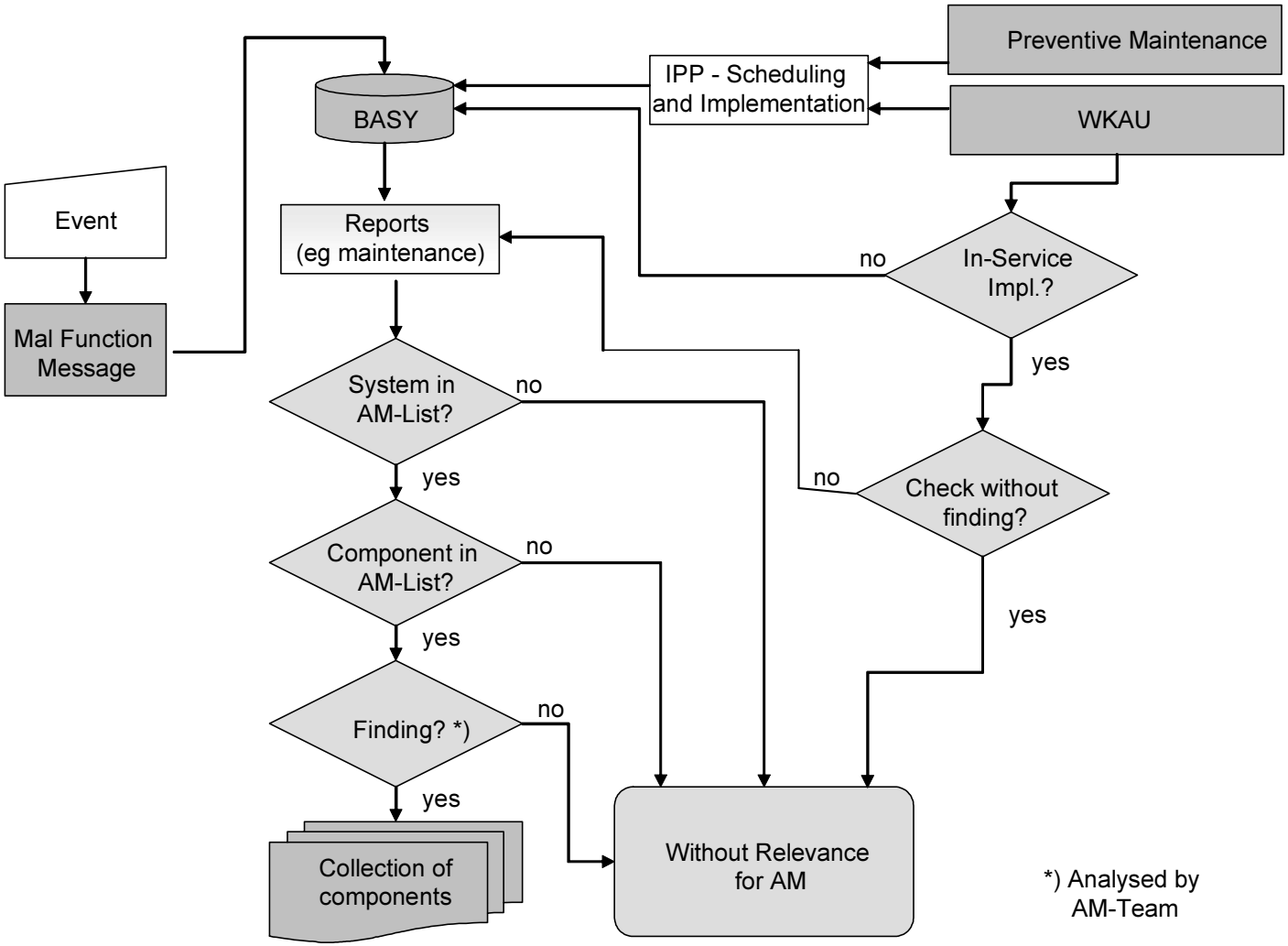
› Check, if the SSC is to be handled in the AMP

➔ SSC is compared in two steps with the list of AM relevant Systems and Components

› If the SSC is a Group 1 or Group 2 SSC it is checked if the event is based on ageing effect

› In the next step of the AMP all the identified potential AM relevant events are analysed by an expert team

Procedure of the AMP at the NPPs of EnKK

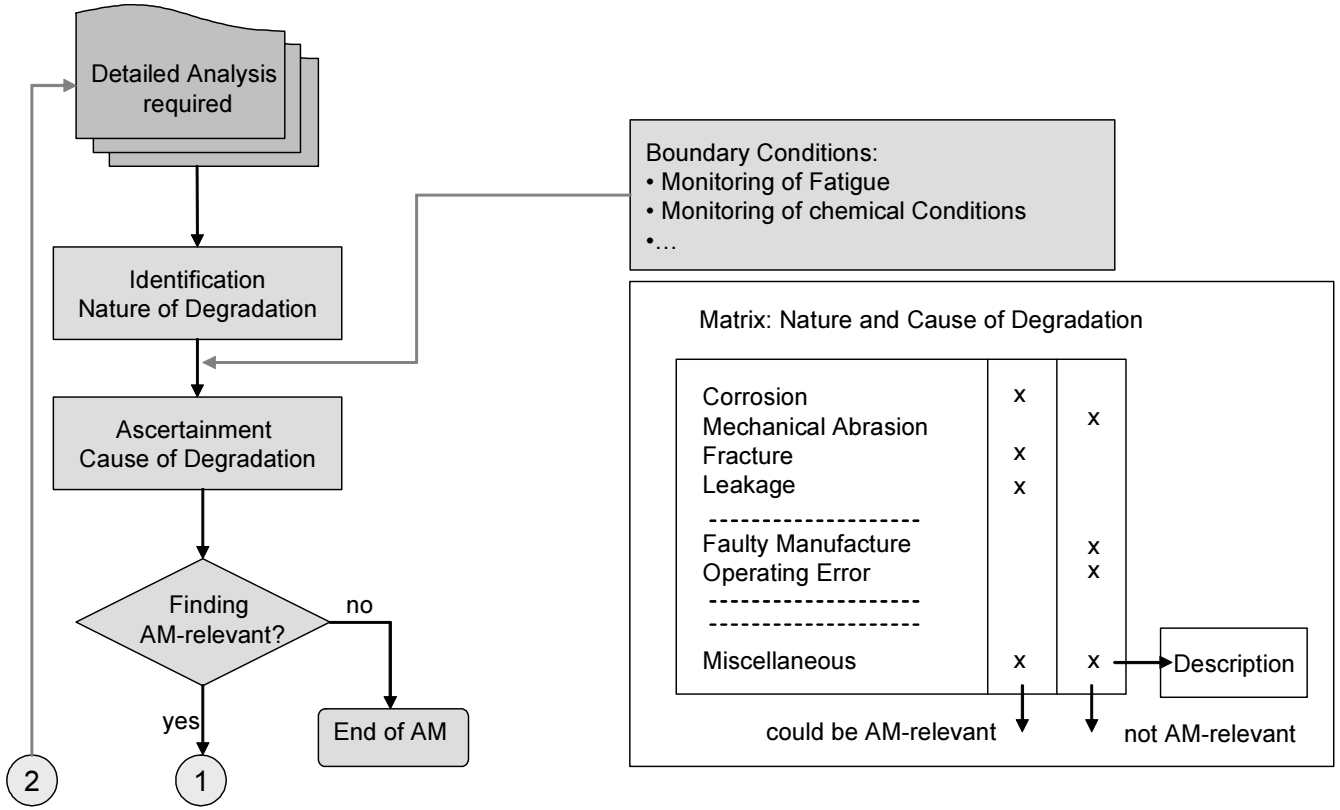


Procedure to identify components with relevant finding (fine structure)

Procedure of the AMP at the NPPs of EnKK

› traceable assay of potential AM-relevant events

› provides to identify common-mode-failures and the transferability to other SSC



Procedure of the AMP at the NPPs of EnKK

› results are documented and presented in the annual status report