

PRACTICAL ASPECTS OF ASSET MANAGEMENT SYSTEM IMPLEMENTATION

Workshop 07

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International Group مجموعة أكزيكون الدولية International Business Unit



Introduction

The workshop is based on the authors' practical experience with AMS implementation in accordance to ISO 55001 and with upgrades of different processes supporting AM.

Some examples are taken from the **Case on HSE Group** (presented on Day 2 of the Conference).

Even though it is short, the WS is intended to be **interactive** and will tackle the following practical aspects:

- AM and AMS,
- Use of International Standards and Guidelines,
- Maturity Assessment,
- Strategic Implementation Framework,
- Project Roadmap and Organization,
- Change Management,
- Deliverables,
- Suggestions for future AMS Implementations.







Initial Discussion with Participants

- Have you already been involved in Asset Management as defined by the ISO 55000 series?
- Have you had a chance to read the ISO 55001 standard?
- What are the main factors influencing decision-making FOR AM System implementation?
- What are the main factors influencing decision-making AGAINST AM System implementation?







Use of International Standards and Guidelines

AM and Maintenance

Are you sure you know (are aware of) the benefits of introducing

- Asset Management and
- Maintenance within the Asset Management

to the company's business, their employees and "maintenance department"?

ISO/TS 55010:2019

Guidance on the alignment of financial and non-financial functions in asset management

ISO 55011: ??

Guidance for development and application of public policy to enable asset management

ISO 55012: ??

People involvement and competence

ISO 55013:

Guidance on the management of Data Assets in asset management

EN16646:2014 Maintenance within Asset Management Asset **Maintenance** Management Standards **Standards** Common basis ISO55000:2014 EN 13306:2017 EN 17007:2017 Overview, principles and terminology Maintenance Maintenance ISO55001:2014 terminology process and Management systems, Requirements associated **ISO55002:2018** Guidelines for indicators the application of ISO 55001 EN17485:2021 Framework for

improving the value of the physical

assets through their whole life cycle

EN 17666:2022

Maintenance engineering: Requirements

EN 15341:2019

Maintenance Key Performance Indicators

EN 16991: 2018

Risk-based inspection framework

EN 13269: 2016

Guideline of maintenance contracts

EN 15628: 2014

Qualification of maintenance personnel

EN 15331: 2011

Criteria for design, management and control of

maintenance services for buildings

EN 13460: 2009

Documentation for maintenance

prEN 17840: ??

Performance and condition assessment for buildings and civil engineering. Framework for assessment within physical asset management





Use of International Standards and Guidelines

Project Management

Useful guidance can be found in *ISO 21502:2020 Project, programme and portfolio management — Guidance on project management,* together with other related standards:

- ISO 21500:2021 Context and concepts,
- ISO 21503:2017 Programme management,
- ISO 21504:2015 Portfolio management,
- ISO 21505:2017 Governance,
- ISO 21506:2018 Vocabulary,
- ISO 21508:2018 Earned value management,
- ISO 21511:2018 Work breakdown structures,
- ISO 21512 EVM implementation guide (under development).







Use of International Standards and Guidelines

Structure and BIM

- ISO 19650 BIM and ISO 16739 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries
- ISO 14224 Petroleum, petrochemical and natural gas industries Collection and exchange of reliability and maintenance data for equipment
- EN 81346 Industrial systems, installations and equipment and industrial products Structuring principles and reference designations
- EN 61355 Classification and designation of documents for plants, systems and equipment







Use of International Standards and Guidelines

Guidelines

• **GFMAM** <u>www.gfmam.org</u>

• IAM <u>www.theiam.org</u>

• **EFNMS** <u>www.efnms.eu</u>

• **ISEAM** <u>www.iseam.org</u>





AM and AMS

The relationship between managing the organization, **AM and AMS**

Managing the organisation Asset Management ISO5501 Asset Management system ISO5500 ISO5502 **Asset portfolio Asset system Individual Asset** (Source: AM Consulting, adapted from ISO 55000)

Coordinated activity of an organization to realize value from assets.

A set of interrelated or interacting elements to establish an Asset Management policy, objectives and Asset Management processes to achieve those objectives.

Assets that are within the scope of the asset management system - AMS.

Grouping of assets having common characteristics that distinguish those assets as a group or class

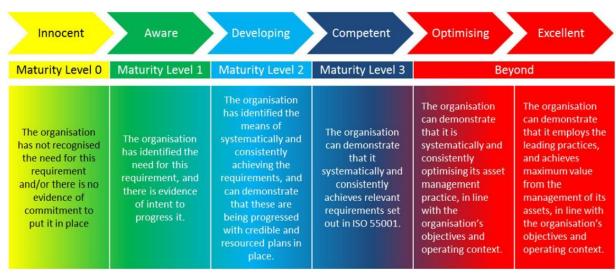
Item, thing or entity that has potential or actual value to an organization.

Component having potential to significantly impact on the achievement of the organization's objectives



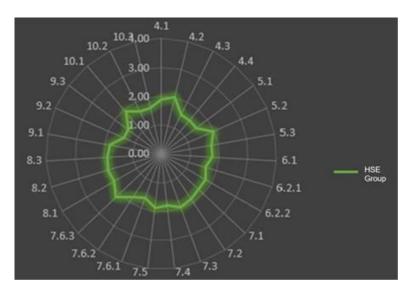
Maturity Assessment

ISO 55001 Maturity Scale



(Source: The IAM, SAM+)

Initial AM maturity selfassessment results, an example



(Source: HSE Group)





Strategic Implementation Framework

An example of a **Strategic Implementation** Framework; a high-level view **HSE GROUP** STRATEGY

CURRENT STATE

FUTURE STATE

IMPLEMENTATION PLAN

EXECUTION

FOLLOW UP

Business Plan

Strategic directions and goals for: Existing production facilities;

- Development and investments in new production facilities:
- Trading, selling and new product development.

AM Policy

- Improvement of value creation from physical assets in all phases of asset life cycle:
- External and internal compliance:
- Coordination of all processes and functions impacting AM:
- · Decision making process supported by
- LCC, Risk & Opportunity management; Adequate resources for achievement of
- Appropriate personnel & competences:
- RCM and digitalization:
- Continual improvement.

AM goals

Long-term strategy and goals for:

- Investments in new and existing nhysical assets
- Operations and maintenance;
- · Support processes;
- Asset Management System

As identified by AM maturity assessment:

- · Scope of AMS;
- Development of AMS:
- · Leadership and commitment;
- AM goals;
- General documented information: Internal audit;

Challenges

- Management review:
- Corrective actions:
- Continual improvement.
- Other Challenges:
- Long-term strategic planning;
- Cooperation among processes and functions:
- Harmonization of asset hierarchy. spare parts, procedures...
- Definition and use of criticality criteria;
- Development of Condition-based Maintenance:
- Improvement of preventive maintenance program:
- Better utilization of EAM (SAP PM. MAXIMO)
- Seizing synergies within HSE Group (knowledge, experience, best practices, ...)

AM Maturity in HSE Group: Self-assessment average: 1,8

Implemented AMS and associated processes for value generation from physical assets

Improved availability of information and analytics with IT support and digitalization (EAM, APM).

Systematic coordinaton of investments, procurement, operations and maintenance functions in all phases of asset life cvcle

Harmonized asset hierarchy and coding within SAP EAM.

Risk & opportunity management, and use of crticality for prioritization and coonsequent improvement of preventive maintenance programs.

Improved decision-making.

Effective use of sinergies within

AM Maturity in HSE Group: Self-assessment average: 3 and

AM Plan

- AM workshops: Update IMS manuals:
- Develop system documents on
- Developm methodology on
- physical asset hierarchy; Develop methodology on risk and
- opportunity management:
- Prepare SAMP:
- Prepare AMPs for pilot systems; Develop detailed AM
- implementation plan for each HSE Group member company; Training of project team and key
- personnel of processes and functions supporting AM;
- Revision of supporting processes descriptions to encompass AM; Training of internal auditors;
- Selection of external auditing institution;;
- Internal audit
- Execution of correctove actions from internal audit and preparation for external audit;

Other activities in accordance with

Two-step certification.

directions from SAMP

Approval of AMS documents in

review at the top management

AM Project reporting and status

Preparation and implementation of AMPs in all HSE Group member companies for pilot systems

Monitor implementation and achievemnts of SAMP goals

ISO 55001 certification for specific asset portfolios in 2022

Monitor implementation and achievemnts of AMP goals

Preparation and implementation of AMPs za remaining asset poortfolios in 2023

Monitor implementation and achievements of Business Plan

ISO 55001 certification for remaining asset portfolios in 2024

Monitor KPIs on AM and reporting by processes

- SAMP Phase II (2025 and on): Physical asset hierarchy;
- Risk & Opportunity management
- Condition-based Maintenance: RCM/FME(C)A:
- Digitalization:
- Implementation of APM within the HSE Group.

Long-term activities in accordance with SAMP.

Internal and external AMS audits

Management review.

Implementation of corrective actions and continual improvements.

Change Management

Project Management and AM Process Management

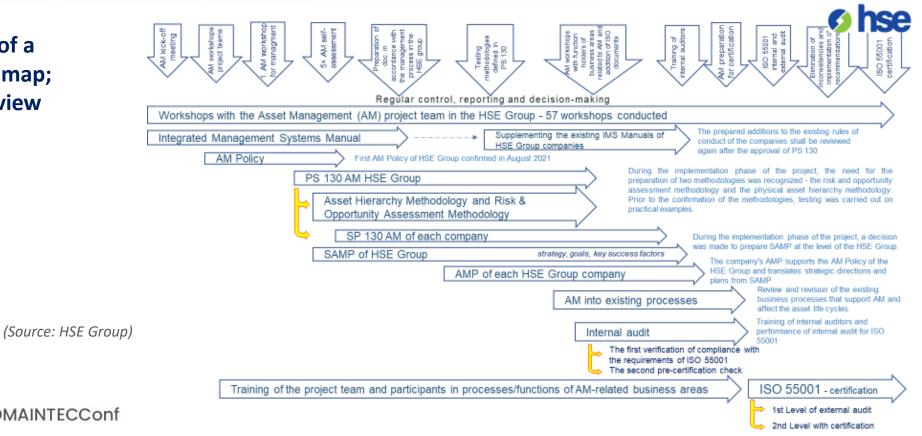


(Source: HSE Group)



Project Roadmap

An example of a Project Roadmap; a high-level view

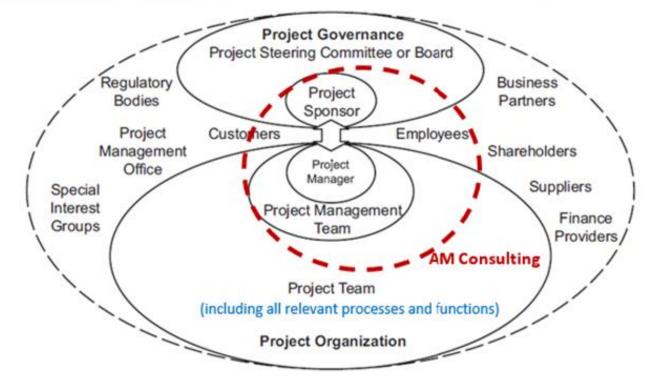






Project Organization

All important stakeholders need to be involved



(Source: AM Consulting, adapted from ISO 21502)



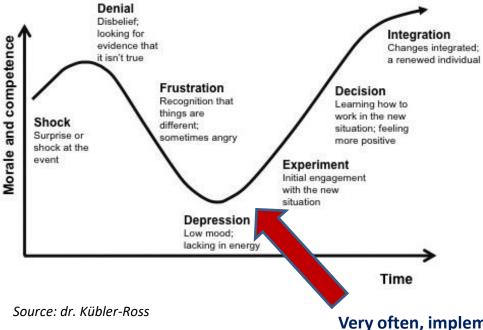




Change Management

AMS Implementation is a Change Project!

Typical human reaction – The Change Curve:





Very often, implementation of change gets stuck at this point...



Change Management (Cont'd)

PCT (Prosci Change Triangle) Model - For a successful change project, the following three elements should be aligned:

- Leadership / Sponsorship, providing guidance and governance,
- Project Management, assuring structure of technical contents,
- **Change Management**, supporting people side of the change (use of proven methodologies e.g., Prosci, Kotter etc. is highly recommended).



(Source: www.prosci.som)





Deliverables

 Definition of documents and activities of AMS (an example of HSE Group)

(Source: HSE Group)



Stakeholder and HSE Group context Market Technology Development plan and strategic objectives of the **HSE Group SAMP Document PS130 AM Policy** AM process (HSE group) t e HSE Strategic Asset Management Plan Metodology: - asset hierarchy 2 (2) thi - risk assesment and opportunities **Asset Management Plans** AMS plans and S **Document SP130** Instructions for preparing development the Investment, Production, Maintenance, AM process (HSE's company) AMS improvements and AM training plans DEM | HSE | HTZ | PV | SENG | TEŠ Implementation of Asset Management S Asset portfolio A S Performance evaluation and improvement

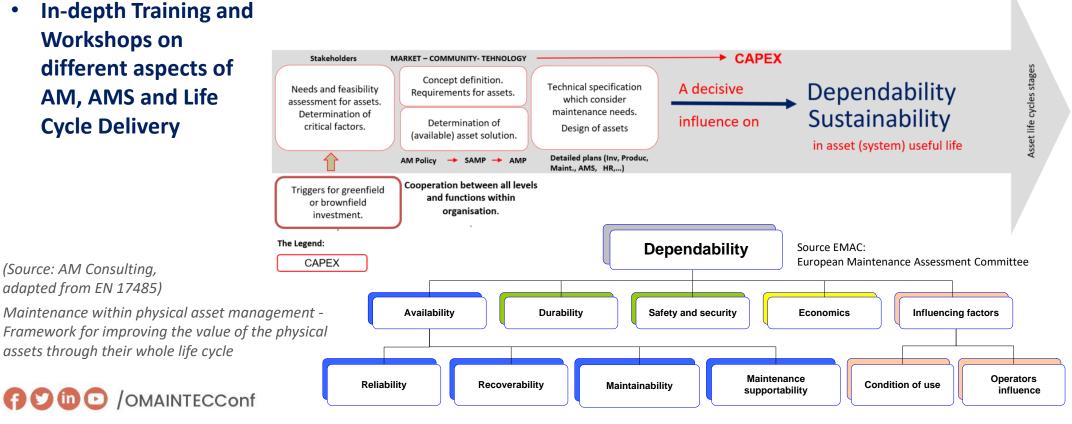


Deliverables

In-depth Training and Workshops on different aspects of AM, AMS and Life **Cycle Delivery**

(Source: AM Consulting, adapted from EN 17485)

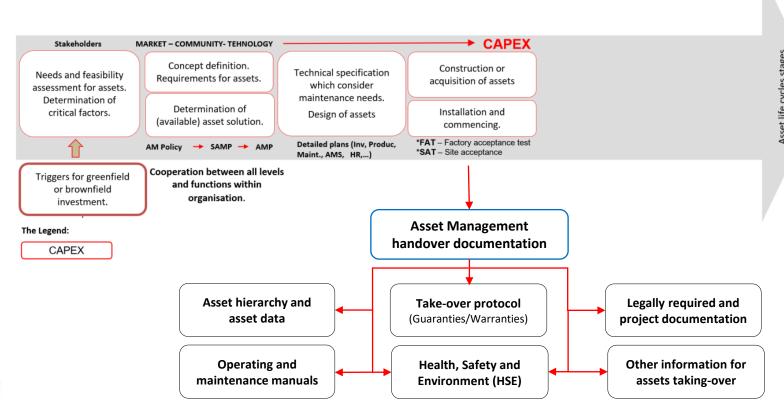
assets through their whole life cycle





Deliverables

 In-depth Training and Workshops (Cont'd)

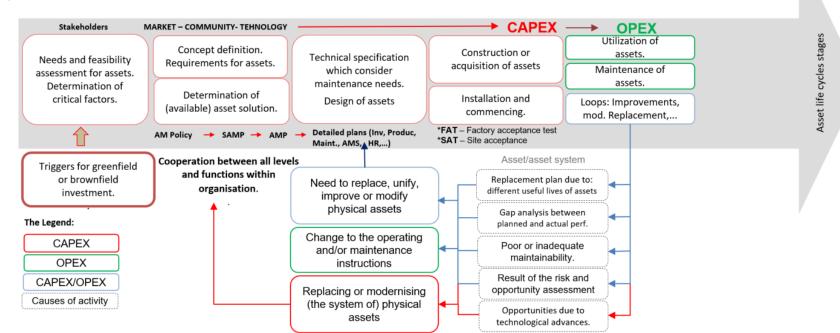


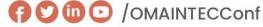




Deliverables

 In-depth Training and Workshops (Cont'd)



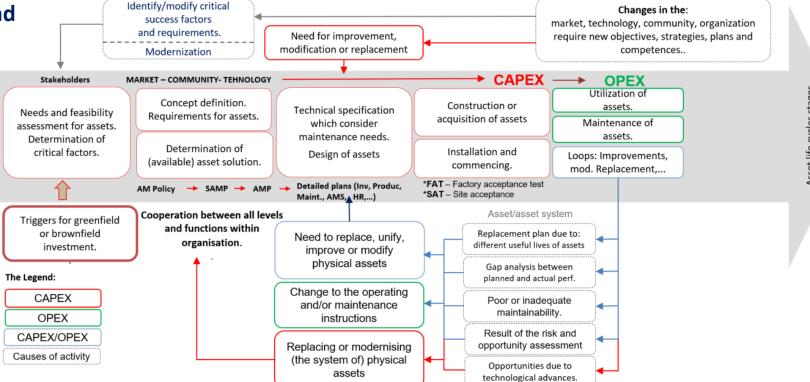






Deliverables

 In-depth Training and Workshops (Cont'd)







Deliverables

 In-depth Training and Workshops (Cont'd)

Identify/modify critical Changes in the: success factors market, technology, community, organization and requirements. Need for improvement, require new objectives, strategies, plans and modification or replacement competences.. Modernization → CAPEX **OPEX** MARKET - COMMUNITY- TEHNOLOGY Stakeholders Utilization of Asset life cycles stages Decommissioning. Concept definition. Construction or assets. Technical specification retirement and/or Needs and feasibility Requirements for assets. acquisition of assets which consider Maintenance of removal of assets assessment for assets. (asset system) maintenance needs. assets. Determination of with the possibility Determination of critical factors. Installation and Design of assets Loops: Improvements, of partial or total (available) asset solution. commencing. mod. Replacement,... disposal. *FAT - Factory acceptance test Detailed plans (Inv, Produc, AM Policy → SAMP → AMP *SAT - Site acceptance Maint., AMS, HR,...) Cooperation between all levels Asset/asset system Circular economy Triggers for greenfield and functions within Inspection/repair, or brownfield Replacement plan due to: Need to replace, unify. organisation. refurbishment. different useful lives of assets investment. improve or modify modification, upgrade, physical assets Gap analysis between extension of useful life The Legend: planned and actual perf. (system) of physical assets. Change to the operating CAPEX Poor or inadequate and/or maintenance Change in technological and maintainability. **OPEX** instructions business environment Result of the risk and Extension of CAPEX/OPEX opportunity assessment Replacing or modernising the asset life Need for improvements. Causes of activity (the system of) physical modifications or Opportunities due to assets modernization. technological advances.





Deliverables (Cont'd)

- Asset Management Policy
- Updated Integrated Management Systems (IMS) Manual
- Strategic Asset Management Plan (SAMP)
- ISO 55000 series handbooks
- AM process description RACI Matrix (example)

(Source: HSE Group)



		,							,		,
	Responsible Activity and/or process	HSE top management	CEO of key function	HSE management representative for AMS	HSE Group AM process owner	Owners of other HSE Group processes	Management of the HSE Group company	Managers / heads of individual areas of HSE Group companies	HSE Group company management representative for AMS	AM process owner at HSE Group company	Other process owners at the company
1.	Corporate Management of AM, SAMP development	v	I		SI	SI	sv*	SI**		SI*	SI*
2.	Development and planning of investments and maintenance of physical assets		v		SI	I	V*	SV*		SI*	I*
3.	Managing the risks and opportunities of physical assets			SI	V, SI	I			SI*	V*, SI*	I*
4.	Defining the operational objectives of physical asset management		v	SI	SI	I	V*	SV*	SI*	SI*	I*
5.	Creation of Asset Management Plans – AMP's		V		SI	I	V*	SV*		SI*	I*
6.	Inclusion of the asset management plans into the preparation of the yearly business plan of the HSE Group	v	SV SI		SI	I	V*	SV* SI*		SI*	I*
7.	Operation, maintenance and investment in physical assets		v		SI	I	V*	sv*		SI*	I*
8.	Procurement and warehousing operations for physical assets		v		SI	I	V*	SV*		SI*	I*
9.	Removal of physical assets		V		SI	I	V*	SV*		SI*	I*
10.	AM monitoring, measuring, analysing and evaluating and continual improvement		v	sv	sv	I		V*	SV*	sv*	I*

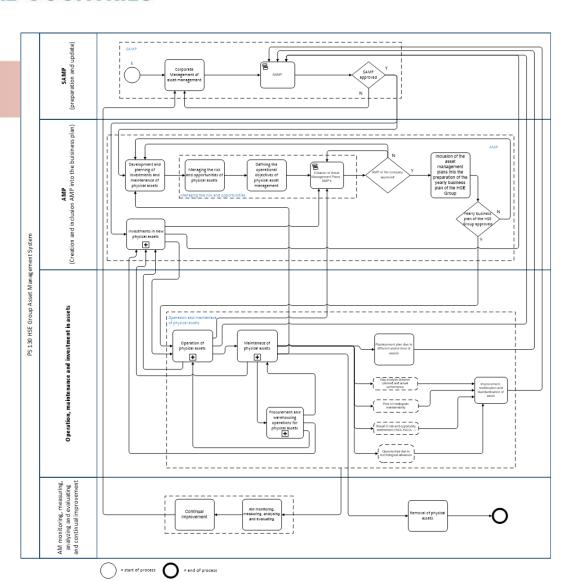


Deliverables (Cont'd)

 AM process description - Process Flow Diagram

(Source: HSE Group)







Deliverables (Cont'd)

- AM process description Integration of Functions and Processes
- Recommendations on AM-related upgrade of existing processes
- Guidelines on Maintenance Requirements for investments and hand-overs

- ✓ Corporate governance,
- ✓ Investments,
- ✓ Operations,
- ✓ Maintenance,
- ✓ Risk management,
- ✓ Controlling,
- ✓ Procurement and warehousing,
- ✓ Human resources,
- ✓ Finance and accounting,
- ✓ IT,
- ✓ etc.



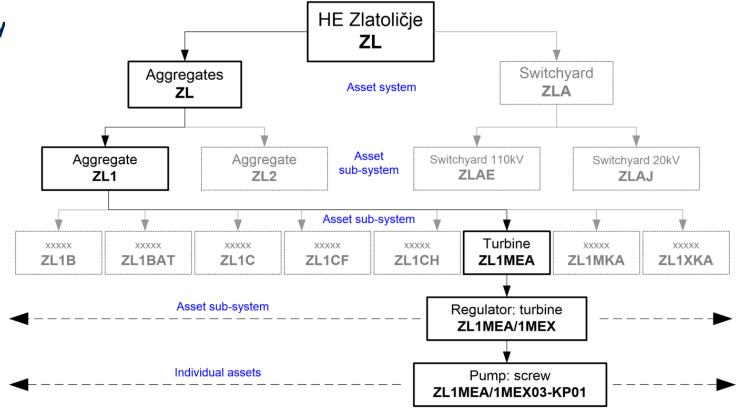


Deliverables (Cont'd)

• Guidelines on Asset Hierarchy

(Source: HSE Group)

(1) (in D) /OMAINTECCONF



Asset portfolio



Deliverables (Cont'd)

- Methodology on Risk & Opportunity Assessment
- Guidelines on Asset Group PM tasks example
- Specific Maintenance Guidelines

(Source:	LICE	Ground	
LOUUI CE.	$\Pi . \Sigma E$	UUUUU	

6 hse	MAINTENANCE PROGRAM (320)				
V ISC	PR PA-320-1-2 Asset group PM tasks - TRANSFORMERS				

HSE - Preventive maintenance tasks			Criticality based (RAM) task execution period					
Task	Comment	Critical	Important	Less important	Non-critical			
1. ROUTINE INSPECTIONS (daily, weekly, monthly)								
Oil level inspection	oil TR only	1W	1W	1M	1M			
Cooling system inspection		1W	1W	1M	1M			
Air dryer inspection	oil TR only	1W	1M	1M	1M			
Oil sump inspection	oil TR only	1W	1M or as needed	1M or as needed	1M or as needed			
Inspection of fire extinguishing CO2 bottles		1W	1W	1M	1M			
Inspection of water quantity in fire extinguishing tar	k	1W	1W	1M	1M			
Thermo meter in spection		1W	1W	1M	1M			
2. TRANSFORMER OIL ANALYSES								
Gas chromatography oil analysis (GC)		1Y	2Y	6Y	6Y			
Liquid chromatography oil analysis (LC)		1Y	2Y	6Y	6Y			
Physical and chemical oil analysis, infrared	1 x 6 yrs for TR up to 12 yrs, 1 x 3 yrs							
spectroscopy (C + IR)	for TR older than 12 yrs	1Y	4Y	6Y	6Y			
Prebojna napetost olja in voda v olju (Pn + v)		1Y	2Y	6Y	6Y			
3. ELECTRICAL MEASUREMENTS								
Isolation resistance		1Y	5Y	6Y	8Y			
Magnetizing currents	*as needed, based on the GC/LC							
	analyses results.	4Y	5Y	6Y	8Y			
Resistance measurement at all stages	*as needed, based on the GC/LC							
-	analyses results.	4Y	5Y	6Y	8Y			







Deliverables (Cont'd)

- Asset Management Plan (AMP) Preparation Procedure, addressing harmonized plans on:
 - ✓ Investments into new physical assets,
 - ✓ Investments into existing physical assets,
 - ✓ Operations,
 - ✓ Maintenance,
 - ✓ AMS improvements, and
 - ✓ Human resources.







Certification

- Internal audits
- 1st level external audit
- 2nd level external audit with certification

Note: management system audits are to be integrated wherever possible.



Building trust together.

Certificate

SIQ Ljubljana has issued an IQNET recognized certificate that the organization:

HOLDING SLOVENSKE ELEKTRARNE d.o.o. Koprska ulica 92, 1000 Ljubljana, Slovenia

has implemented and maintains an Asset System

for the following scope:

Asset management in production infrastructure

which fulfils the requirements of the following standard:

ISO 55001:2014

Issued on: 2022-11-11
First issued on: 2022-11-11
Expires on: 2025-11-11

Registration Number: SI - AM-003

Alex Stoichitoiu

Gregor Schoss

Managing director of SIQ Ljubljana



is attestation is directly linked to the IONET Member's original certificate and shall not be used as a stand-alone docume

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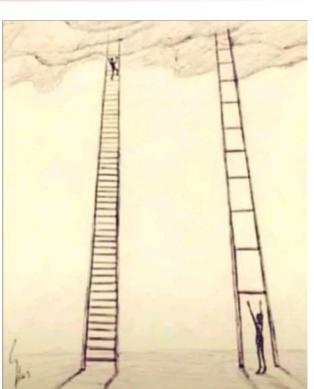
(Source: HSE Group)



Suggestions for Future AMS Implementations

- Set realistic goals, establish AMS in line with current AM maturity –
 STEP BY STEP,
- Gain top management support where necessary,
- Establish and motivate an active project management team,
- Regularly communicate,
- **Define clear Ownership of the project** consultants provide structure and guidance, customer owns and executes,
- Utilize Change Management methods as much as possible,







Suggestions for Future AMS Implementations (Cont'd)

- Pay utmost attention to alignment of functions and processes & harmonize the decision-making,
- Introduce risk and opportunity methodology at the asset system and individual asset levels,
- Use implementation of AMS as a learning process,
- Utilize international standards and guidance wherever feasible,
- Do not overdo contents of a single project be cautious with simultaneous alignment and upgrade/reengineering of AM supporting processes (e.g. Investments, Procurement, Maintenance etc.).
- As part of digitalization, make BIM a key supporting tool for Asset Management on the long run.







Questions?

For any later questions the authors can be reached at: andrej.androjna@quantum-consulting.si and janez.tomazin@dimas.si.







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