

# 1ST GERMANY- INDIA SMART ENERGY WORKSHOP

## Session-1: Asset Management in Distribution Networks

**Speaker : *Marcus Merkel***

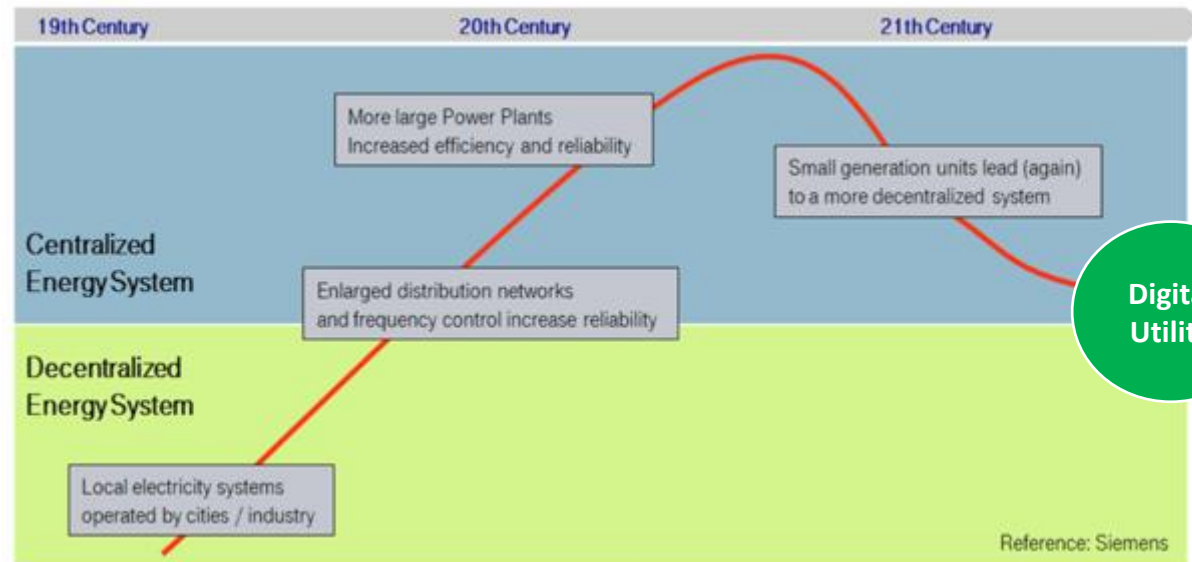
*Senior Strategy Manager - EWE AG, Germany*



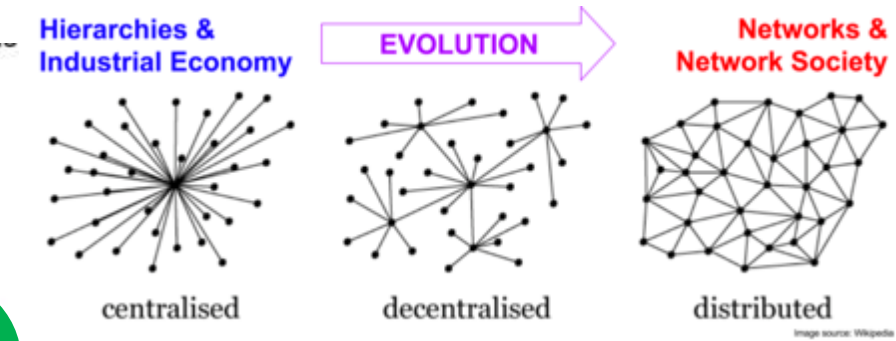
- 1** ➤ **Power sector challenges**
- 2** ➤ **Evolution pathway of standardization on Asset Management**
- 3** ➤ **The big picture on why Asset Management?**
- 4** ➤ **What is Asset management and ISO 55000 about?**
- 5** ➤ **IEC Whitepaper, Implementation and way forward towards DAM**

# Long term evolution of power systems towards digital utilities

## Long-term evolution of power systems \*



## From Industrial Economy to Network Society



## From analog to digital



The long-term evolution of power systems is smart and digital – it is as well an integration task of centralized and decentralized energy systems towards smart systems and distributed/digital structures towards a network society.

\* Source: Siemens/EU KOM: Smart Grid Architecture Model ; Taskforce Smart Grid der EU-KOM, 2011; Wikipedia 2019

# Electricity networks around the world are facing an once-in-a-lifetime level of profound challenges

- Ranging from the **massive uptake of distributed generation devices**, through to **significant changes in the control and communications equipment** used in the network itself.
- Power networks in developed nations are struggling with **an equipment base nearing the end of its lifetime**, whilst those in developing nations trying **to identify best-practice examples to model their future operations**.
- There is **ever-increasing regulatory and funding pressure** being placed on electricity network businesses to **justify their management actions and expenditure decisions**.
- There is **great variation around the world on how electricity network companies approach the design, maintenance and operation of a large network of electrical equipment**.
- **Different approaches in testing equipment, calculating the lifetime and financial costs of various equipment maintenance options, and even reporting on the performance of their system.**
- **Lack of internationally accepted global standards or guidelines on how to practice asset management in the electricity network sector → significant impact on the reliability and future viability of the electricity sector.**

Standards such as the ISO 55000 series provide general guidance on best-practice asset management procedures, but they do so far not provide the industry-specific guidance that is needed given the operational methods and challenges of the power transmission and distribution sector.





# A short evolution pathway of Asset Management Standardization at a Glance

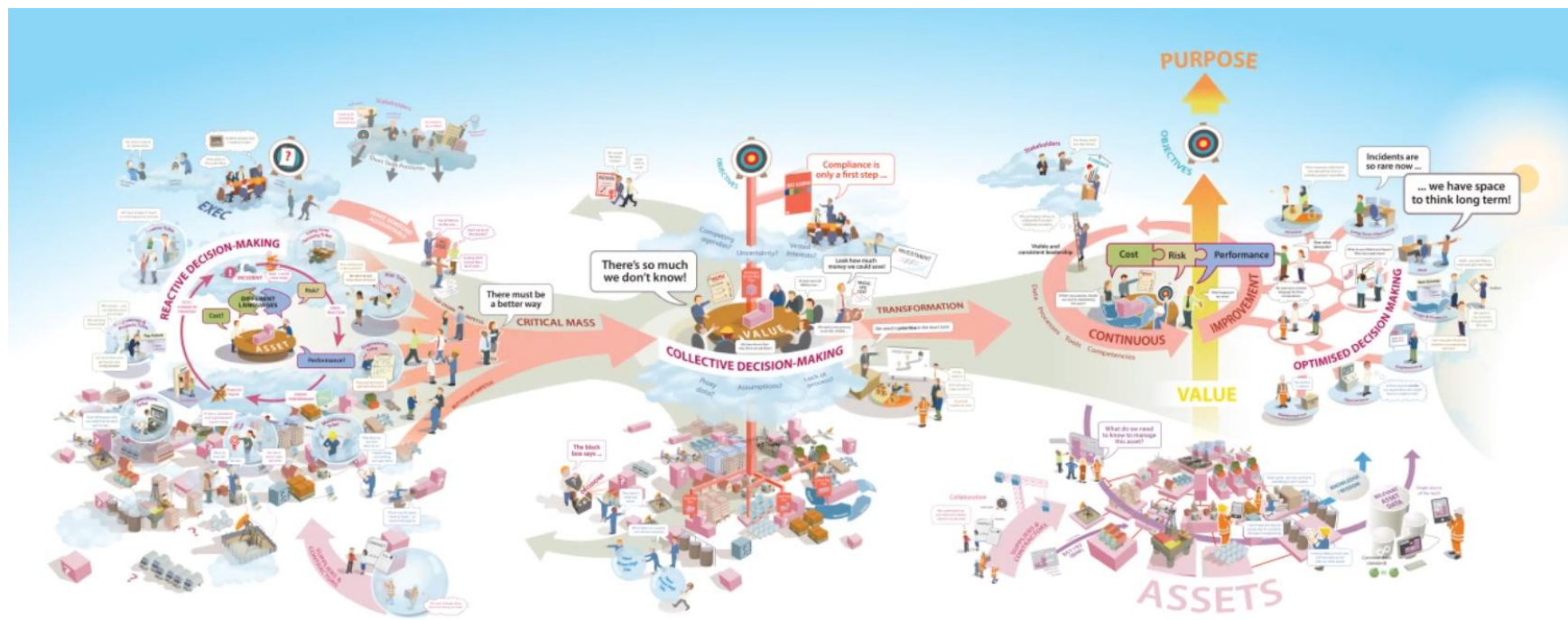


IAM: Institut for Asset Management; PAS: Publicly Available Specification (UK) ; Global Forum: Global Forum on Maintenance and Asset Management (<http://www.gfmam.org>); ISO: International Standardization Organization; CIGRE: global community committed to the collaborative development and sharing of power system expertise



# Highly Recommended

## The big picture on why asset management?



### The Asset Management Journey



<https://www.youtube.com/watch?v=Zp62O373q3c>

Source: IAM: Institut for Asset Management, Youtube



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India Smart Utility Week

# What is ISO 55000?

- ISO 55000/1/2 are the international standards for Asset Management \*
  - The standards introduce the discipline of asset management and specify the requirements for an asset management system (AMS).
  - Developed under the umbrella of ISO TC251
- The ISO 55000 standard is comprised of three documents:
  - ISO 55000 provides an overview of the subject of asset management and the standard terms and definitions to be used.
  - ISO 55001 is the requirements specification for an integrated, effective management system for assets.
  - ISO 55002 provides guidance for the implementation of such a system.

**Asset Management translates the organization's objectives into asset-related decisions, plans and activities to create value, using a risk-based approach.**



Objectives

Asset

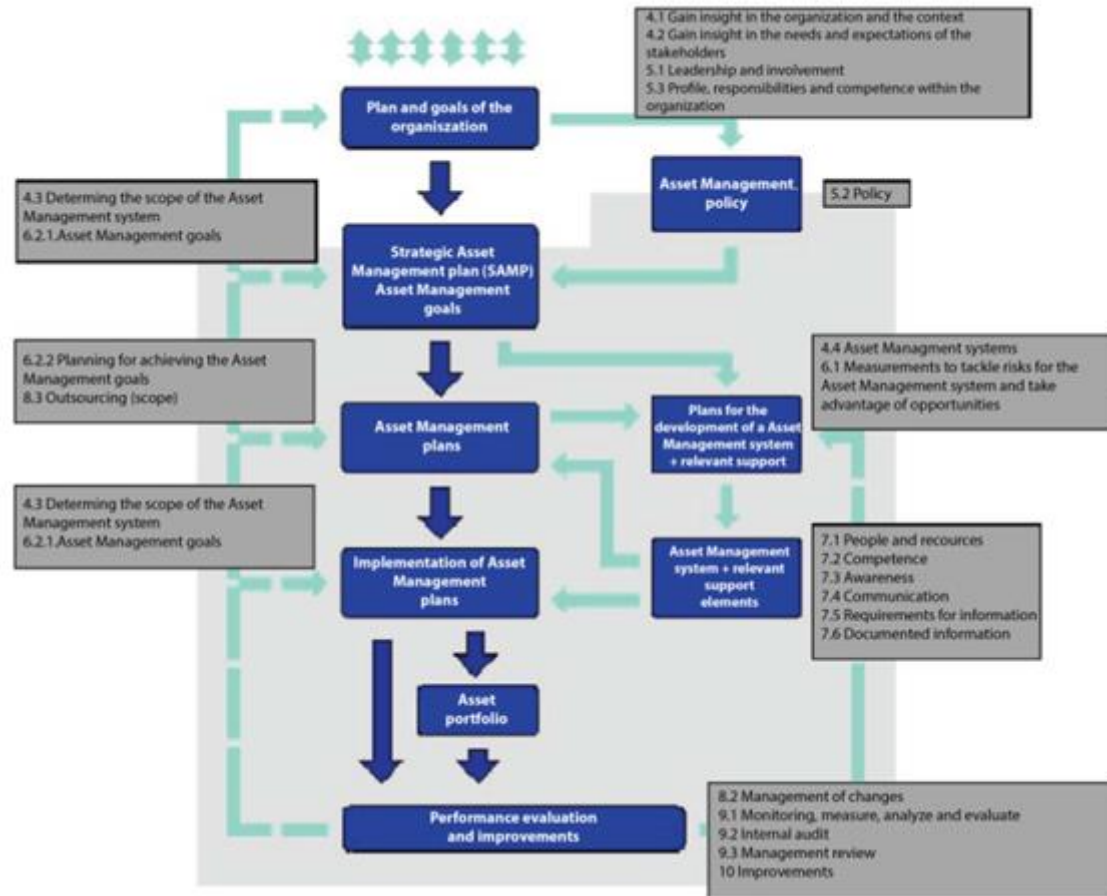
Value

\* Note: These standards do not describe the processes for Asset Management.





# Overview on Asset Management System and the interdependencies according to ISO 55000 Standard implementation

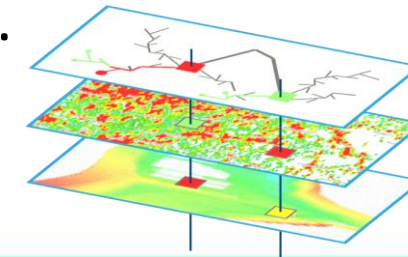


- Blue: Major „deliverables“ in the implementation
- Grey: Tasks to be executed in numerical order along the process and „to enable innovation in the loop“
- Note 1 from best practices: First important step is to define the Asset portfolio of the DSO and the classification of assets.



Grid Model, asset portfolio and clustering

- Note 2: An assessment of available data in the GIS and the existence of maintenance plans are as well a prerequisite.



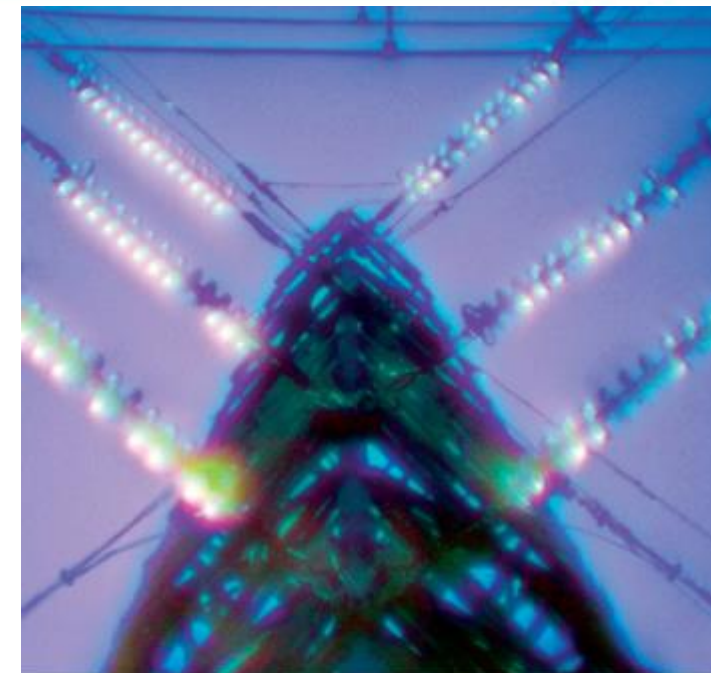
Source: CIRED 2017 (Glasgow), Paper 0667, own illustration



# Example: IEC Whitepaper & content

- Glossary
- Section 1 **Introduction**
- Section 2 **Current status**
- Section 3 **Asset management metrics**
- Section 4 **Risk analysis and prioritization**
- Section 5 **Asset owner decisions**
- Section 6 **Existing standards and guidelines**
- Section 7 **Conclusion and recommendations**
- Annexes
  - Annex A – **Monitoring and maintenance procedures and intervals**
  - Annex B – **Deterioration modes for electrical power network equipment**
  - Annex C – **Failures and failure rates for common electrical network assets**
  - Annex D – **Health index parameters for electrical network equipment assets**
- References

Source: IEC, 2019 ; Note the term digital asset management is not used



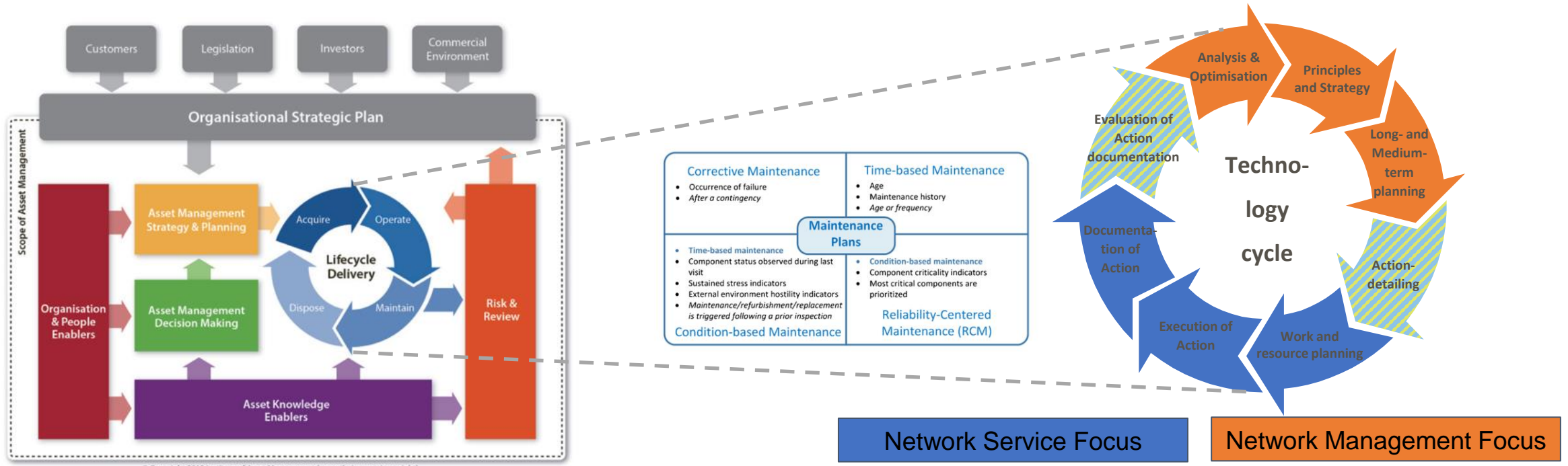
White Paper

Strategic asset management  
of power networks

# Example: The conceptual model of asset management – a possible DSO perspective

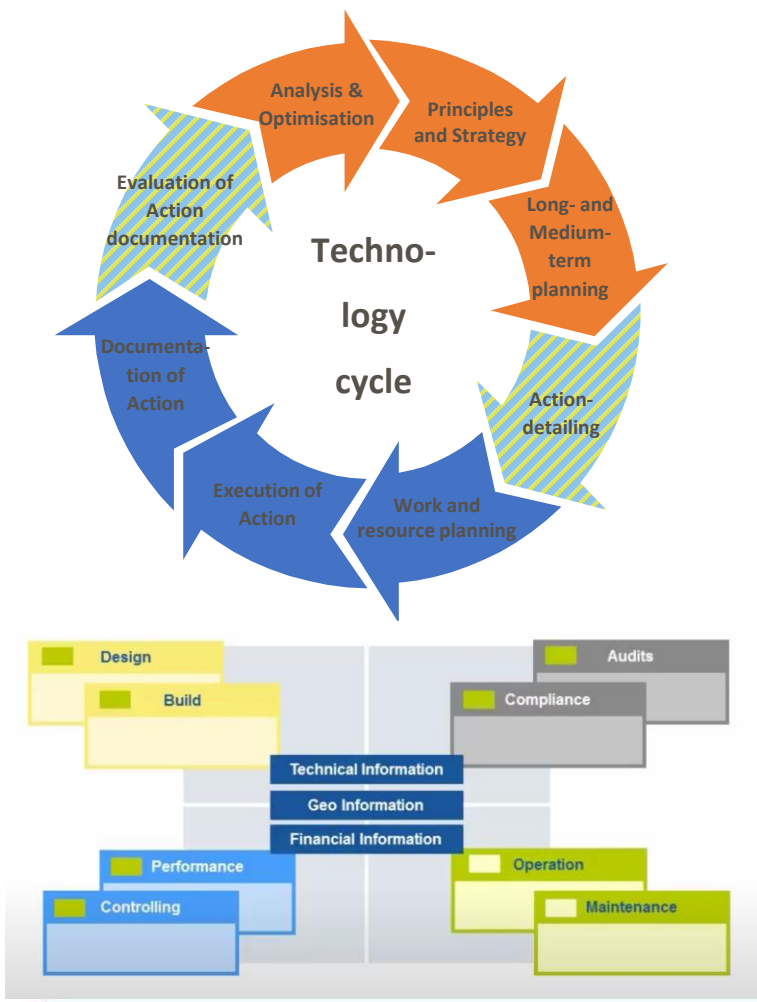
Asset management strategy and planning and asset management decision making are the core practices of asset management, utilizing input from the organizational strategic plan and asset knowledge systems

Example of Implementation of „Lifecycle Delivery“ at a DSO as „Technology Cycle“ in Asset Management \* - allows for innovation in the Loop!



Source: Own Illustration based on Presentation at IEC MSB workshop in Washington DC, Head of US Delegation to ISO PC/251 for ISO 55000; IEC Whitepaper „Strategic asset management of power networks“, 2019; A literature survey on asset management in electrical power [transmission and distribution] system, 2016; \*EWE NETZ 2020

# Example: Value and risk-oriented Asset Management – a possible DSO perspective



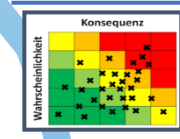
## Stakeholder



## Corporate Values

Werte	Beschreibung	Maßnahmen	Verantwortung
Integrität	...	...	...
Transparenz	...	...	...
...	...	...	...

## Risk Matrix



## Risks Classification







Nr.	Lebensdauer	Risikostufe
1	100 Jahre	1
2	50 Jahre	2
3	25 Jahre	3
4	10 Jahre	4
5	5 Jahre	5
6	2 Jahre	6
7	1 Jahr	7
8	6 Monate	8
9	3 Monate	9
10	1 Monat	10

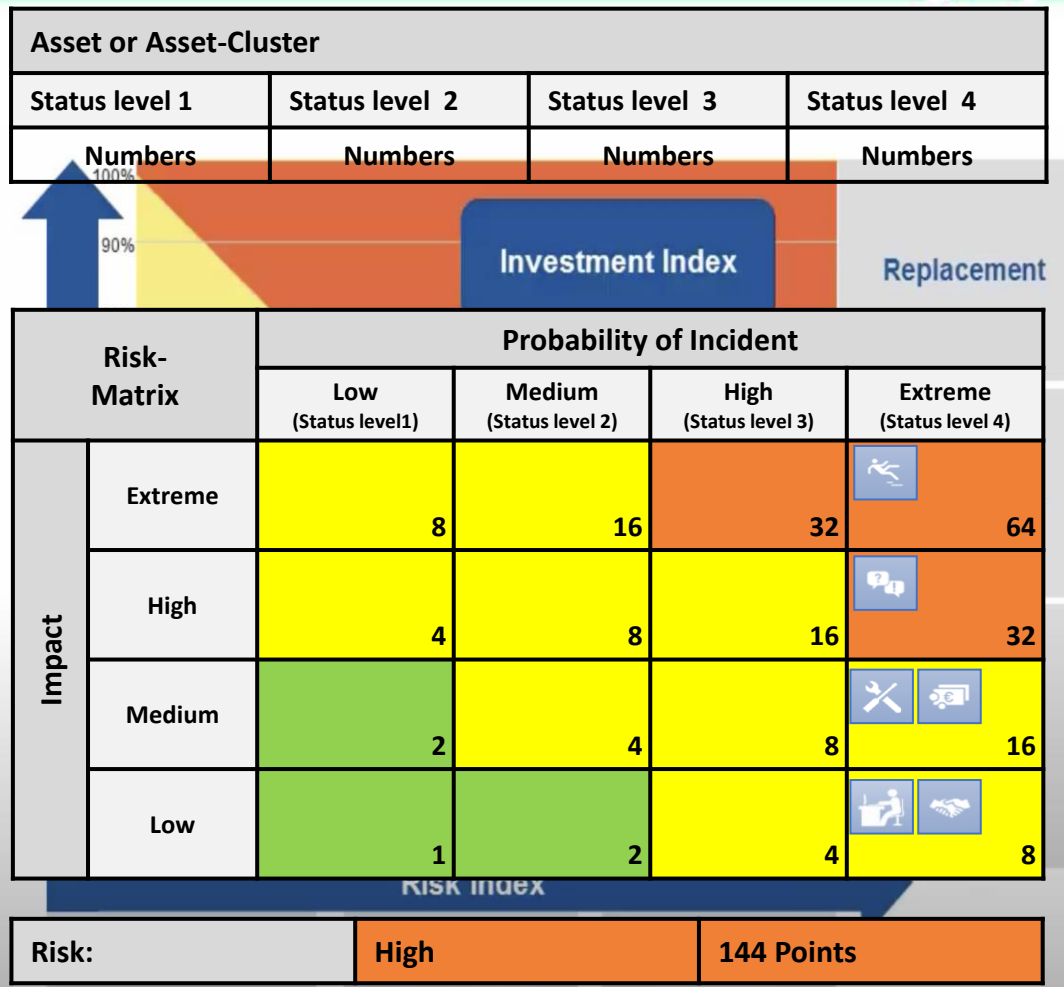


- Define Stakeholder demand
- Define Corporate values (inkl. stakeholder demand)
- Define Measures
- Risk-Matrix with evaluation criteria for each asset or asset cluster
- Define Health Index parameters and risk acceptance
- Failures and failure rates
- Determination of the assessment level
- Valuation
- Budgeting

# Example: Corporate values, measures and health index for electrical network equipment assets

## Possible Basic Corporate Values of a DSO

Value	Measure	Risk value
Image 	Reputation	Media coverage
Sustainability 	Environmental Protection	Emissions
Co-operation 	Partner satisfaction	Partner satisfaction
Personal Safety 	LTIF	Risk of injury
Reliability 	SAIDI	Reliability of supply
Economics 	Regulatory Return	Maintenance costs



\* Distribution asset/Distribution asset cluster; Location: Numbers in total



# Example: Simplified Intelligent Asset Information Dashboard utilising Smart GIS and provide financial, maintenance and task information

### Example Pipeline – Berlin

Object ID : 4711

#### Status Information

#### Asset Condition

#### Risk Information

Likelihood	Impact				
	Insignificant	Minor	Moderate	Major	Severe
Almost certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

#### Maintenance Information

#### Financial Information

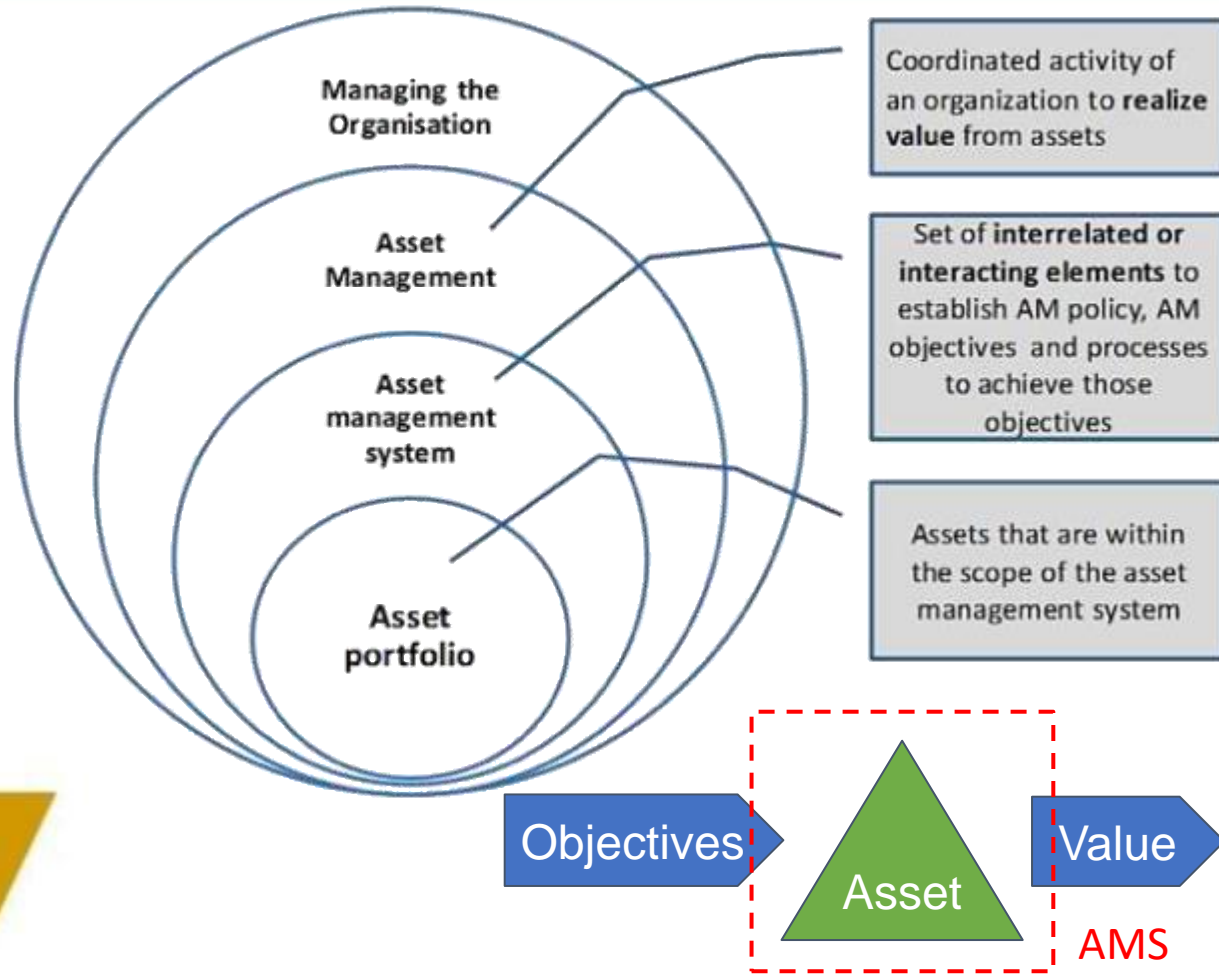
Investment	: \$ 1.150.000
Bookvalue	: \$ 250.000
Asset Life Time	: Month 48

#### Asset Tasks

# 234	Inspection	(30.06.2015)	
# 235	Maintain	(tbd)	
# 236	Dispose	(tbd)	

Source: BTC AG, 2016

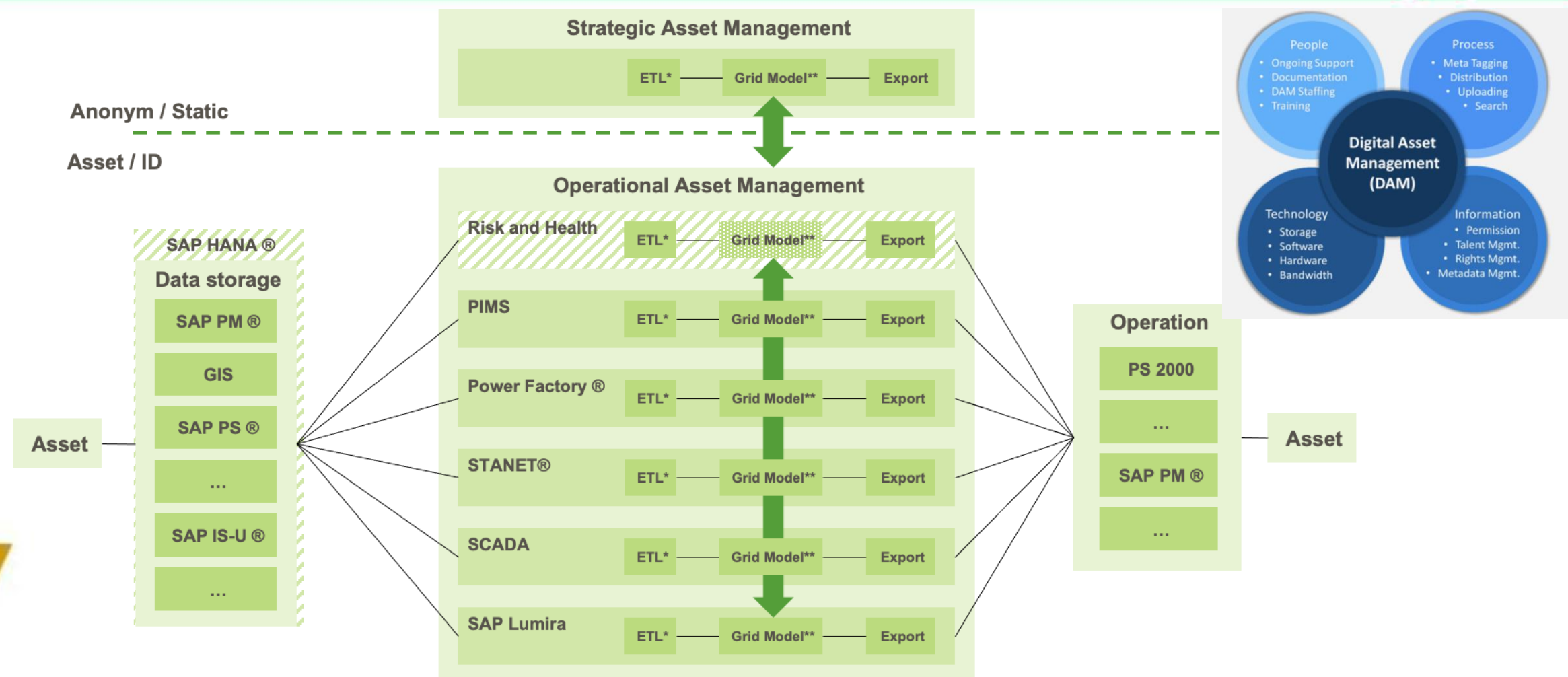
# Relationship of the „digital“ asset management system (AMS) to asset management



- ISO Definition of Management System is a set of interrelated or interacting elements of an organization to establish policies and objectives, and processes to achieve those objectives.
- A management system can address a single discipline or several disciplines.
- The system elements include the organization's structure, roles and responsibilities, planning, operation, etc.
- The scope of a management system may include the whole organization,
- The asset management system also includes the strategies and plans.

Source: ISO, own addition

# Example of a system architecture and main software components : Risk - Systems - Strategy – Going operational and towards DAM



Extract, Transform, Load (ETL); Project Information Management System (PIMS);



# Outlook: Based on the IEC TC 123 „Management of network assets in power systems“ the following next standardization steps were foreseen in 2021

- **Members of IEC TC 123:** Australia, Belgium, Canada, China, France, Germany, **India**, Italy, Japan, Korea, Republic of, Netherlands, Russian Federation, Spain, Sweden, Switzerland, United Kingdom
- **SCOPE:** Standardisation to deliver, in co-operation with other TC/SCs and international organizations, common methods and guidelines for coordinated lifetime management of network assets in power systems to support good asset management. In addition this may include the development of new methods and guidelines.\*
- **Liaisons:** ISO TC 251, CIGRE, IEC TC 8
- **Established WGs:** WG 1: Terminology; WG 2: Case studies of managing assets
- **Planned Projects:** Risk Evaluation and Risk mitigation, Common framework for management of all assets
- New IEC standards development is underway:
  - **IEC 63223 ED1 „Management of network assets in power systems – Terminology“ in 12/2021**
  - **IEC TS 63224 ED1 „Management of network assets in power systems - Practices and case studies“ in 11/2021**

Source: IEC TC 123; \* Excluded are: Generation assets & scopes of other IEC Technical Committees, such as TC 8, TC 56 and TC 57.







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# Thank you for your attention!

*For discussions/suggestions/queries email:*

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