



# Physical Asset Management: What is it all about and why?

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# Section 1

**What is physical asset management?**

# What is 'Asset' (ISO55000 Draft)

## ***Asset:***

**Something that has potential or actual value to an organization**

## ***Physical asset:***

**Physical item that has potential or actual value to an organization**

# Asset Management (ISO 55000 Draft)

## Asset Management

**coordinated activities of an organization to realize value from assets**

Note 1: Realization of value will normally involve a balancing of costs, risks, and performances

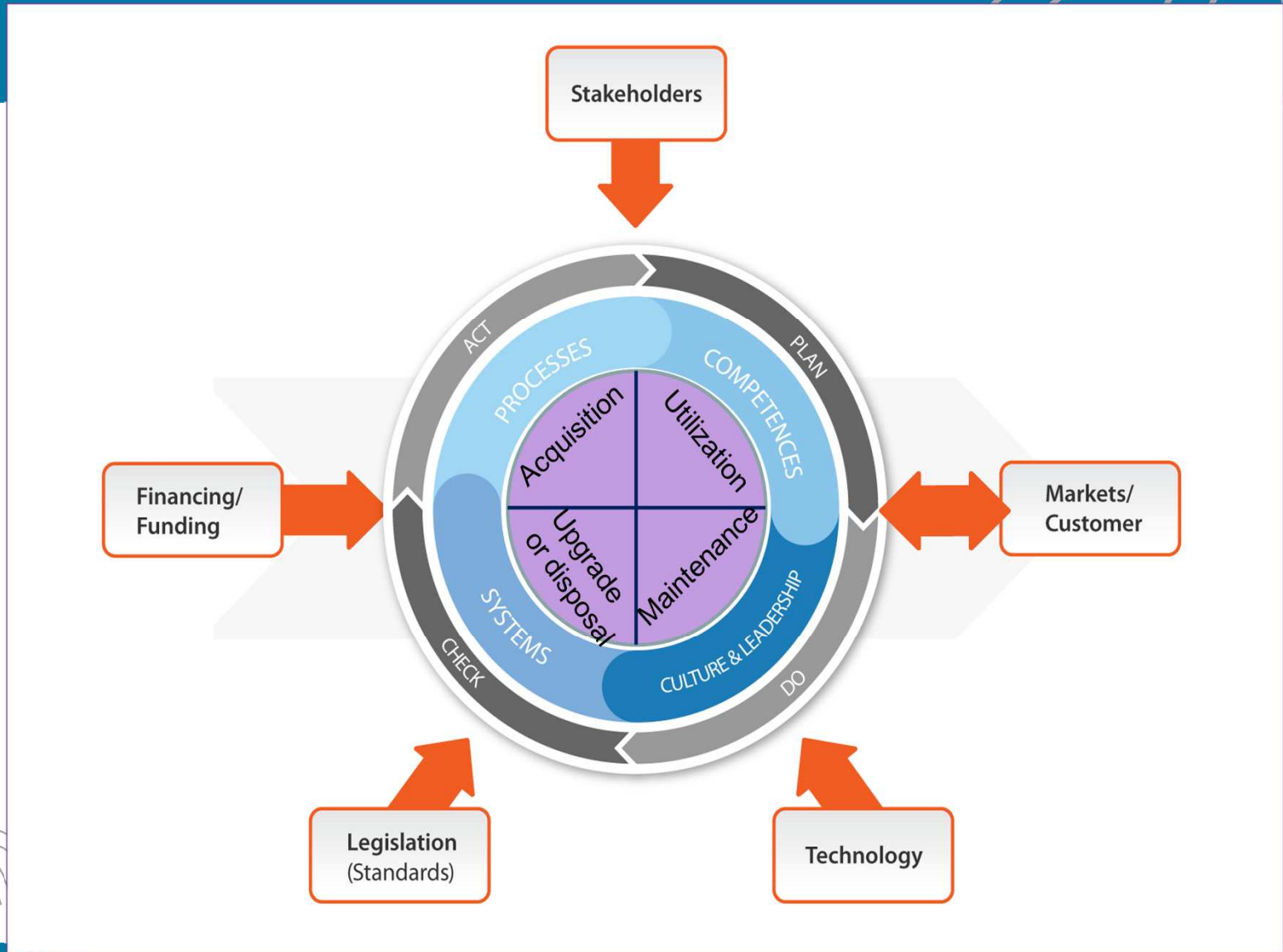
# Physical Asset Management

European Federation of National Maintenance Societies experts have preferred the following definition (EFNMS 2009):

**“Physical asset management is the optimal life cycle management of the physical assets to sustainably achieve the stated business objectives”.**



# Conceptual physical asset management model (EFNMS)



# Important questions of strategic physical asset management

- Are assets suitable for the effective delivery of the services they are intended to support?
- Is the capacity of existing assets sufficient to provide the required services?
- Are existing assets appropriately located for effective service delivery?
- Can service delivery be made less asset-dependent?
- Are existing assets fully used in service delivery?

NSW Government Asset Management Committee. Total Asset Management Manual.  
<http://www.gamc.nsw.gov.au/tam/> (visited October 11, 2006)

# Physical asset management system

Some key areas of physical asset management:

- Organizational context
- Asset hierarchy
- Life cycle management
- Portfolio management
- Critical success factor management
- Capacity management
- Asset management processes
- Management system for physical assets
- Performance evaluation
- Uncertainty management



# Some management systems of physical assets

With modifications Komonen et al. 2012. Corporate Asset Management.. .

In Asset Management ed by van der Lei et al. Springer.

	Portfolio management	Success factor management	Capacity management	Life cycle management	Maintenance management
	<b>Continuity and risk management</b>				
<b>Corporate</b>	Greenfield expansion, mergers, disposals, outsourcing	Decisions on flexibility, efficiency and other capability development	Greenfield expansion, allocation, outsourcing, efficiency improvement	Definition of lifecycle for various products and plants	Coordination, general policies, supporting ERP, benchmarking
<b>Plant</b>	Minor role	Policies, strategies and requirements for capability development	Expansion, efficiency development and outsourcing	Sub-process life cycle planning, replacements and improvements	Objectives, strategies, programmes, outsourcing, resources, competences, CMMS, culture
<b>Sub-process</b>	Minor or no role	Planning and design of processes to match with requirements	Improvements, efficiency development	Equipment life cycle planning, replacements and improvements	Objectives, strategies and programmes
<b>Equipment</b>	No role	Minor or no role	Minor role	Techno-economic cycle optimization	Maintenance programmes

# Section 2

## Why do we need asset management?



# Physical asset management, Something new?

- Asset management is not a new issue that has suddenly come out of nowhere.
- In some sense asset management activities have been used ever since we started utilizing capital assets.
- People have thus been engaged in asset management activities for hundreds or even thousands of years.
- However, there has been changes in our living and business environment which mean that asset management is now more important than ever before.

# Background of importance

**There are many reasons why asset management has become a more essential part of management activities and management science, e.g.:**

- aging of asset systems
- integration of asset systems
- increased quality requirements for infrastructure
- increased requirements from the safety and environmental point of view
- growing risks
- growing turbulence in the market
- globalization and increasing competition
- pressure for higher profitability and return on assets
- incentive systems of top management
- rigid accounting principles

# To manage investments and capacity in the more qualified way

**There are many reasons for losses during the life cycle of production equipment, which demand for the more effective asset management e.g.:**

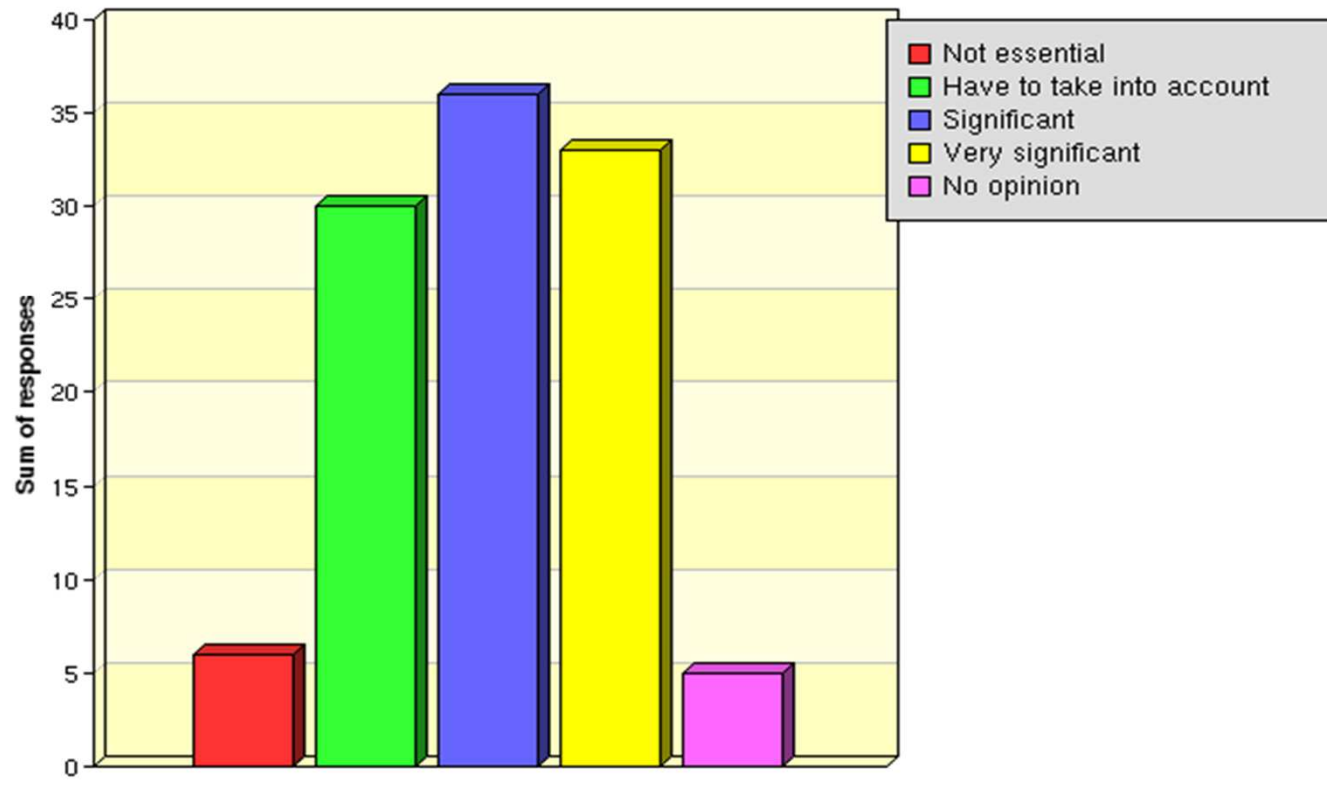
- economic lifetime is not in balance with technical lifetime
- all processes are not functioning at the same operating rate
- during process and product transitions production capacity of large asset concentration is lost
- demand does not match with capacity
- during installation and commencing of investments production losses may be huge
- low OEE (low availability, low speed and low quality rate) causes production losses
- due to low flexibility of assets equipment is used in an ineffective way (product mix and insufficient adaptation to demand fluctuations)
- construction of equipment is not up to date

# EFNMS asset management survey 2011

## Future business drivers: Long term return on assets

### 47. Long term return on assets

Absolute distribution of the responses

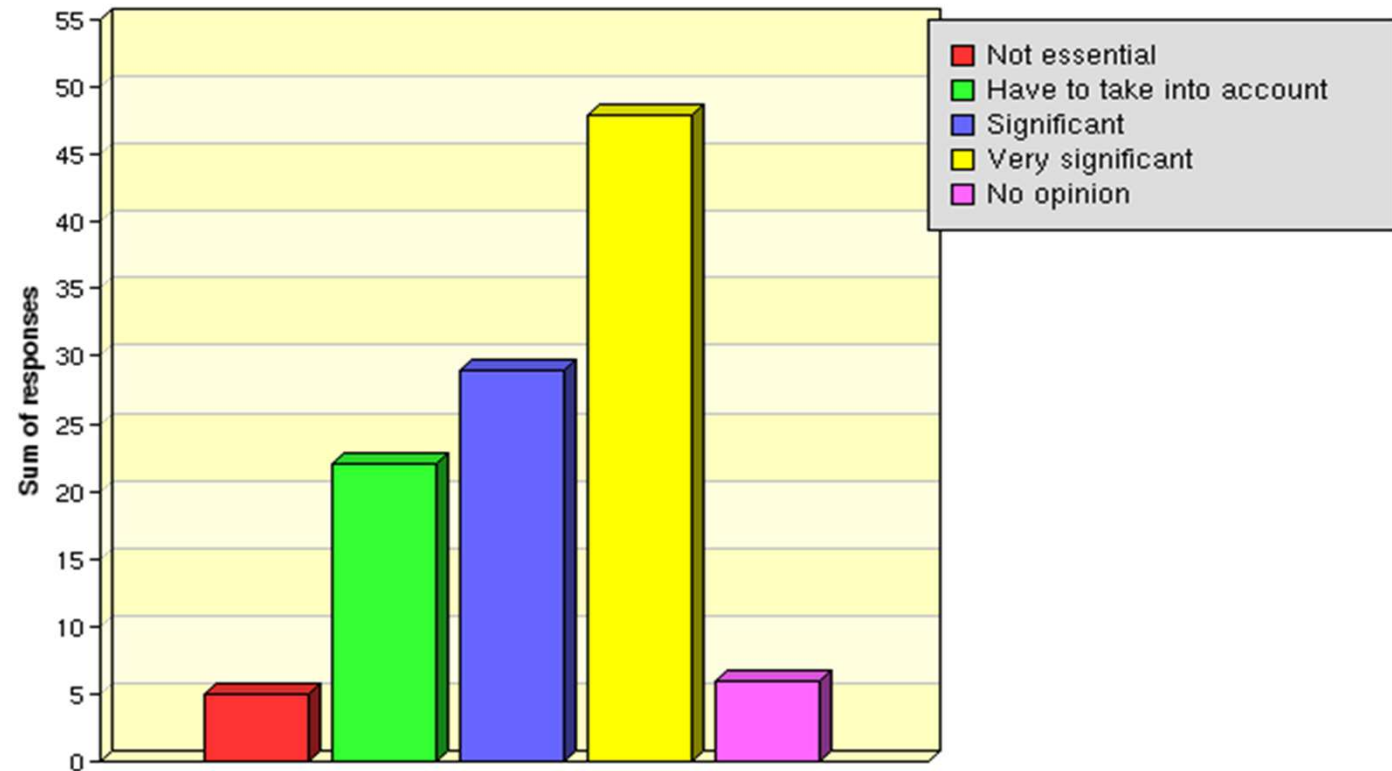


# EFNMS asset management survey 2011

## Future business drivers: OEE

49. OEE (Overall equipment effectiveness): availability + performance rate + quality rate

Absolute distribution of the responses

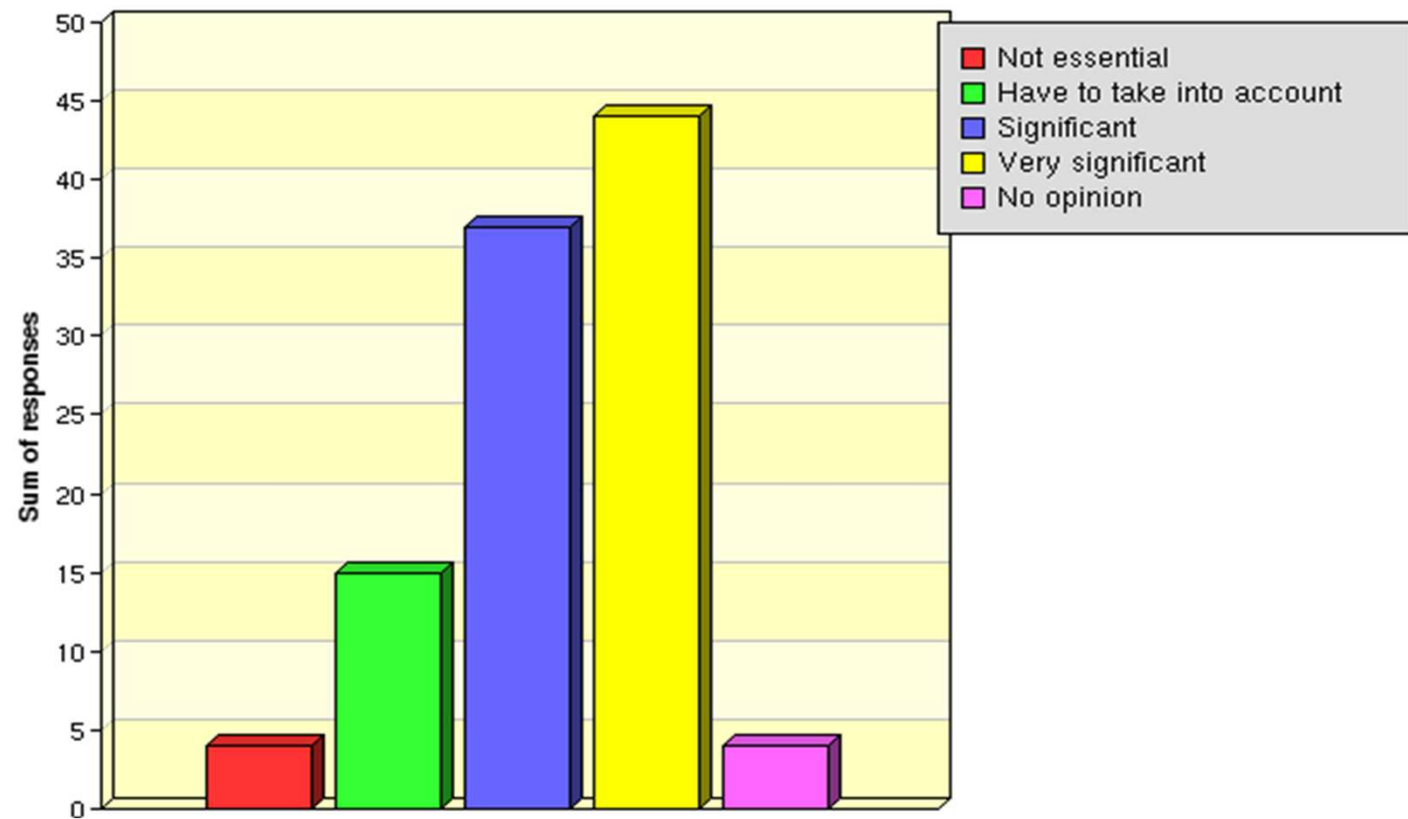


# EFNMS asset management survey 2011

## Future business drivers: Reliability of deliveries

### 50. Reliability of deliveries

Absolute distribution of the responses



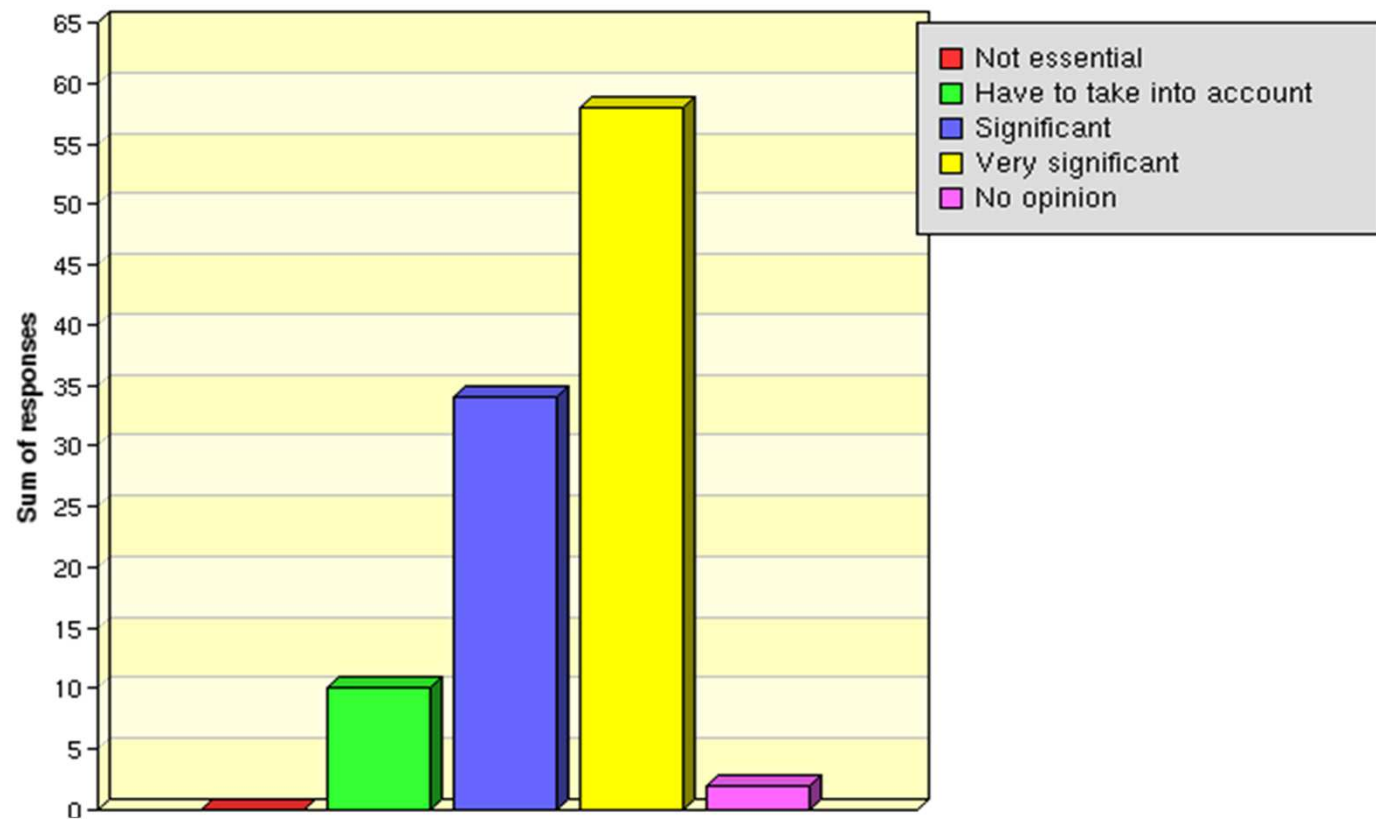


# EFNMS asset management survey 2011

## Future business drivers: Dependability, safety and environment

### 53. Dependability (availability), safety and environment

Absolute distribution of the responses



# Section 3

## What is in the air?

# What happens in the area of physical asset management

- EFNMS asset management committee
- Networks of national maintenance societies: ESREDA, EFNMS Asset Management Committee, Global Forum (GFMAM)
- Research networks: e.g. EURENSEAM and ISEAM
- Standardization: ISO 55000 – ISO 55002, CEN TC319 Maintenance Within asset management
- Magazines and Journals: IJSEAM, ISEAM Journal, Maintworld
- Conferences
- Research projects

# EAMC objectives

## EFNMS Asset Management Committee EAMC

### Objective

- Promote asset management and contribution maintenance makes to it
- Encourage national societies to actively participate in the development of asset management
- Developing guidelines for members of national maintenance societies to follow good practices in asset management
- Encourage national societies to define competencies and training programs for asset management.

# GFMAM Global Forum on Maintenance & Asset management

Member organizations are maintenance and asset management societies

- Europe
- Canada
- USA
- Latin America
- Brazil
- Australia
- South Africa
- Gulf Region

# Academic research networks

e.g.

## EURENSEAM (European Research Network on Strategic Engineering Asset Management)

- Members from 15 universities or research centres from 10 countries
- Workshops, sessions in conferences, a journal, has published a book (Asset Management: the state of the art in Europe....., Springer 2012)
- Joint research projects

## ISEAM: International Society for Engineering Asset Management

- Global Society
- Arranges WCEAM (World congress on engineering asset management)



# Other networks

## ESREDA (The European Safety, Reliability and Data Association)

- Seminars
- Projects (asset management project team, asset management survey)
- Publications
- Members from industry, academia, consultant companies



# Standardization

## Standardization: ISO 55000 – ISO 55002

- Global standard, ready commenting 2013?
- Management system standard which follows general ISO principles
- ISO 55000: Overview, principles and terminology
- ISO 55001: Management systems — Requirements
- ISO 55002: Asset management — Management systems — Guidelines for the application of ISO 55001

## CEN TC319 Maintenance Within Physical Asset Management

- European standard, ready for commenting 2013
- Focus on relation between maintenance and physical asset management
- More focus on manufacturing industries than on infrastructure
- More focus on physical asset management processes
- Liaison with ISO 55000 series



# What is asset management system

- An asset management system is a set of interrelated or interacting elements of an organization, that establish asset management policies and objectives, and the processes needed to achieve those objectives (ISO 55000 draft).
- An asset management system is not simply an information system; it also includes the organization structure, roles, responsibilities, business processes, plans, operation, etc (ISO 55000 draft).
- This can cause some confusion, since many vendors of information systems that support asset management also refer to their products as “asset management systems” (ISO 55000 draft).

# ISO 5500 Requirements

## General ISO structure for all management system standards

1. Organizational context
2. Leadership
3. Planning
4. Support
5. Operation
6. Performance evaluation
7. Improvement

# ISO Asset management system: content

## Context of the organization

- Understanding the organization and its context
- Understanding the needs and expectations of stakeholders
- Determining the scope of the asset management system

## Leadership

- Leadership and commitment
- Policy
- Organizational roles, responsibilities and authorities

## Planning

- Actions to address risks and opportunities for the asset management system
- Asset management objectives and planning to achieve them
- Asset management objectives
- Planning for asset management

## Support

- Resources
- Competence
- Awareness
- Communication
- Information requirements
- Documented information

## Operation

- Operational planning and control
- Management of change
- Outsourcing of asset management activities

## Performance evaluation

- Monitoring, measurement, analysis and evaluation
- Internal audit
- Management review

## Improvement

- Nonconformity and corrective action
- Preventive actions
- Continual improvement



# CEN Maintenance within asset management

## Overview of physical asset management

### Physical asset management system (management system for physical asset)

- Interaction between organizational context, physical asset management and maintenance mgt
- The influence of organizational context at the different levels of physical assets

### Physical asset management processes

- Physical asset management processes and life cycle stages
- Life-cycle management, asset management and maintenance management processes
- Interrelationship between maintenance and other processes at asset and asset system level

### Performance monitoring

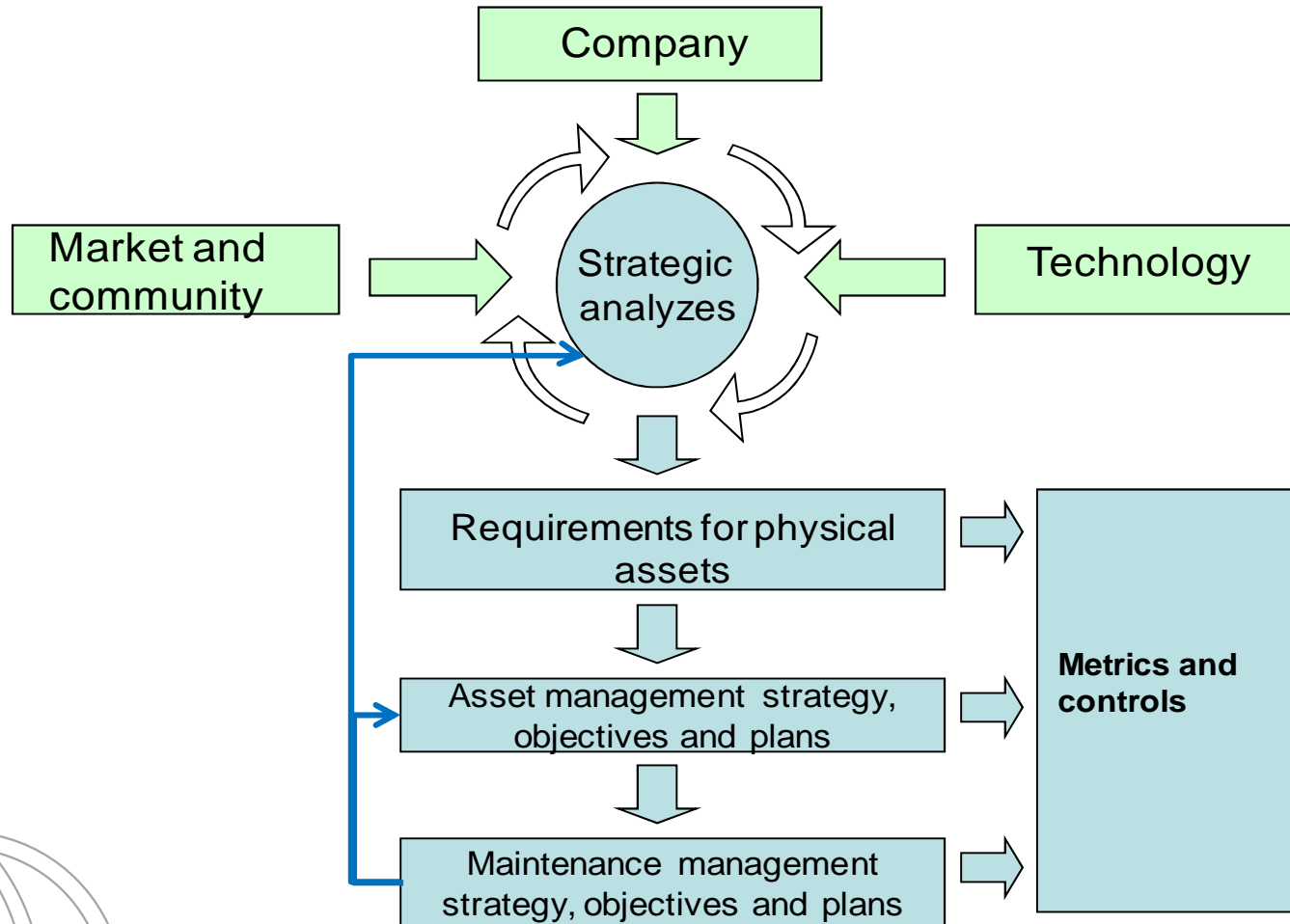
- General asset management system requirements and Specific requirements

### Information management

### Organization and people enablers: organizational competences

- Structure and procedures
- Competences

# Organizational context and Strategic asset management process

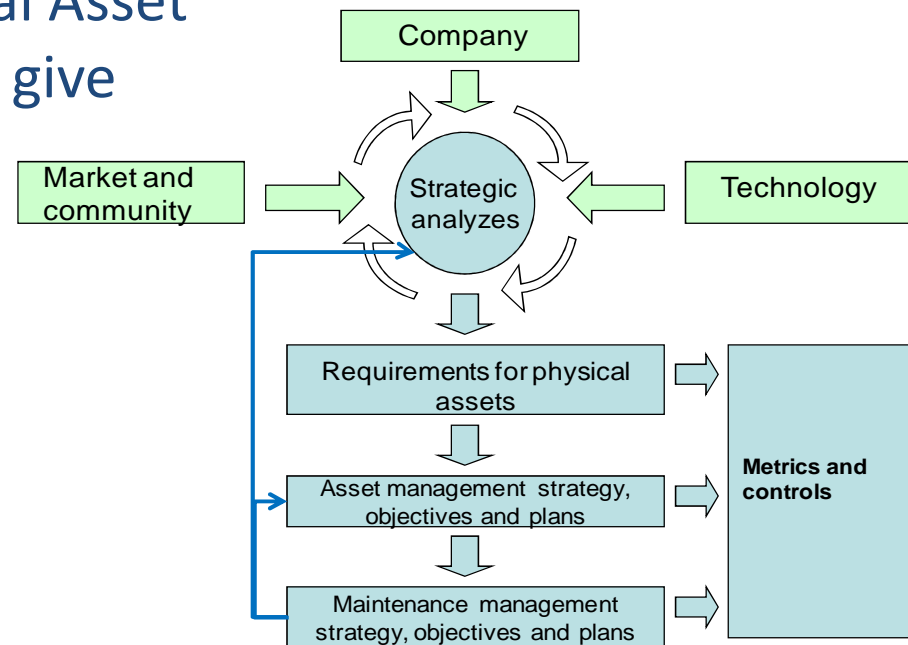


# Asset management processes and maintenance function

No.	Task or process of the asset system	The role and tasks of the maintenance function
1	Organisation's business strategy and physical asset strategy (this is partly portfolio level issue, but belongs also to asset system level)	Informative and consultative role in determining the impact of various asset solutions on the performance of the assets, maintenance costs, safety and environmental risks. The role of maintenance should be more active at the asset system level.
2		
3		
4	Key success factors for the asset system. Requirements and constrains for the asset system	Consultative role in defining key success factors for the asset system and in identification of maintenance oriented requirements. For example, the choice between cost differentiation and specialisation influences maintenance policies and activities.
5	Concept exploration, specification of the asset system and obsolescence planning and management	Consultative role in exploration and specification of asset systems e.g. in the form of reliability, availability, failure rate, maintainability, lifecycle costs, investment costs, in order to take into account trade-offs between various options and various requirements
6		
7	Design of the asset system	Active participation
8		
9		

# Performance evaluation and competences

- Performance evaluation is not well established.
- Challenge exists e.g. with economic performance indicators.
- A new version of the standard EN 15341 and
- ‘Maintenance within Physical Asset Management’ standard will give some guidance for development
- Competence development which is in line with the described models is also poorly organized



# Section 4

## Some important dimensions



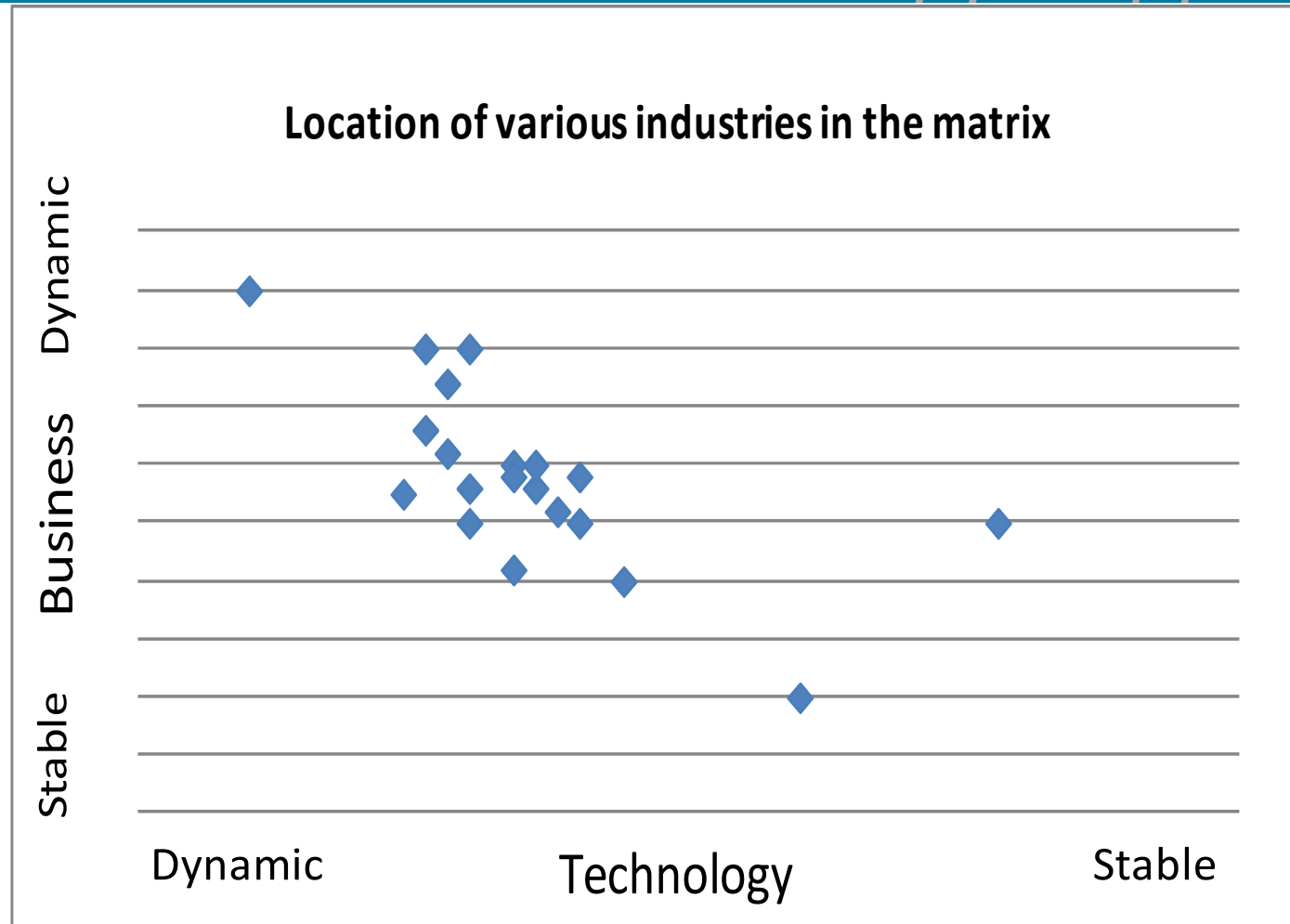
# Organisational context

<b>Market</b>	<b>Dynamic</b>	<p><b>Specific features e.g.</b></p> <ul style="list-style-type: none"> <li>•Determine economic life time</li> <li>•Short economic life-time</li> <li>•LCP-approach required</li> <li>•Increase flexibility</li> <li>•New asset concepts</li> </ul>	<p><b>Specific features e.g.</b></p> <ul style="list-style-type: none"> <li>•Determine economic and technical life time</li> <li>•Short economic life-time</li> <li>•Short pay-back time required</li> <li>•LCP-approach required</li> <li>•Manage dynamics</li> <li>•New asset concepts</li> </ul>
	<b>Stable</b>	<p><b>Specific features e.g.</b></p> <ul style="list-style-type: none"> <li>•Long economic life-time</li> <li>•Long pay-back time</li> <li>•Increase life time</li> <li>•LCC-approach</li> <li>•Continuous improvements</li> </ul>	<p><b>Specific features e.g.</b></p> <ul style="list-style-type: none"> <li>•Short technical life-time</li> <li>•Determine technical life time</li> <li>•LCC-approach</li> <li>•New asset concepts</li> <li>•Improve technical performance</li> </ul>
		<p><b>Stable</b> Long life cycle</p>	<p><b>Dynamic</b> Short life cycle</p>
		<b>Technology</b>	

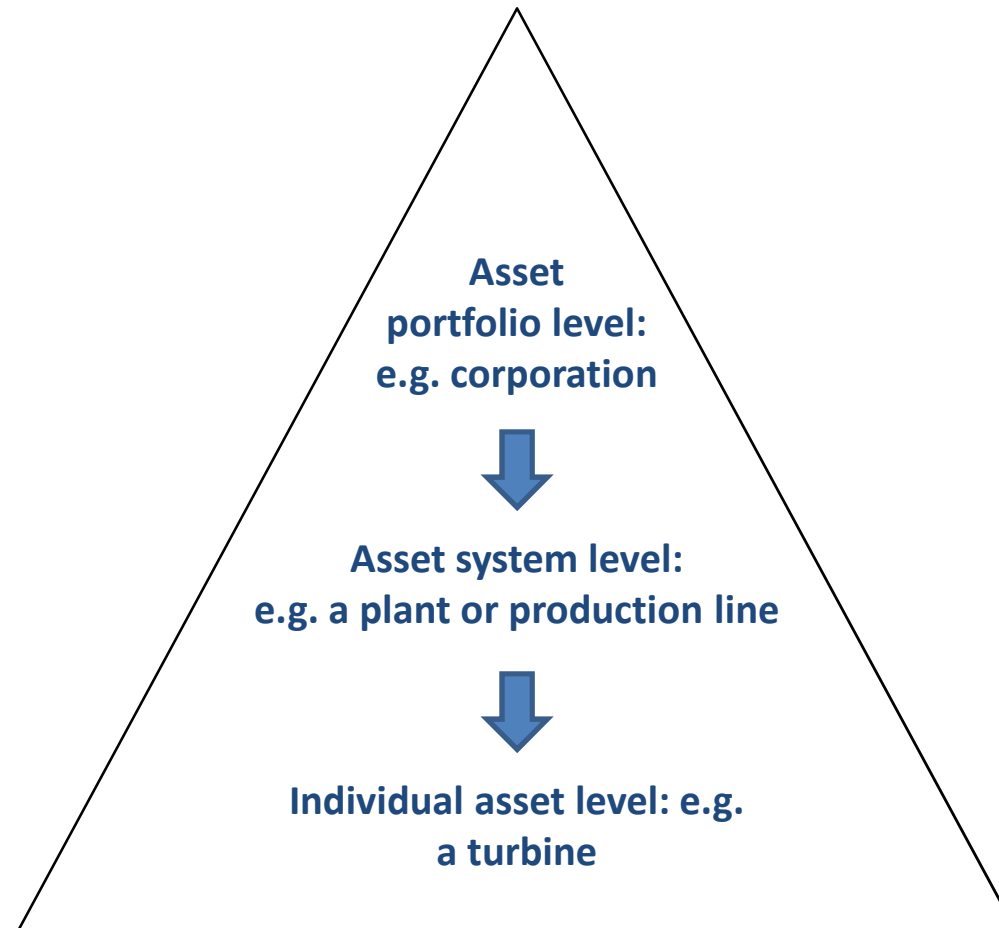
# Comparison of stable and dynamic business and technological environments: Matrix presentation

Dynamic		<p>8 Top management has financial responsibility for AM of existing equipment</p> <p>10-12 Maintenance function has a stonger role in the investment process</p> <p>14 Investment decisions are based more often on life-cycle costs or profits</p> <p>15 OEE is applied at the deeper level of technical hierarchy</p> <p>23 Working culture with asset management in more proactive</p>
Market	<p>21 Events are more complitely registered in CMMS</p> <p>34 Planning, allocation and management of resources is better organised</p> <p>35 Respond to front line systems failures and incidents is better organised</p> <p>45 Measuring, development and monitoring the organisation's asset management performance is better taken care of</p> <p>46 46. Developing and maintaining an adequate supply of suitably competent, motivated people is better organised</p>	
Stable		
Stable, long useful life		Dynamic, short useful life
		<b>Technology</b>

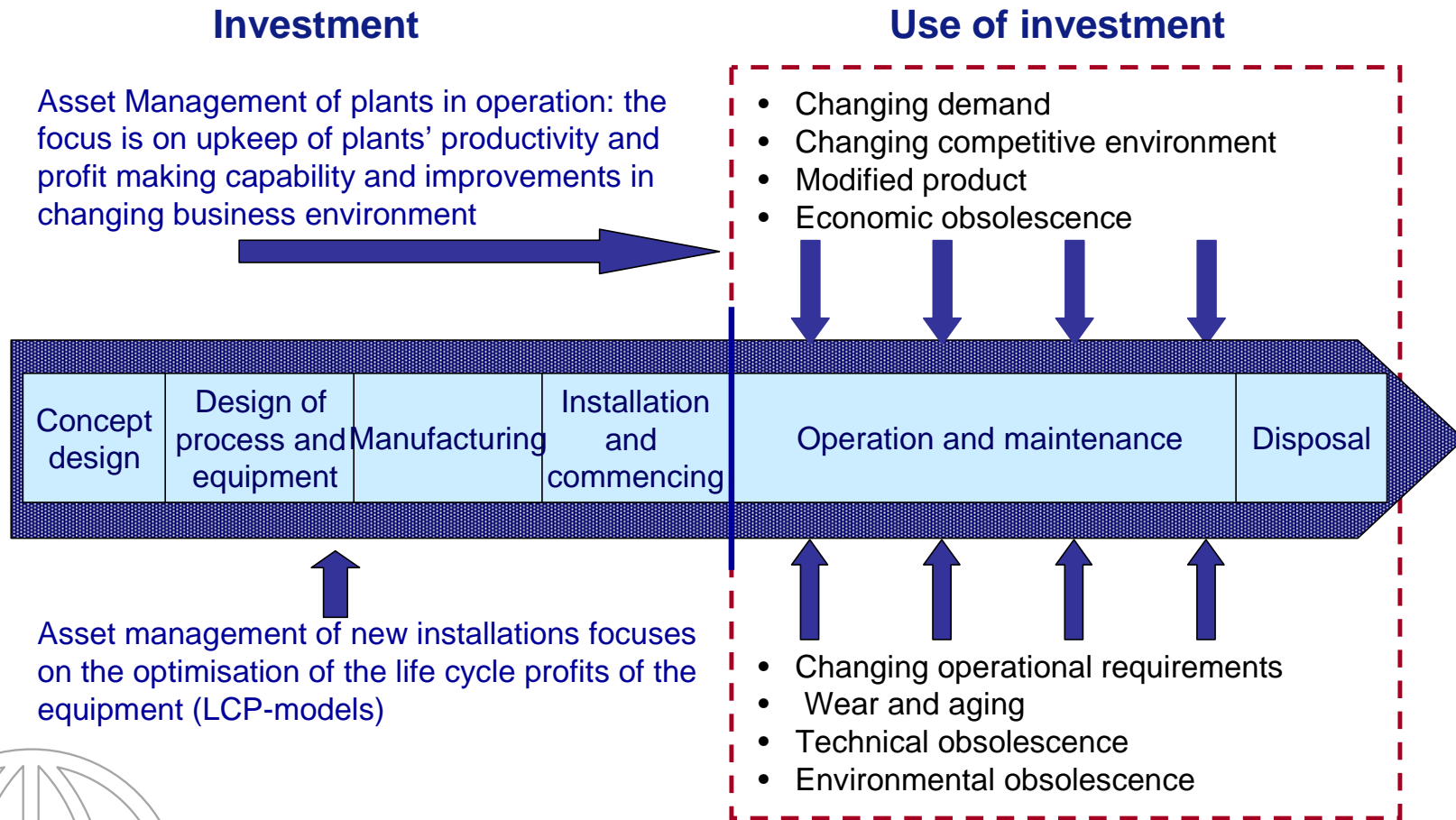
# A map of industries in the stable-dynamic matrix



# Asset hierarchy (ISO and CEN)



# Life-cycle perspective: a framework for physical asset management

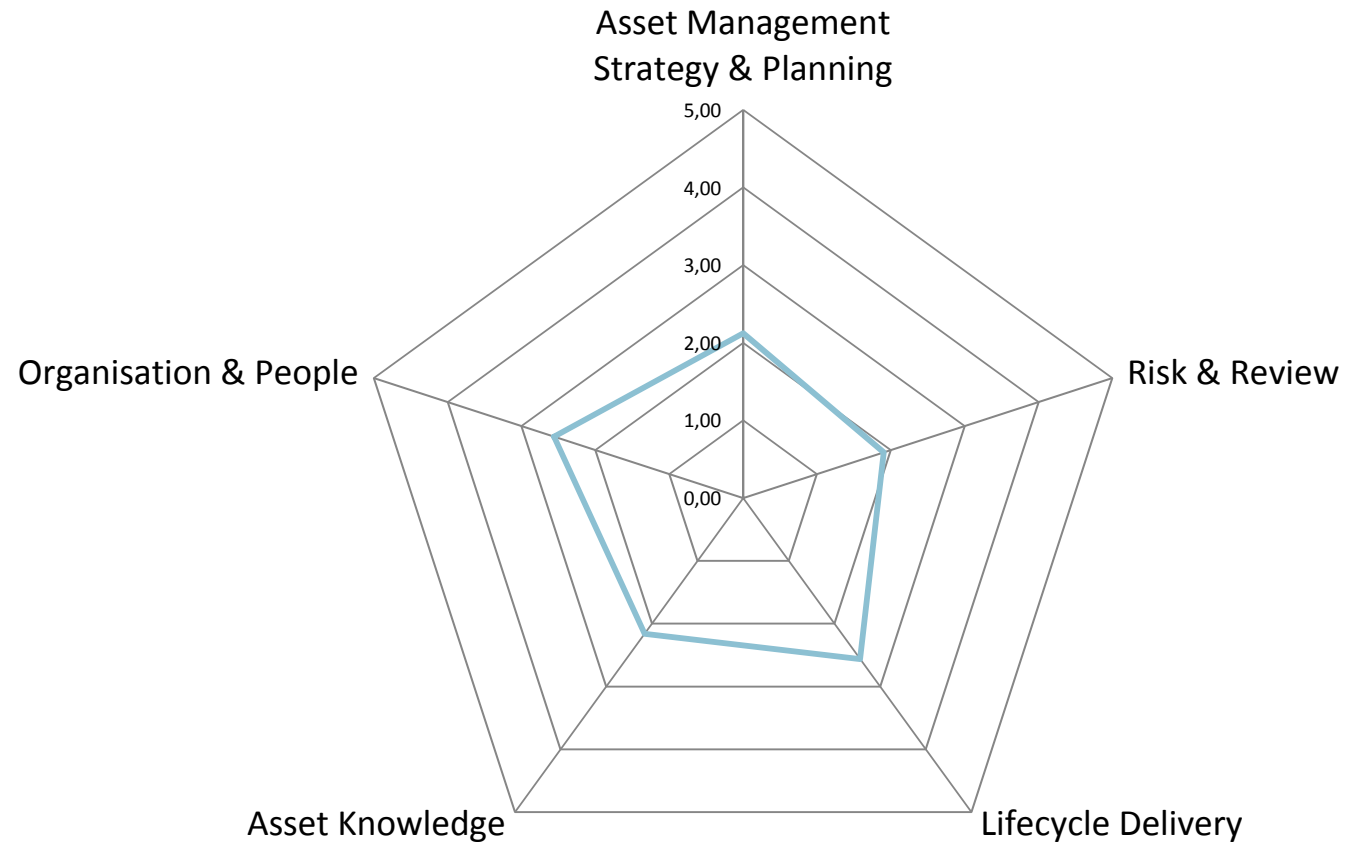


# Section 6

## EFNMS Asset Management Survey Examples of the results



# Maturity of asset management system according to PAS55 categories



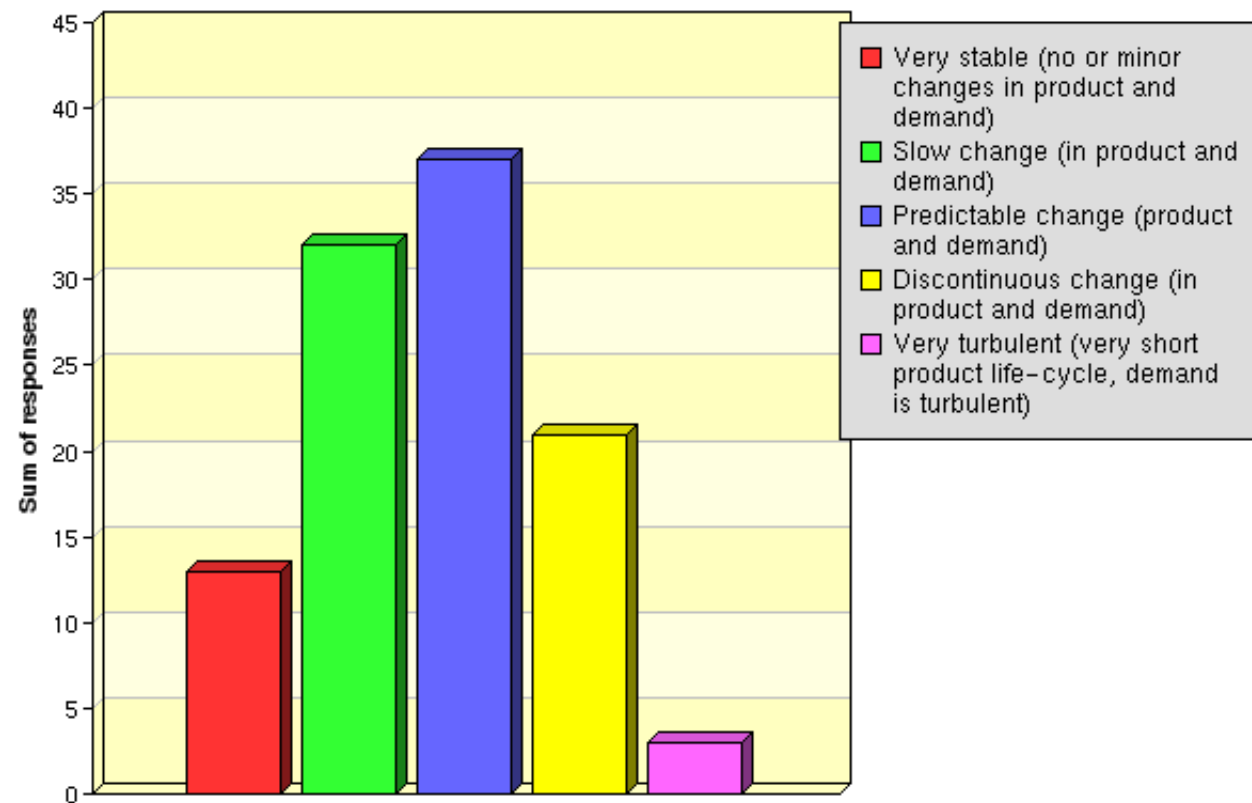
# Summary of the results

1. Companies should focus on developing the area of 'Risk & Review' as a priority as it appears this area is the least understood throughout industry.
2. 'Asset Knowledge' emerges as the 2nd key issue that is insufficiently addressed. Since asset owner organisations tend to outsource more than before, there is a danger to lose 'Asset Knowledge' and how the assets are managed in general.
3. The third important focus area would be improvement of 'Asset Management Strategy and Planning', because that lays the sound basis for successful physical asset management and because an improper strategy formulation and planning may lead to huge economic, safety or environmental losses.



# Dynamics of business environment

**Absolute distribution of the responses**

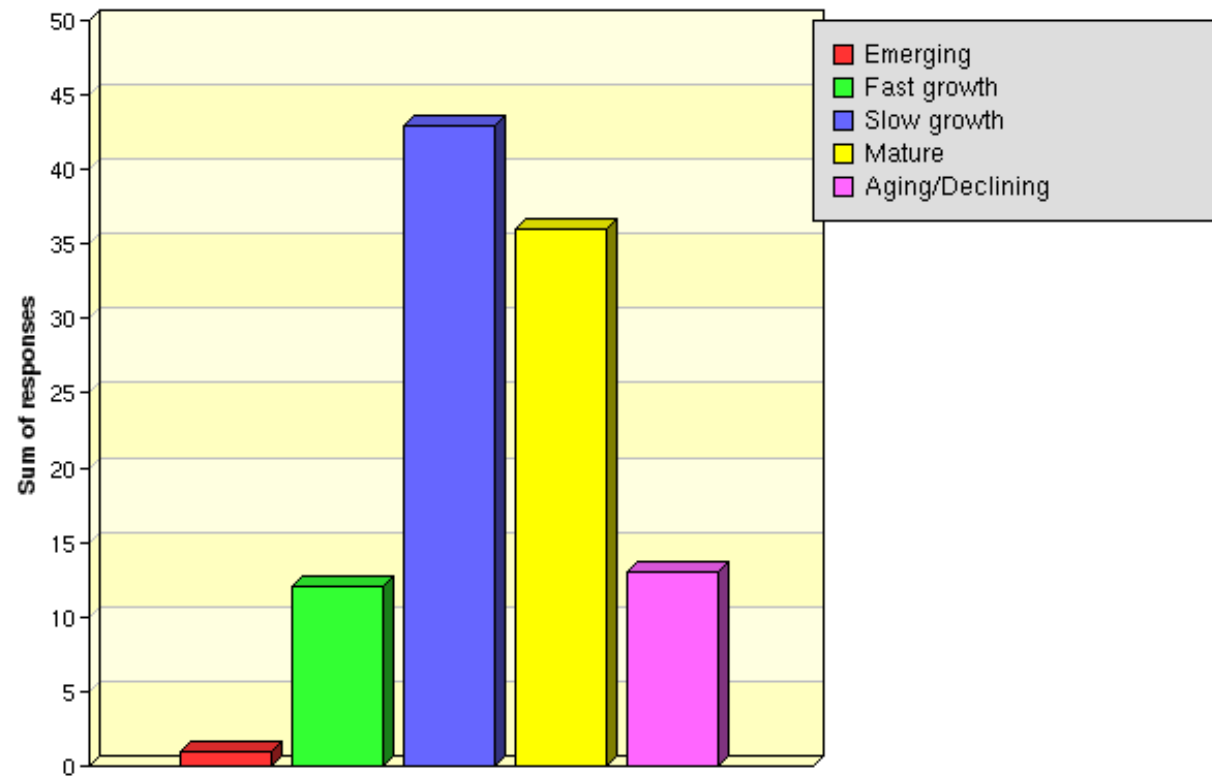


# Life-cycle stage of the industry

## 2. The life-cycle phase of the industry

### 2. Choose:

#### Absolute distribution of the responses

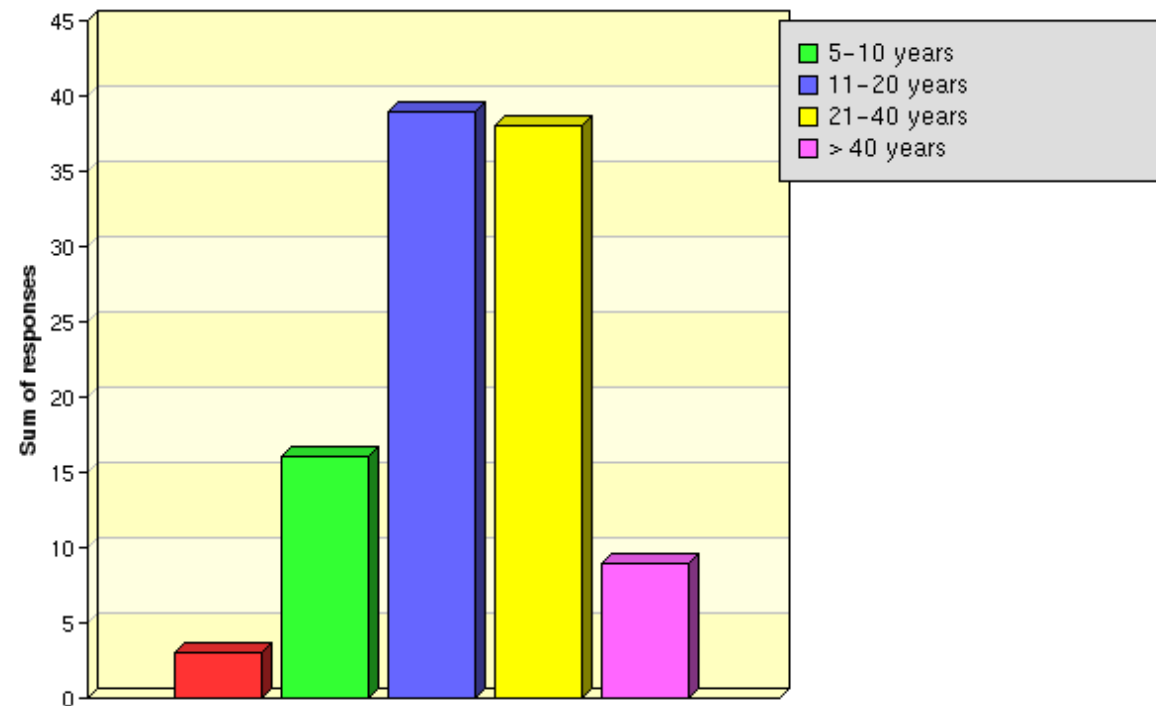


# The typical economic useful life of the equipment

6. The typical economic age of our production equipment (may differ from technical age)

6. Choose:

Absolute distribution of the responses

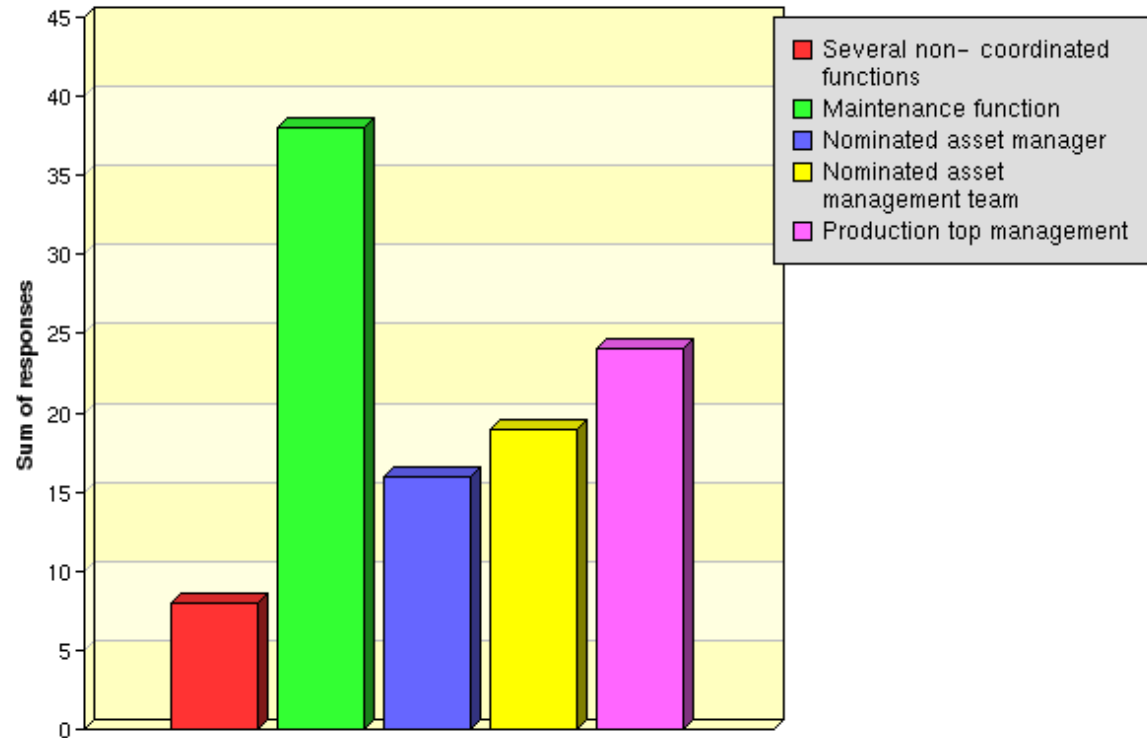


# Asset management responsibilities in organisations

## 8. Financial responsibility for asset management of our existing equipment

8. Choose:

Absolute distribution of the responses

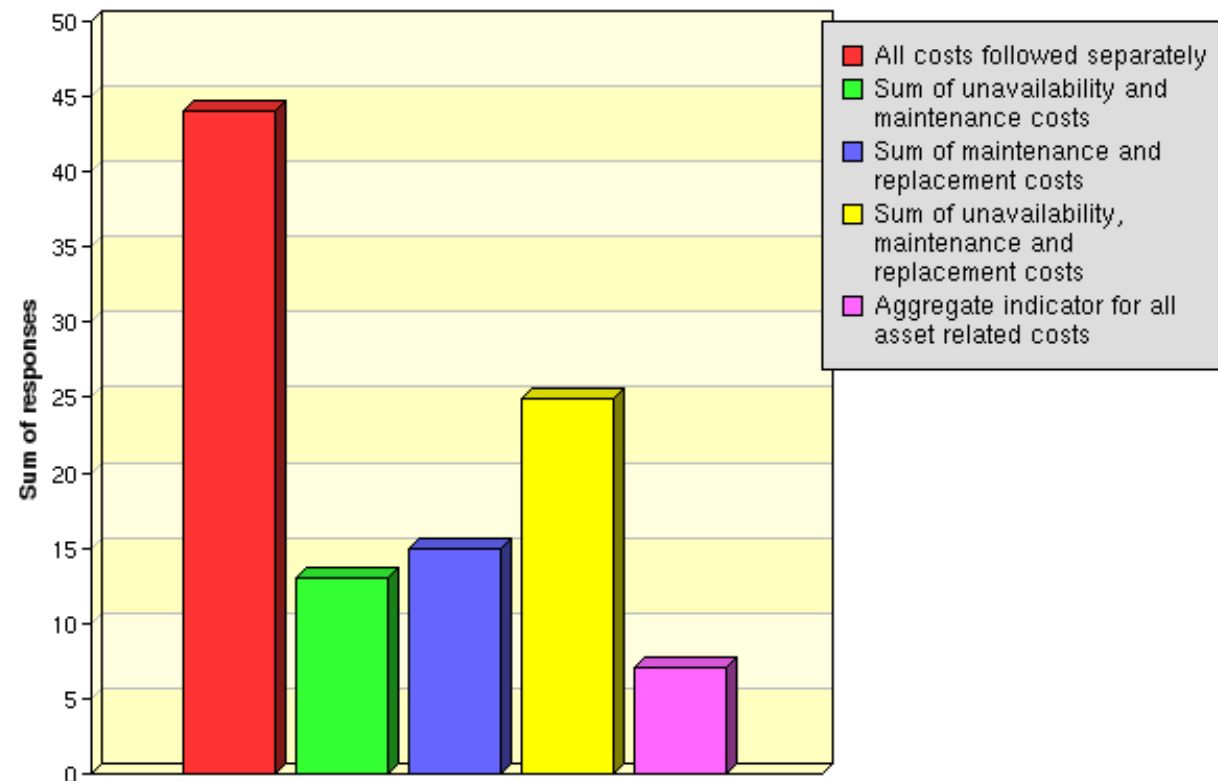


# Utilisation of aggregate key performance indicators

## 13. Use of aggregate key performance indicators for asset management

13. Choose:

### Absolute distribution of the responses

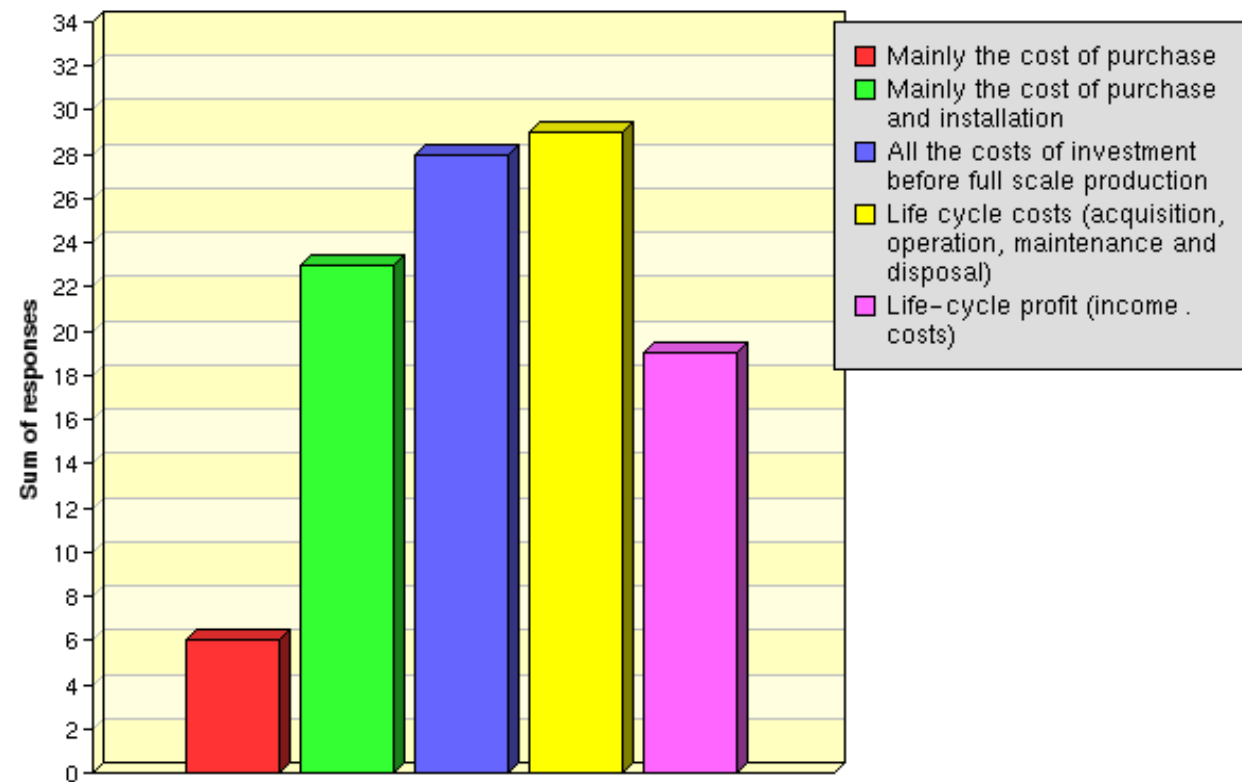


# Criteria for investment decisions

## 14. Criteria for investment decisions

### 14. Choose:

#### Absolute distribution of the responses

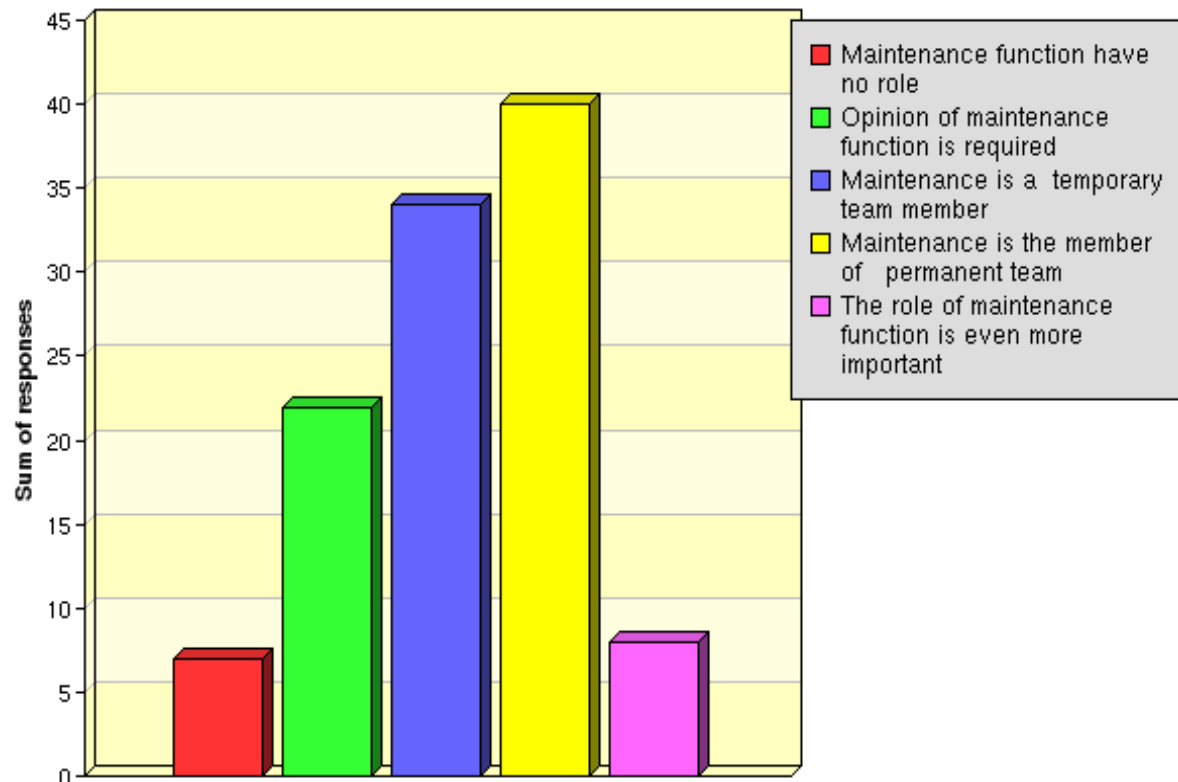


# The role of the maintenance function in the design phase

## 11. Participation in design phase of investments

### 11. Choose:

#### Absolute distribution of the responses

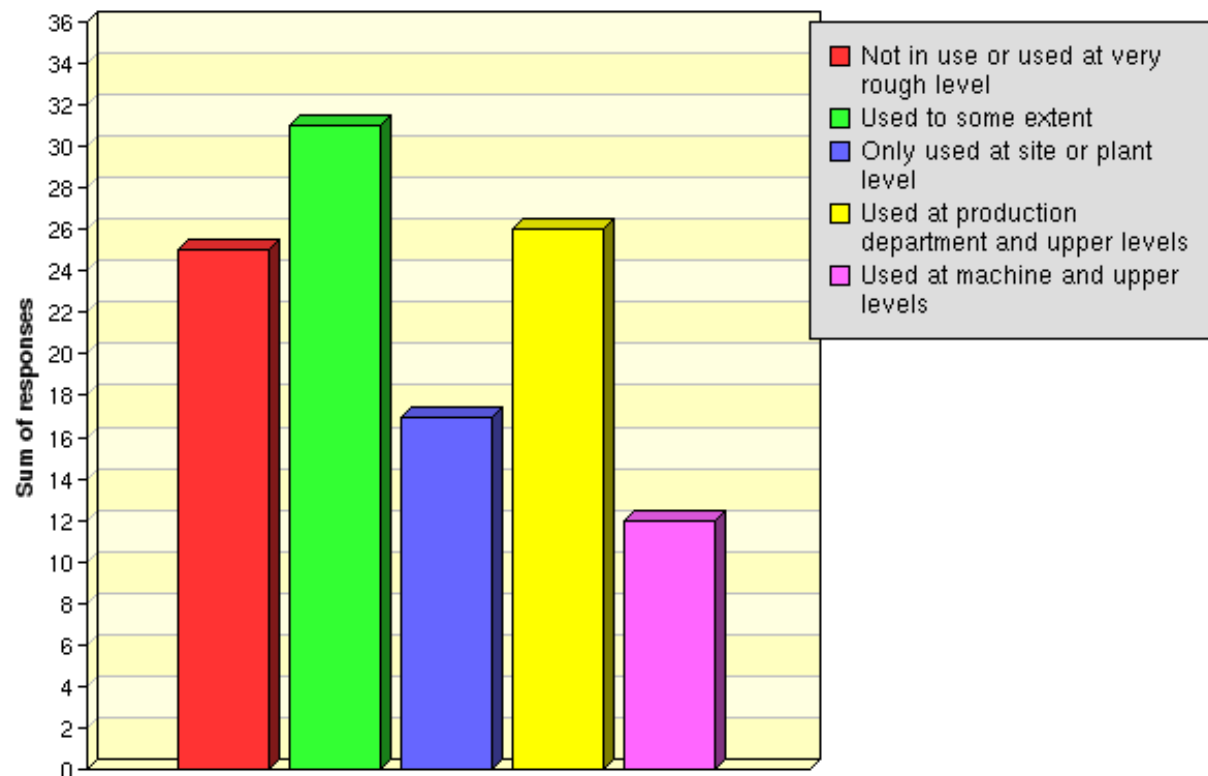


# The utilization of availability for management controls

## 16. Availability or unavailability costs

16. Choose:

### Absolute distribution of the responses



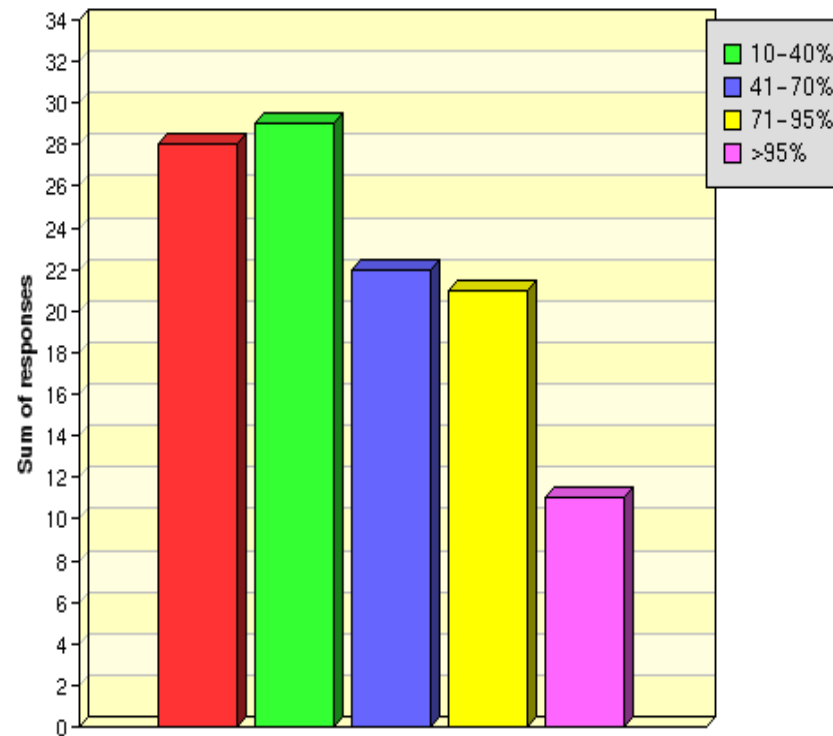


# The coverage of criticality analyses

20. Coverage of criticality analyses in the site in question (criticality analyses covers X % of plant's equipment)

20. Choose:

Absolute distribution of the responses

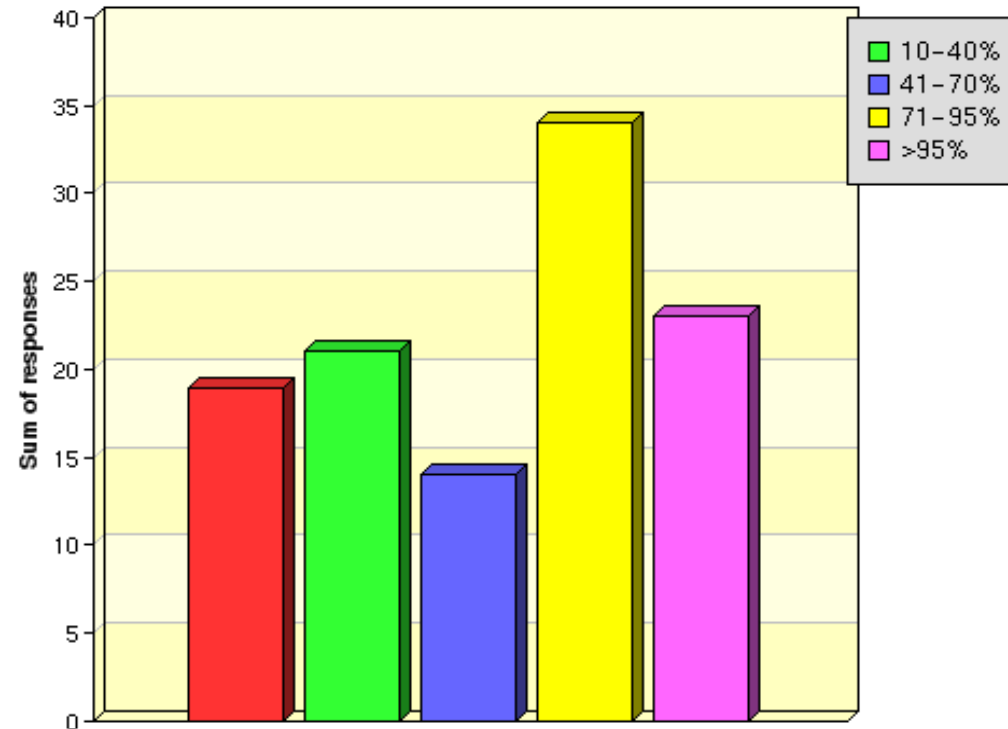


# The proportion of asset events registered in CMMS or corresponding systems

21. Proportion of asset events registered in CMMS or a corresponding history system

21. Choose:

Absolute distribution of the responses

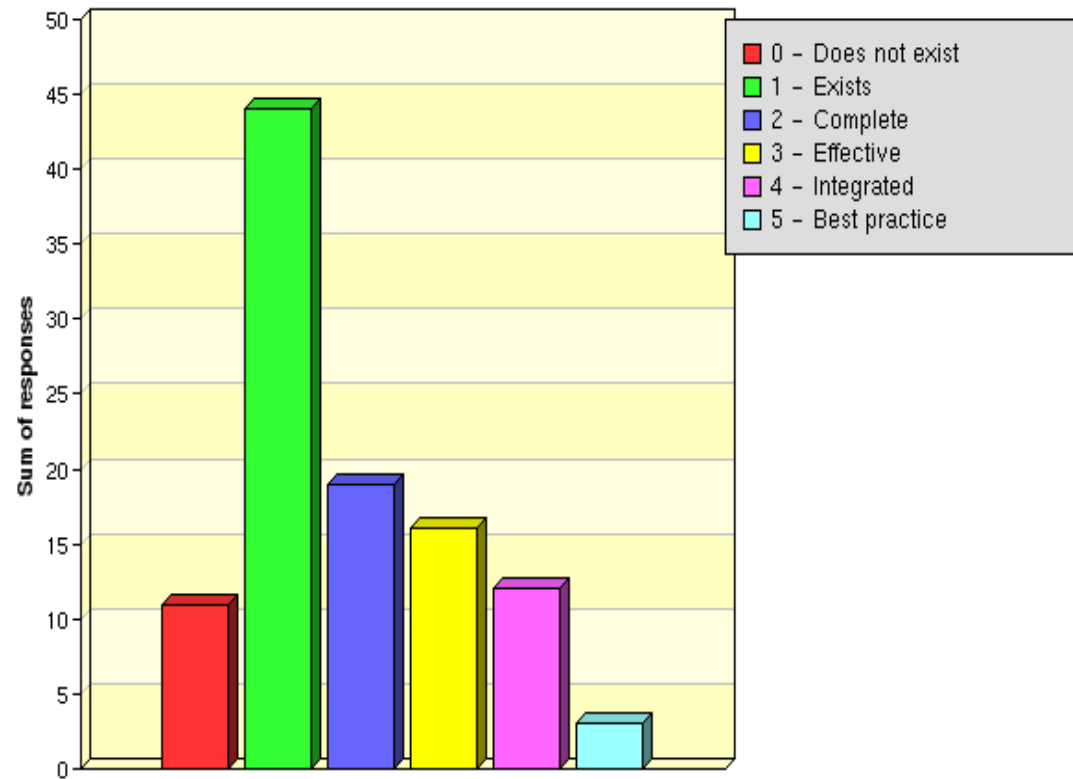


# The quality of asset policy and strategy formulation

## 24. Develop and deliver asset management policy and strategy

24. Choose:

Absolute distribution of the responses

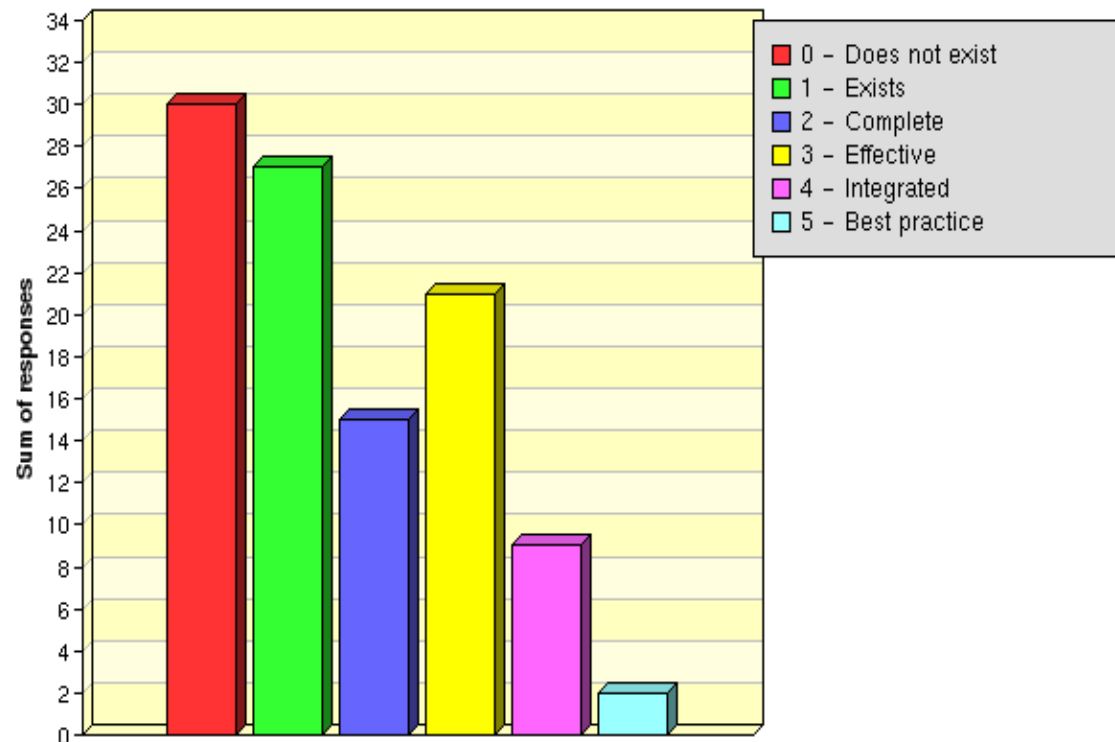


# Considering the whole life cost of assets

28. Evaluate capital expenditure requirements considering whole life costs of ownership

28. Choose:

Absolute distribution of the responses

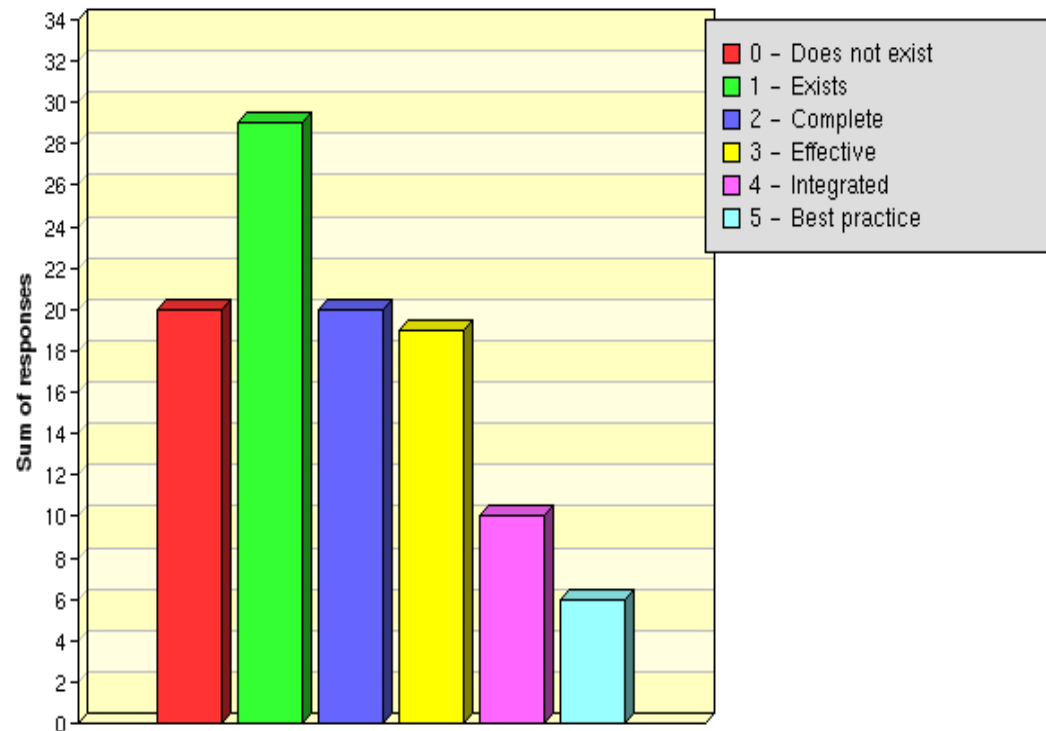


# The status of business recovery plans

**30. Determine business recovery plans in order to minimize business losses in the case of business interruption**

**30. Choose:**

**Absolute distribution of the responses**

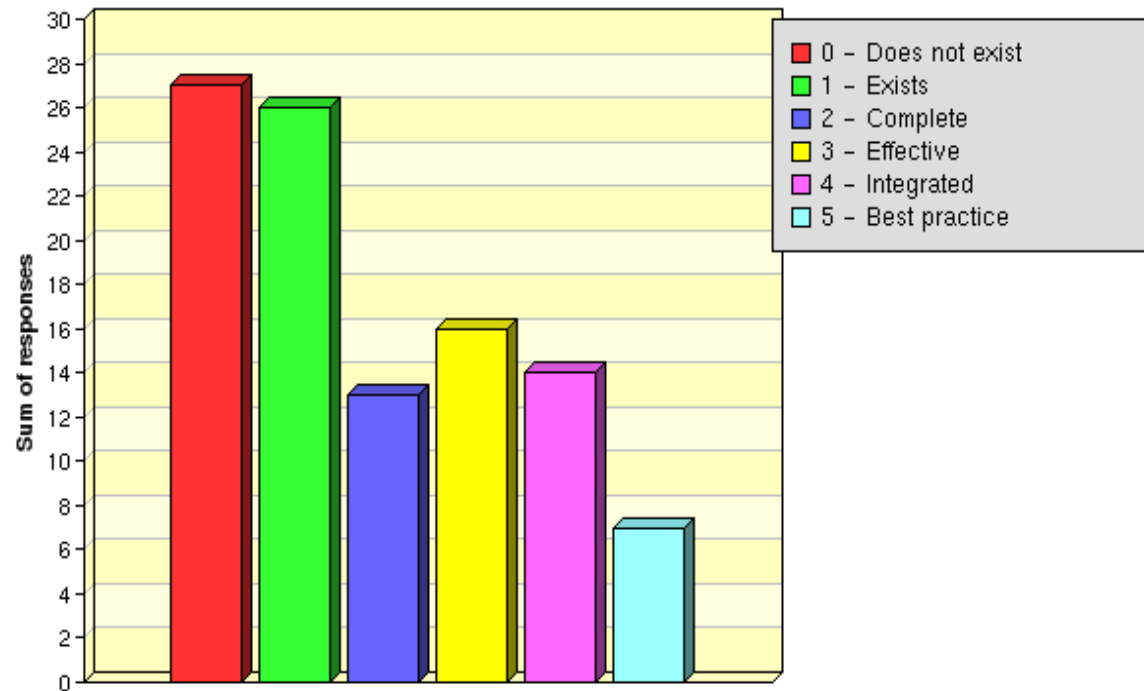


# The management of environmental and societal issues

**43. Assess and manage the implications of severe weather and climate change, and evaluate and mitigate the social and environmental impact of asset management plans**

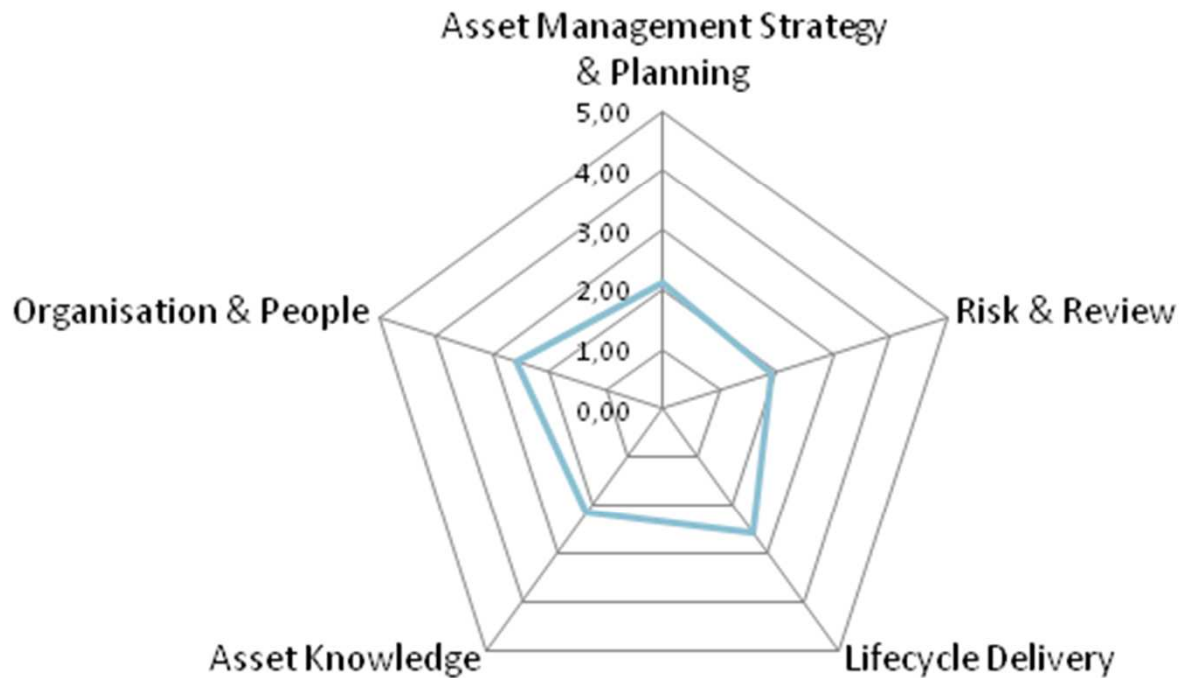
**43. Choose:**

**Absolute distribution of the responses**

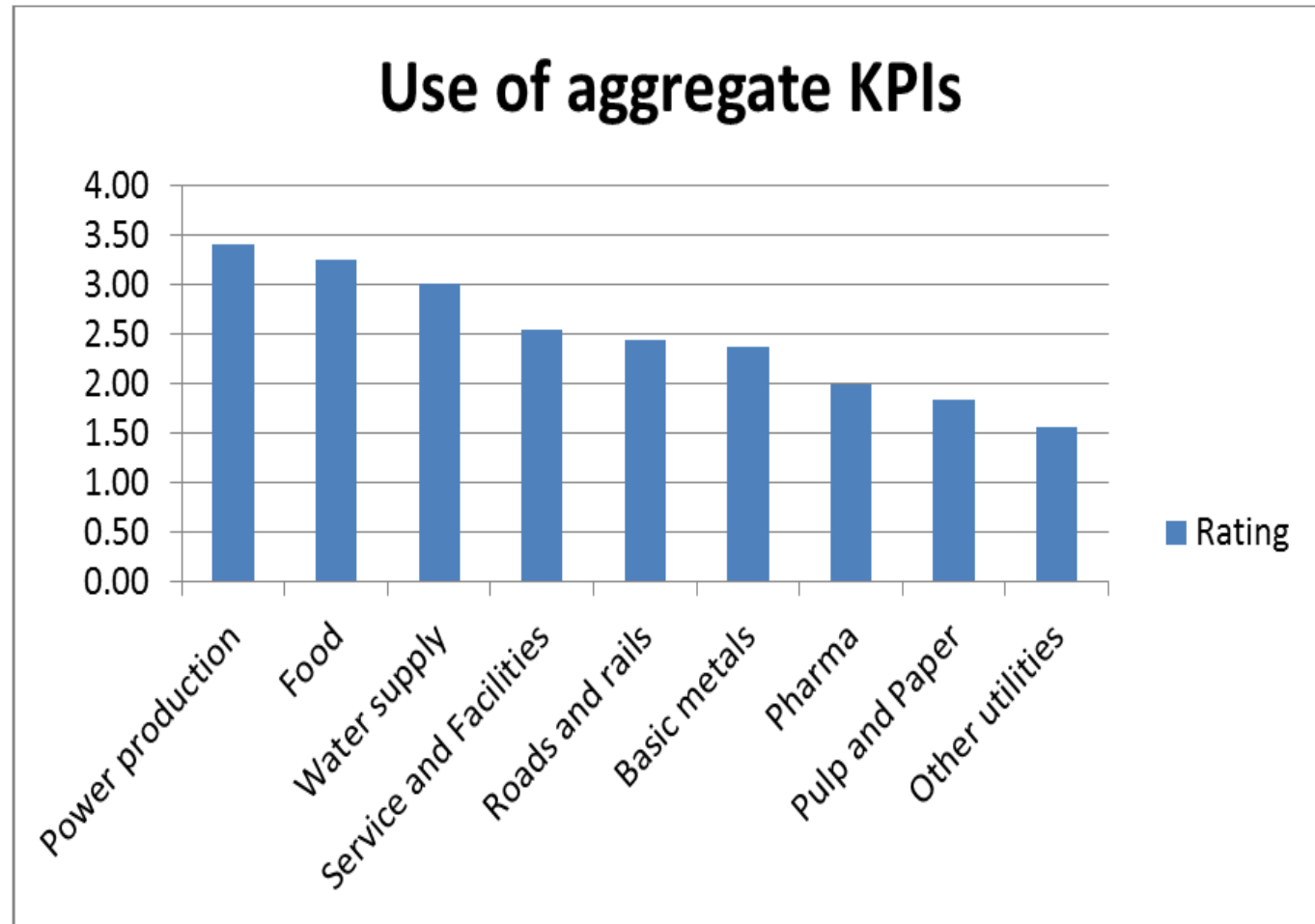


# Radar plot of industry summary according to PAS 55 categories

## PAS55 Industry Summary



# Column graph of use of aggregate KPIs





**Thank you!**

