

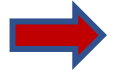
Asset Management: A Fad or Value Adder!

Presented at RMC/UT Knoxville, Fall meeting, 8-9 November 2023




Ramesh Gulati, aka Reliability Sherpa
ReliabilityX.com

Outline... Asset Management: a fad or Value Adder!



- Safety Moment
- Introduction
 - Current environment
 - Key terms and definitions
- ISO 55000 – Asset Management standard – what and why?
- Implementing Asset Management Process
- Challenges
- Takeaways / Conclusion
- Q/A





***WHAT is THE **TOP**
SAFETY-CITED
VIOLATIONS FOR
2022 BY OSHA?***

**What is the
TOP SAFETY CITED VIOLATIONS
for 2022 ?**

SELECT ONE:

A. LADDERS

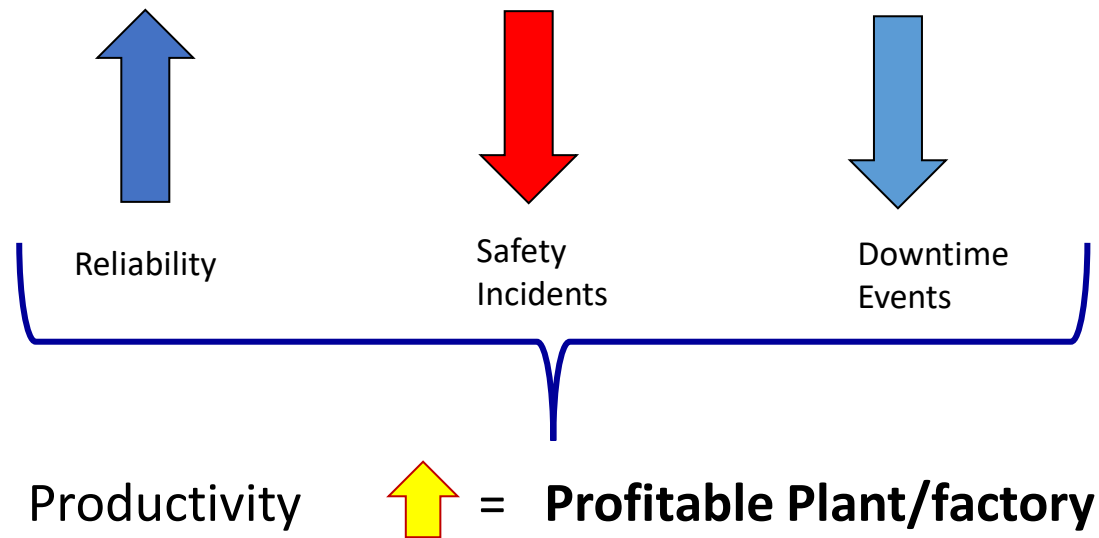
B. LOCKOUT TAGOUT

C. HAZARD COMMUNICATION

D. FALL PROTECTION

AM- Reliability, Safety, and Productivity Relationship

⌘ Reliable and Safer Operations makes a Profitable Plant /Factory



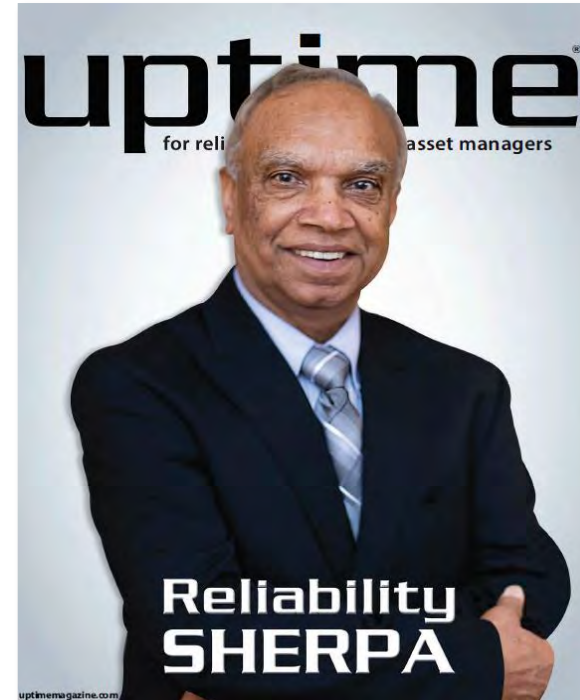
Ramesh Gulati, the Reliability SHERPA



Receiving “**Lifetime Achievement Award**”
at The Reliability Conference, Seattle, WA
/USA 8th May 2019



Receiving “**AEDC
Lifetime Achievement
& Fellow award**” from
Maj. Gen. Wiedemer
25th August 2020 at
Arnold Lakeside Club,
AEDC TN/USA



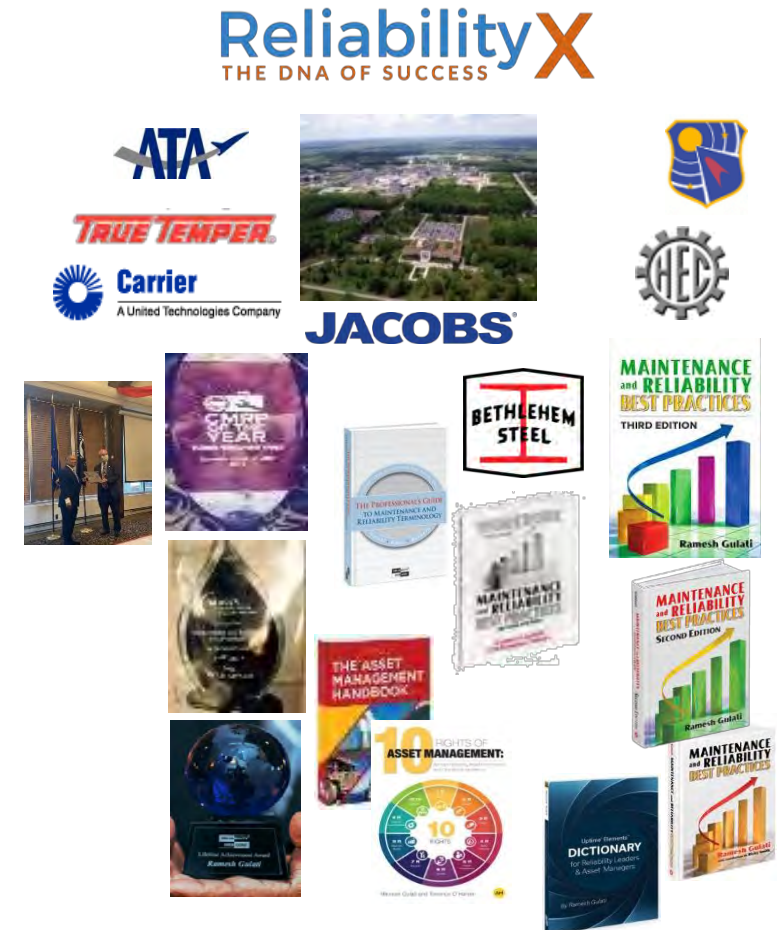
Front cover of *Uptime Magazine*
June-July '19 issue



Front cover of – *Predictiva*
October 2021 (Latin America)

Ramesh Gulati ...aka Reliability SHERPA

- 59 plus ... years in the industry
- Maintenance & Reliability and Operations Management
 - Certified Professional – CMRP, CMRT, CRL, CRE, CAMA
 - BSME, MSIE, ExecMBA
- ReliabilityX 2022**
- Jacobs' Asset Management Group, Tullahoma, TN (1983 – 2022) 38 years
 - AEDC/ATA-Jacobs – Arnold Engineering Development Complex, TN (1983-2016)
- Before AEDC (1963-1983)
 - Carrier A/C (TN)
 - True Temper Corp. (Ohio)
 - Bethlehem Steel, Burke Steel (NY)
 - Heavy Engineering Corp./Foundry Forge Plant
- Heavily involved with Industry/Societies
 - AMP and IMC/Reliability Web
 - SMRP – Society for Maintenance & Reliability Professionals
 - Reliability & Maintenance Center (RMC)/UT Knoxville
 - IIE/ASQ/NASA – OMFIT/USAF – reliability council
 - Member US TAG – PC 251/ISO 55000 Asset Management
 - Member US TAG – PC 56/Dependability
- Awards – Misc.
 - Recipient of “ AEDC Fellow - Lifetime Achievement Award “ at ALC/AEDC-TN, 25th Aug. 2020
 - Recipient of “Lifetime Achievement Award “ at 2019 The Reliability Conference, Seattle
 - “2014 CMRP of the Year”
 - Winner of 1st Prize – GOLD book Award at RGVA@ MARTS (Maintenance Technology) 2011
 - US Patent holder



The Complete Solution Provider

ReliabilityX

THE DNA OF SUCCESS

WHAT DO WE DO?



Training, Coaching, Mentoring

We offer online and onsite training courses. We will be by your side through your journey to world class. At ReliabilityX, our desire is to see people reach their full potential and pass their successes and wisdom onto others.



Loss Analyses

We will come out to your facility and due a full line loss analysis based on our 30 Major Manufacturing Loss platform with a focus on the 7 Big Losses.



Asses, Design, Engineer

We will come to your site to complete an assessment against our Holistic Reliability Framework. It includes assessments of Maintenance, Operations, Engineering, and Reliability.



Implement

Allows us to transform your organization from the culture to the organizational objectives through the implementation of our Holistic Manufacturing Model with the use of our framework of Holistic Reliability.

A quick survey#RMC1123

- 1) Have you heard the term AM – Asset Management?
 - a) Yes
 - b) No
- 2) Was/Is it (AM) related to:
 - a) Finance related
 - b) Equipment – machines related
- 3) Have you heard the term ISO 55000?
 - a) Yes
 - b) No
- 4) Are you – your organization certified in any of these standards?
 - a) ISO 9000
 - b) ISO 14000
 - c) ISO 55000
 - d) All three
- 5) If yes, what benefits are you getting?
 - a) Increase in productivity
 - b) Quality improvement
 - c) Processes discipline/robustness
 - d) a) + b)
 - e) All of the above
 - f) None

Assessing Reliability - AM Knowledge of Best Practices - A (Q10R-A)

1. Maintainability is measured by PM schedule compliance
 - a) True
 - b) False
2. Best way to improve reliability is with a maintenance plan
 - a) True
 - b) False
3. The best method of measuring the Reliability of an asset is by
 - a) MTTR
 - b) MTBF
 - c) OEE
4. The acquisition (capital) cost of an asset/system is ____ of the total life cycle cost
 - a) Less than 25 %
 - b) About 50 %
 - c) More than 50 %
 - d) None of the above
5. When most of the maintenance (and operations) costs get fixed?
 - a) After installation of equipment/system
 - b) During the operational phase
 - c) During design
 - d) None of the above

Assessing Reliability -AM Knowledge of Best Practices - B (Q10R-B)

6. Which phase of the asset life cycle has the highest cost?

- a) Design
- b) Acquisition
- c) O & M
- d) Disposal

7. RCM provides the best results when used

- a) During operation/production
- b) During design
- c) After the asset has failed or keeps failing

8. Reliability is one of the components of OEE calculations

- a) True
- b) False

9. FMEA is applicable only to assets currently in use

- a) True
- b) False

10. The intent of the asset management system is to:

- a) Reduce PM tasks
- b) Minimize failures
- c) Maximize value realization
- d) None of the above

What comes to mind when we think or talk about ...

Standards / Standardization

Have you flown on Southwest Airlines?

⌚ Southwest Airlines is the world's largest low-cost carrier airline, and it has been profitable for the last 45 years in a row. The airline was established on March 15, 1967,





**What are the key factors in
the success of Southwest Airlines?**

Southwest Airlines (SWA) competitive strategy – Cost Leadership

⌘ Minimize Operating costs while maintaining service quality

⌘ Efficient operations

⌘ Standardization – ONE type of Airplane fleet – Boeing 737

⌘ Easy to train –all including Pilots and flight crew, ground support, etc.

⌘ Familiarity/knowledge

⌘ Spares optimization

⌘ Innovative logistics solutions

⌘ Optimize profit margins

⌘ Keep low prices

⌘ Employee engagement – the best place to work

Other Examples of Standards -



The thread standard for garden hoses in the United States and its territories is known as GHT or "garden hose thread", which has an outer diameter of $1 \frac{1}{16}$ inches (26.99 mm) and a pitch of 11.5 [TPI](#) 2.2 mm; parallel thread (non-tapered).

Outside the United States, the more common [BSP](#) standard is used, which is $\frac{3}{4}$ " 1.041 in or 26.44 mm OD) and 14 TPI 1.8 mm. The GHT and BSP standards are not compatible.



ISO 8124 Part 1:2018: "Safety aspects related to mechanical and physical properties"

Part 1, with a few exceptions, covers all toys meant for children 14 years and younger. The focus of this section is on the physical and mechanical aspects of a toy's various components. The standard was updated in 2018 to harmonize with recent changes to ASTM F963 and EN-71. Changes include:

- Established minimum tip angles of certain ride on toys
- Modified definitions, including "cords", "elastic", "A-weighted equivalent sound pressure level" and "pull or push toy"
- Modified kinetic energy requirements for arrows
- Warning clarifications for toys designed for children between the ages of 36 and 72 months
- Subclauses distinguishing various cords, loops, strings, and straps.

All children's **toys** manufactured or imported on or after February 28, 2018, must be tested and certified to ASTM F963-17.

Examples of Standards – things in our daily life ...



All products (or services) covered by some standards....

How We Measure



History of Standards

⌘ Standards have evolved significantly:

- ⌘ Cylindrical stones in Egypt (5000-7000 B.C.).
- ⌘ King Henry's length of his forearm "ell" (1120)
- ⌘ Boston's brick manufacturing (1689)
- ⌘ U.S. railroad system (Industrial Revolution)
- ⌘ The Baltimore fire and non-standard fire hydrants (1904)
- ⌘ Interchangeability of parts, components, and safety (20th century)

⌘ American National Institute of Standards (ANSI) founded in 1918 via professional societies (ASME, IEEE, ASCE, ASTM, etc.) to support standards development.

the birth of globalization began with standards.



What is a Standard?

- ⌘ *“A prescribed set of rules, conditions, or requirements concerning definitions of terms;*
- ⌘ *Classification of components;*
- ⌘ *Specification of materials, performance, or operations;*
- ⌘ *Delineation of procedures;*
- ⌘ *Or measurement of quantity and quality in describing materials, products, systems, services, or practices”*

As defined by National Standards Policy Advisory Committee

Simply,

Something established by the authority, custom, or general consent as a model, a point of reference or as a rule for the measure of quantity, weight, value, or quality.

Key terms ...I

 **Asset:** equipment/machinery/system/software etc..

 Something which an organization owns and has a value

 It Creates a value

 Could be Physical or non-physical and tangible or non-tangible

 Needs to be taken care...

 **Maintenance:**

 Upkeep of asset.... So it can keep producing (functioning) or providing service.

 **Capacity Assurance (New name)**

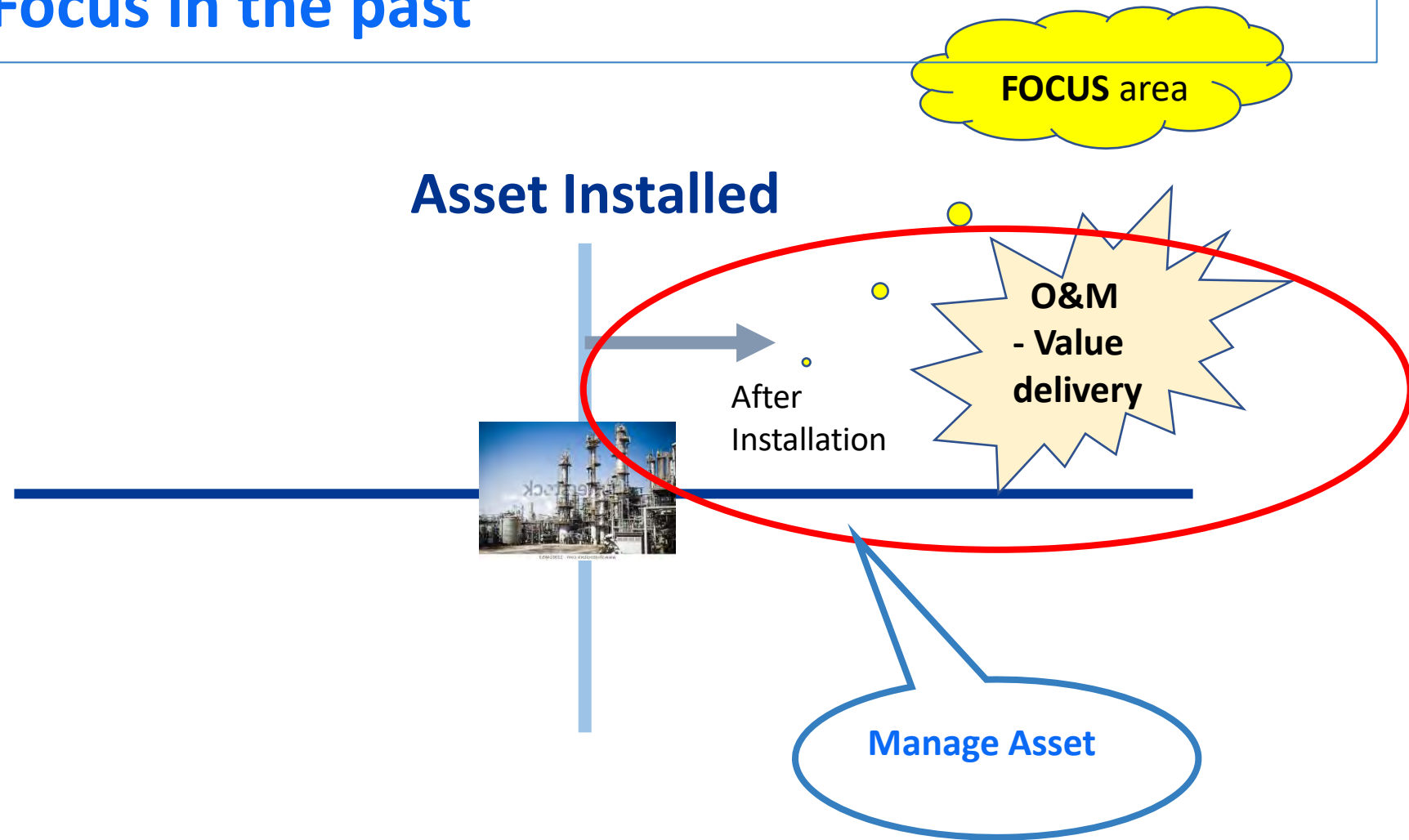
 **Asset Management**

 Coordinated activity of an organization to **realize value** from assets

 Reducing the Total Cost of Ownership

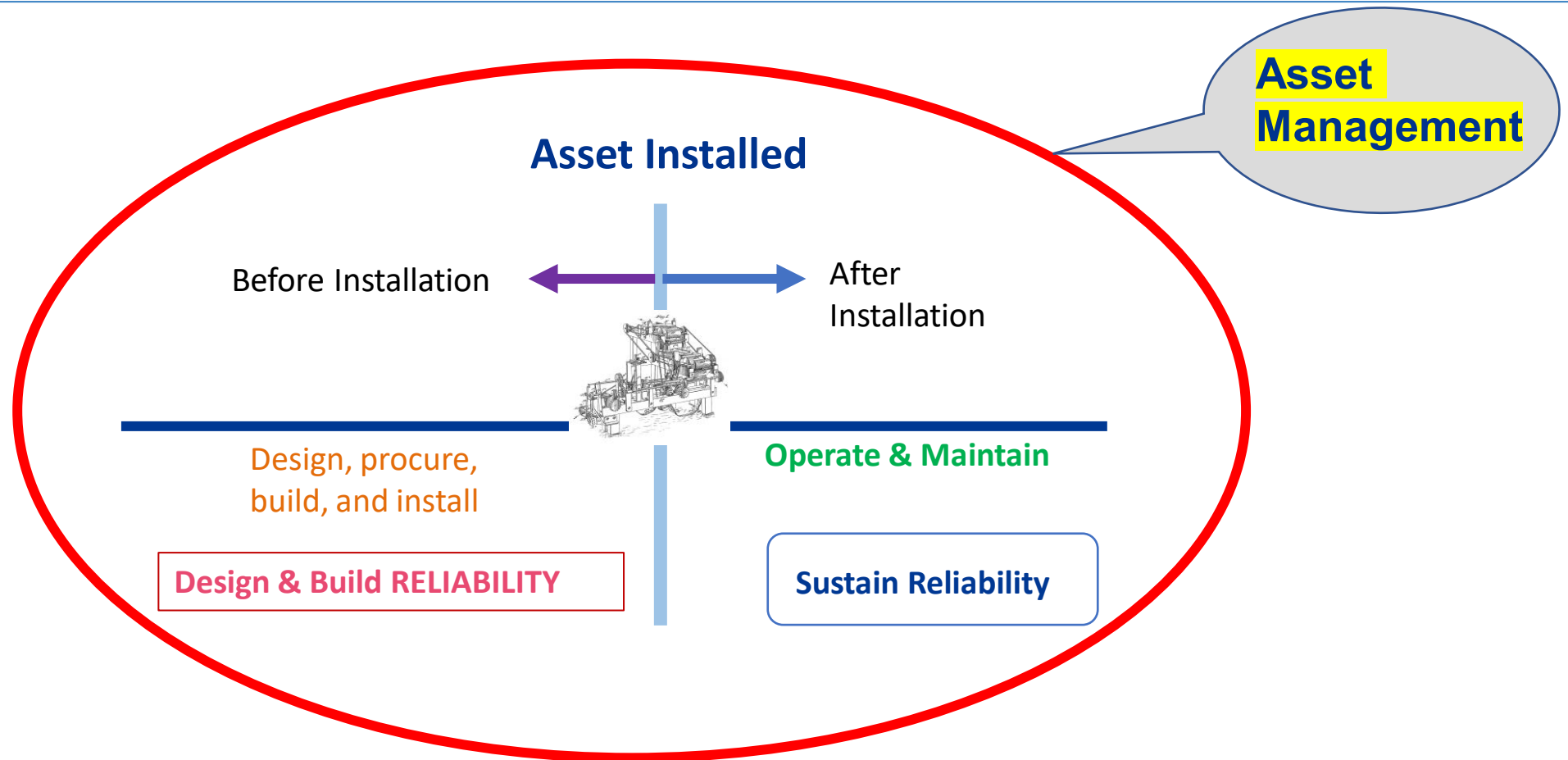
 Optimizing Asset Lifecycle costs

Assets...Our Focus in the past



O&M : Operations and Management

Focus should be ... before and after asset installation



AM – Managing Whole Asset Life Cycle, “Cradle to Grave”

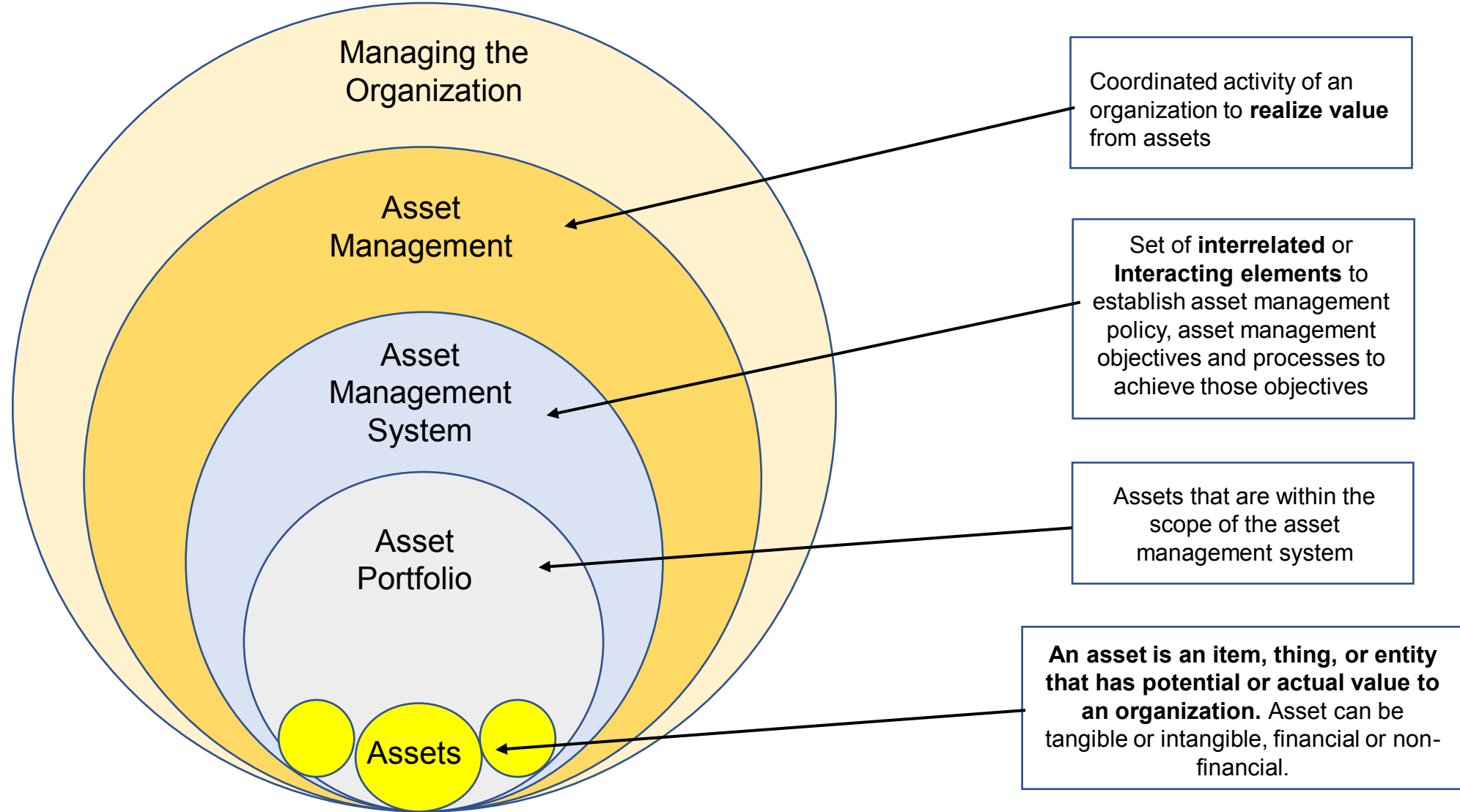
10 Rights of Asset Management ** ...managing asset life cycle



1. **Specify** It Right
2. **Design** It Right
3. **Source** It Right
4. **Build/Fabricate** It Right
5. **Install/Commission** it Right
6. **Operate** It Right
7. **Maintain** It Right
8. **Improve/Modify** It Right
9. **Dispose/Decommission** It Right
10. **Manage** It Right




** 10 Rights of Asset Management by Ramesh Gulati and Terrance O'Hanlon
ISBN # 978-1-941872-83-3

AM -Relationships between key termsISO 55000






Key terms ... II cont.



Reliability:

-  Keep providing functions satisfactory as designed
-  “Peace of mind”
 -  Minimum failures –breakdowns

Safety:

-  Asset(s) is safe to operate & maintain
 -  OSHA’s injury rate -TRIR (incidents per 100 people (FT) or 200,000 man-hours)
 -  TRIR= Total Recordable Injury Rate
 -  Overall, the average is 2.7 (2020); Best of Class is < 1

Productivity:

-  A measure of efficiency..... Throughput from asset/system meeting the needs or as designed.
 -  Higher the productivity... increases the profitability

Key terms ...

Standard:

 An established norm or requirement generally presented in a formal document that establishes uniform technical criteria, methods, processes, or practices


standards = Best Practices

Standardization:

 the process of making something conform to a standard.

 to bring to or make of an established **standard** size, weight, quality, strength, or the like

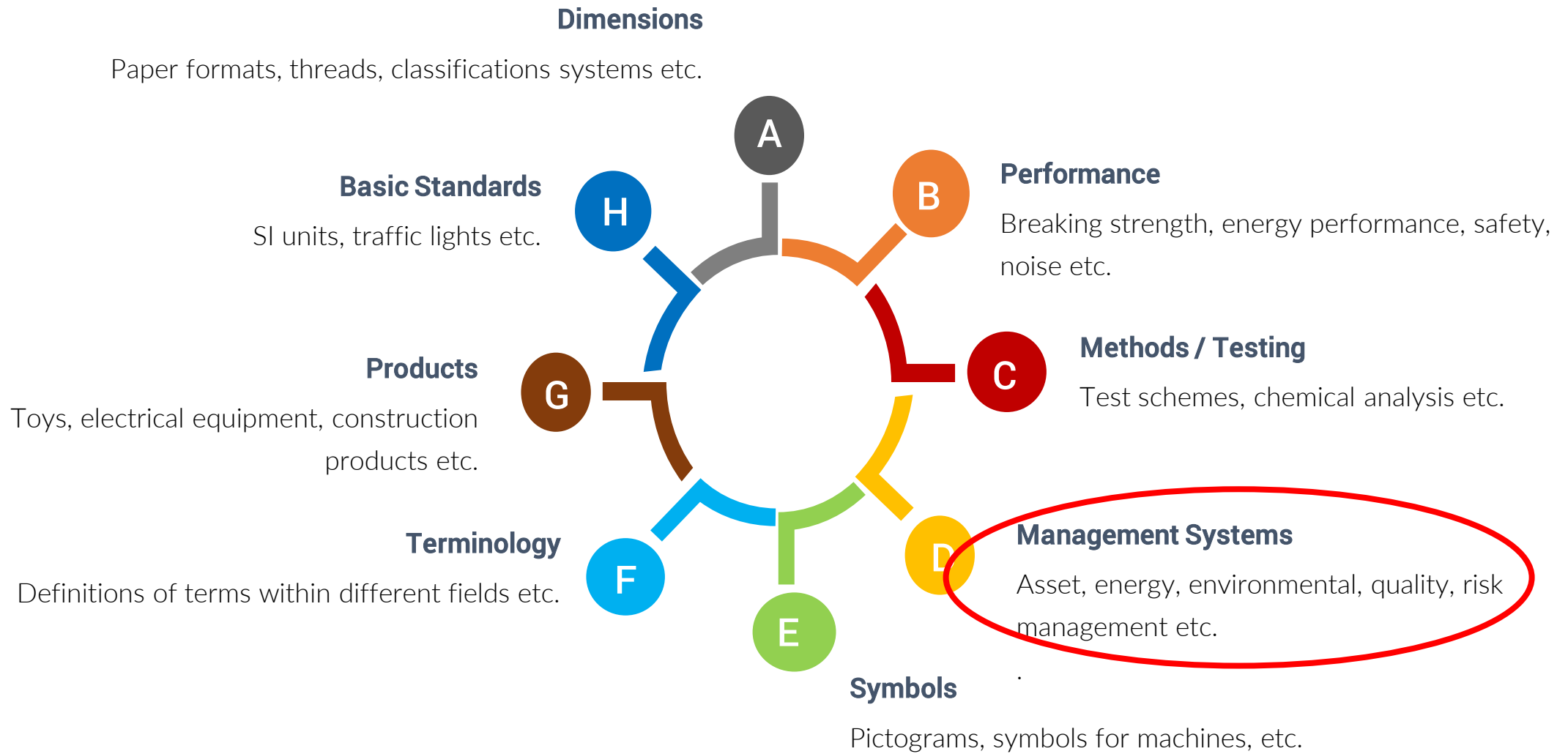
Certification:

 The results of meeting the established criteria / requirements of an accrediting or certificate granting organization

Best Practices (BP):

 A technique, method or process that is more effective at delivering a desired outcome than any other. This practice usually becomes as benchmark, a practice that leads to a superior performance.

Categories of Standards



Management Systems – Standards (Asset Management Related)

- ⌘ BSI's PAS 55 Asset Management (2004/2008)
- ⌘ Initiated Asset Management ISO standard development process 2009/2010
 - ⌘ ISO 55000 Series of Asset Management standards developed/released ... 2010-2014
- ⌘ ISO's – Management & Leadership Standards
 - ⌘ ISO 9000x Quality Management
 - ⌘ ISO 14000x Environment Management
 - ⌘ ISO 26000 Social Responsibility
 - ⌘ ISO 27000 Information Security – Cybersecurity
 - ⌘ ISO 31000x Risk Management
 - ⌘ ISO 45000x Occupational Health and Safety
 - ⌘ ISO 50000 Energy Management
 - ⌘ **ISO 55000x Asset Management (Released January 2014)**
- ⌘ Other important standards
 - ⌘ ISO 4406: 2021 - Hydraulic Fluid Power / Oil Cleanliness -method of coding
 - ⌘ ISO 14224; 2016 - Petroleum, petrochemical and natural gas industries — Collection and exchange of reliability and maintenance data for equipment

Fig 12.2 Principles of Quality Management



The 9001:2015 standard contains the following 10 sections:

Section 1. Scope

Section 2. Normative reference

Section 3. Terms and definitions

Section 4. Context of the organization

Section 5. Leadership

Section 6. Planning

Section 7. Support

Section 8. Operations

Section 9. Performance evaluation

Section 10. Improvement

ISO 55000x Asset Management System Standard Structure

 **ISO 55000**: Overview, Principles and Terminology

 A marketing document (why)

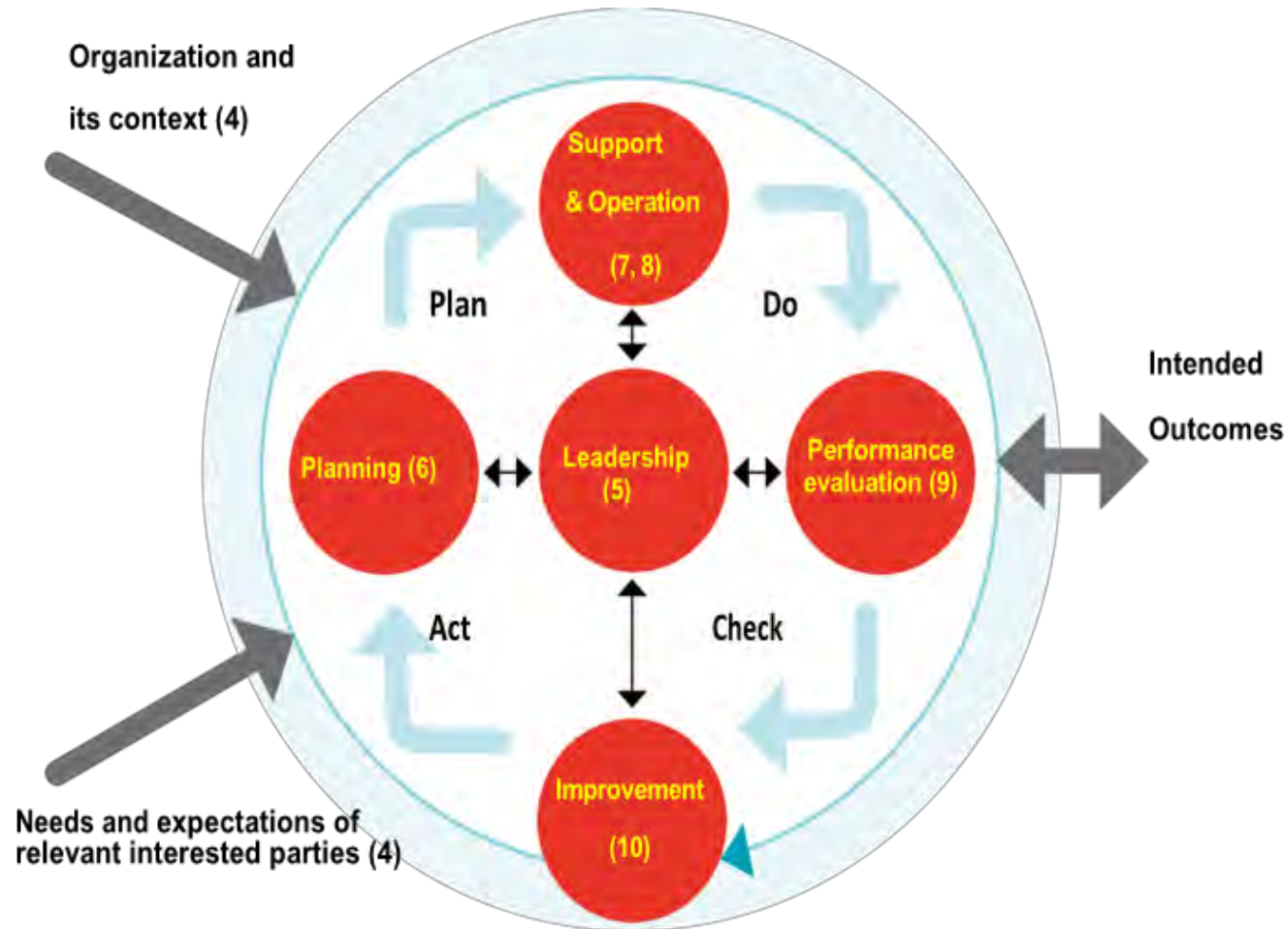
 **ISO 55001**: Requirements

 The “shall” statements (what)

 **ISO 55002**: Guidelines

 Explanations and examples (how)

Fig 12.7 ISO 55001 Clauses and PDCA Cycle



ISO 55001 clauses

1. Scope
2. Normative references
3. Terms and definitions
4. Context of the organization
5. Leadership
6. Planning
7. Support
8. Operation
9. Performance evaluation
10. Improvement

Source: BSI

Other Maintenance and AM Related Standards

- ISO 55000 ... under revision (RCD fall2024)
- **ISO 55001**....to comply with (SHALL statements)
... Under revision (RCD fall2024)
- ISO 55002 ... revised 2018
.... Under consideration for revision to start in 2024
- ISO 55010 guidance for alignment of financial & NF
- ISO 55011 ..AM and Public policy (Guidance)
Under development
- ISO 55013 .. Data for Asset Management
Under development

 ISO 9001

 ISO 14001

 ISO 26000

 ISO 27000

 ISO 45001

 ISO 14224

 ISO 4406

ISO 55001 – Table of Contents

1. Scope

2. Normative reference

3. Terms and definitions

4. Context of the organization

- 4.1 Understanding the organization and its context
- 4.2 Understanding the needs and expectations of stakeholders
- 4.3 Determining the scope of the asset management system
- 4.4 Asset management system

5. Leadership

- 5.1 Leadership and commitment
- 5.2 Policy
- 5.3 Organizational roles, responsibilities and authorities

6. Planning

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

7. Support

- 7.1 Resources
- 7.2 Competence
- 7.3 Awareness
- 7.4 Communication
- 7.5 Information requirements
- 7.6 Documented Information
 - 7.6.1 General
 - 7.6.2 Creating and updating
 - 7.6.3 Control of documented information

8. Operation

- 8.1 Operational planning and control
- 8.2 Management of change
- 8.3 Outsourcing

9. Performance evaluation

- 9.1 Monitoring, measurement, analysis and evaluation
- 9.2 Internal audit
- 9.3 Management review

10. Improvement

- 10.1 Nonconformity and corrective action
- 10.2 Preventive action
- 10.3 Continual improvement

Annex A Information on asset management activities (informative)

Bibliography

Our Challenge... 20 + years ago...

(AEDC/ATA – Jacobs' Asset Management Program story)

2001-2003 Our Dilemma

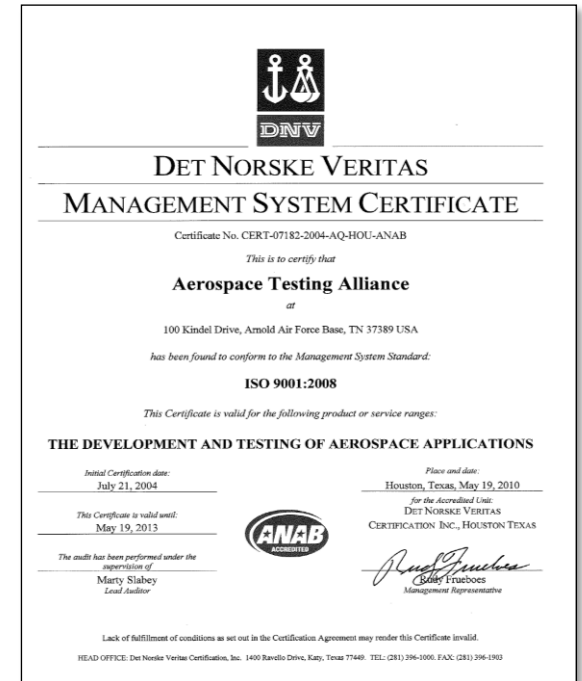
Our customers demanding assurance

- Processes (assets/systems) reliability
- Processes repeatability with quality
- Improved effectiveness / Efficiency

Identified/ established several key processes including, **ASSET Management**

ISO 9001 Certified (2004-2015)

Asset Management



Establishing an AM process

✂ Establish an implementation team

✂ Maintenance, operations, engineering, design, material, property etc.

✂ Use SIPOC tool to identify inputs/outputs to AM process.

✂ Chart / map the process

✂ Use SWOT to identify areas to focus

✂ Develop policy, procedures, work instructions, guidelines/standard templates

✂ Use ISO 55001 standard as a guide for structure

✂ Ensure good communication/awareness

POLL Question...

- 1) Quality Policy (QP)
- 2) Environmental policy (EP)
- 3) Sustainability policy (SP)
- 4) Asset Management policy (AMP)

How many of you have ... select one

- a) 1- QP only
- b) 1 (QP) + 2 (EP)
- c) 1 (QP) + 2 (EP) + 3 (SP)
- d) ALL : 1 (QP) + 2 (EP) + 3 (SP) + 4 (AMP)
- e) None of above

Challenges

- ⌘ When things break, we (Maintenance) are always in pressure to fix them quickly
 - ⌘ No time to analyze and find the root causes and then take corrective action
 - ⌘ No good (quality) data available (being collected)
- ⌘ Lack of a robust maintenance – **Asset Management Process**
- ⌘ Don't get involved (or too late) in the asset development phase
- ⌘ Don't have enough resources to do a good job in the design, installation /commissioning, and operational phases
 - ⌘ **Lack of quality procedures/policies (Standards/standardization)**
- ⌘ Lack of skilled workforce
- ⌘ Etc..

Application of Standards/Standardization Benefits

✂ Southwest Airlines.... Deploys only one type of plane Boeing 737

✂ Think of ...

✂ At your plant/factory (**Gemba 現場**) – **the place of value generation**

Having a minimum, maybe 1-3 types of PLCs (Equipment/components standardization)

✂ Having 1- 3 types (manufacturer) of

✂ Valves

✂ Cylinders/actuators

✂ Pumps

✂ Electrical components-UPS, motor controls, breakers

✂ Etc..

✂ Establish – have a policy for procurement (best value – Not lowest cost)

✂ Advantages/benefits of standards/standardization

✂ Streamlined deployment - procedures

✂ Simplified operation and maintenance

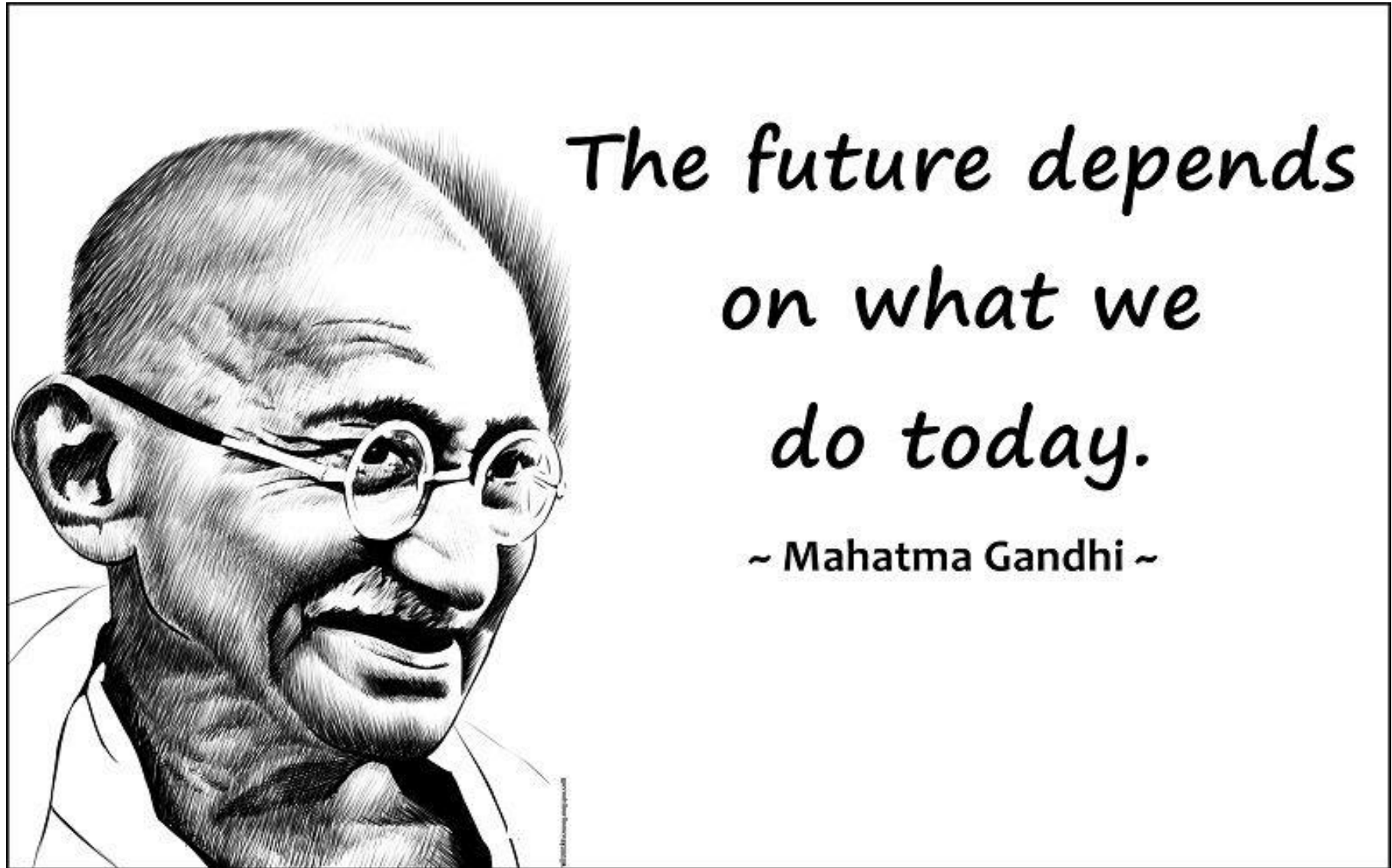
✂ Easy and reduced training

✂ Lower inventory

✂ Lower O&M costs – reduced working capital, etc..

✂ Process intimacy/ familiarity

Don't WAIT; do it TODAY



Benefits of AM Process (Standard)

- ⌘ A disciplined approach of doing things
- ⌘ Procedures/Instructions standardized and documented
 - ⌘ “We know what we are doing and why we are doing it”
- ⌘ Access to current (right) information only
- ⌘ Auditing requirements (3rd party) ensures that we are doing what we said we are going to do and continuous improvements.
- ⌘ “Process Council” ensures visibility and engagement of all stakeholders

Conclusion / Summary

- ⌘ Standards/standardization are BEST practices
- ⌘ Best practices are improvements, and Improvements are Change
- ⌘ Change is difficult to implement
 - ⌘ Change requires... stakeholders, specifically O&M personnel, to be involved in the execution of best practices – improvements
- ⌘ An effective implementation requires a new mindset, ... a culture of excellence, or a reliability culture
- ⌘ Organizations with **Robust Processes built on standards** with strong reliability cultures achieve higher results because employees sustain focus both on what to do and how to do it.
- ⌘ Application of Standards ... create/adds VALUE
 - ⌘ They do NOT create disruption; DO NOT let them become a fad (program of the month)

Asset Management IAM/ISO



What is Asset Management?

Asset Management - the coordinated activity of an organisation to realise value from assets

www.theIAM.org

theIAM.org/BigPicture

12.X References and Suggested Reading

- 📖 American National Standards Institute website. www.ansi.org.
- 📖 American Society for Quality website. www.asq.org
- 📖 American Society for Testing and Materials International website.
www.astm.org
- 📖 British Standards Institution website. www.bsigroup.com
- 📖 Global Forum on Maintenance & Asset Management. www.GFMAM.com.
- 📖 Gulati, Ramesh, and Terrence O'Hanlon. **10 Rights of Asset Management**, Reliabilityweb, 2017
- 📖 International Organization for Standardization website. www.iso.org
<https://committee.iso.org/home/tc251>
- 📖 ISO standards, including 4406, 9001, 14001, 27000, 31001, 50001, 55001, and 14224.
- 📖 US-TAG/pc251 Committee notes. The committee has been supporting the development and sustainment of the ISO 55000 series of standards in the United States. The author is one of the founding members of this committee. <https://www.assetmanagementusa.org/>

Questions?

⌘ Ramesh Gulati,

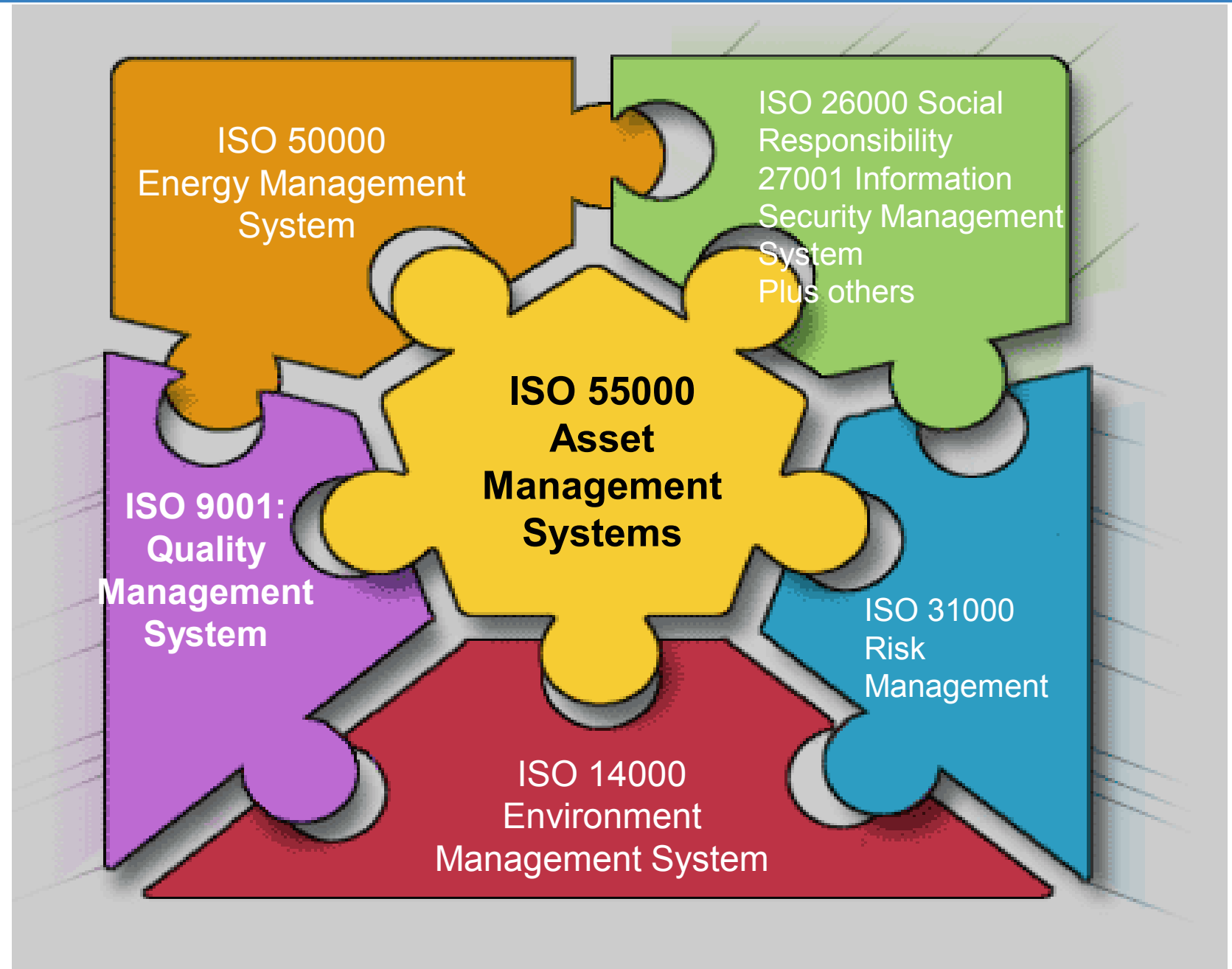
⌘ Ramesh.gulati@reliabilityX.com

⌘ ask@reliabilityx.com

⌘ 1-877-RLBLTYX



**Asset
Management-
Related Standards**



Find a word?

X	H	S	D	H	Z	J	E	N	V	I	R	O	N	M	E	N	T	A	L	Y
Y	S	T	V	K	T	D	K	J	A	R	B	1	R	O	I	S	L	S	A	B
B	U	A	E	E	Z	K	O	C	P	C	0	M	S	A	T	T	R	S	S	D
N	S	N	S	O	R	Z	O	K	O	0	C	T	X	E	I	A	N	E	S	E
N	T	D	P	S	I	I	W	S	9	N	Z	K	S	C	S	K	W	T	E	P
R	A	A	E	B	E	O	F	O	T	M	T	S	V	I	O	E	D	M	T	R
M	I	R	C	B	M	T	S	I	A	A	A	E	Y	U	1	H	R	A	M	O
C	N	D	I	W	C	I	P	U	C	F	N	T	X	K	4	O	R	N	A	G
E	A	I	F	V	F	I	W	O	E	A	I	D	K	T	0	L	T	A	N	X
R	B	Z	I	A	D	D	F	Q	R	L	T	J	A	P	0	D	V	G	A	D
T	I	A	C	O	T	G	I	E	A	T	G	I	G	R	1	E	L	E	G	T
I	L	T	A	X	G	C	A	U	F	I	F	W	O	T	D	R	K	M	E	I
F	I	I	T	M	F	G	Q	C	W	V	H	O	E	N	W	S	T	E	M	S
I	T	O	I	K	I	L	H	F	N	C	I	E	L	C	O	D	E	N	E	O
C	Y	N	O	L	E	H	R	K	M	C	P	M	W	I	J	P	R	T	N	5
A	C	O	N	F	I	G	U	R	A	T	I	O	N	H	O	K	C	R	T	5
T	E	I	S	O	3	1	0	0	1	B	B	E	N	E	R	G	Y	B	P	0
I	N	T	E	R	E	S	T	E	D	P	A	R	T	I	E	S	L	B	L	0
O	S	Y	S	T	E	M	S	E	N	G	I	N	E	E	R	I	N	G	A	1
N	U	R	I	S	K	M	A	N	A	G	E	M	E	N	T	Q	Q	U	N	U
A	S	S	E	T	M	A	N	A	G	E	M	E	N	T	P	O	L	I	C	Y

Asset
 Asset Management
 Asset Management Plan
 Asset Management Policy
 Asset Portfolio
 Certification
 Code
 Configuration
 Context
 Energy
 Environmental
 Interested Parties
 ISO 14001
 ISO 31001
 ISO 55001
 ISO 9001
 Quality
 Risk Management
 Specifications
 Stakeholders
 Standardization
 Standards
 Sustainability
 Systems Engineering
 Verification