Accelerating Business Value, Reducing Risks and Lowering TCO in Digital Transformations

Mike Jordan, VP, EAM Practice

March 30, 2021

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Flavors of Digital Transformations

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SAP RISE Program

"Designed to simplify the move to the cloud, removing the complexity by effectively packaging business transformation as a service under a single offer on a single contract"

Oracle Cloud Maintenance

ORACLE®

CLOUD

"Oracle Cloud Maintenance is a connected, smart maintenance management solution. Powered by advanced technologies, it enables predictive maintenance and helps you increase reliability and uptime while reducing overall costs."

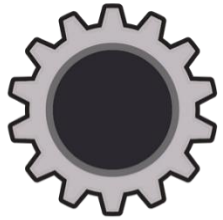
Internet of Things (IoT) – The Vision

Motor

Sensors

Analytics

Maintenance Planning



MRO Supply Chain

Maintenance Action

Motor Failure Pending	Detects abnormal readings	Predicts failure pending and notifies maintenance that action is required	Maintenance planner compiles appropriate maintenance plan & task list – requests appropriate spare parts, initiates work order	Issues appropriate replacement parts	Prepared maintenance worker performs effective repair of motor

Minimal Business Interruption

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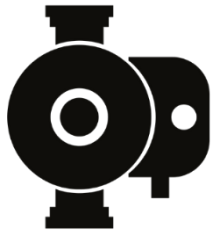
IoT – The Reality with Inaccurate Asset Data

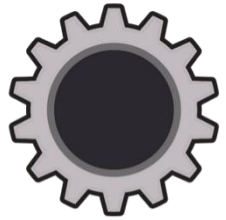


Motor

Sensors

Analytics

Maintenance Planning



MRO Supply Chain

Maintenance Action

Motor Failure Pending

Readings Detected

Message transmitted to maintenance for action

Planner initiates work order based on erroneous asset information in maintenance system

Inaccurate asset data in MRO Supply Chain - leads to wrong spare parts ordered/ issued

Maintenance worker arrives to fix the wrong motor, with wrong instructions, and wrong parts delaying fix

Motor Fails

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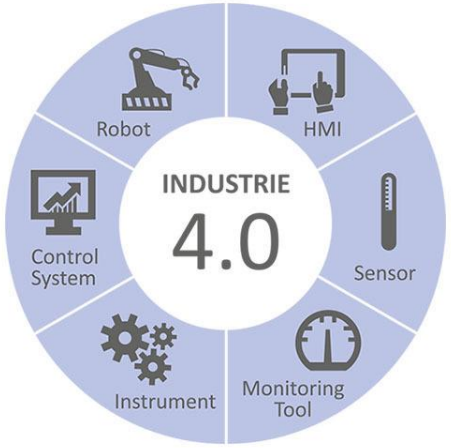
Other Digital Transformations



Building a Data Foundation for Your Digital Transformation

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While good data can be your most strategic asset…

Bad Data Can Be Catastrophic!

Data you don't trust Isn't data.

56%

of CEOs are concerned about the quality of their data.

8%

of organizations have reached "transformation al" levels of maturity in data and analytics.

3%

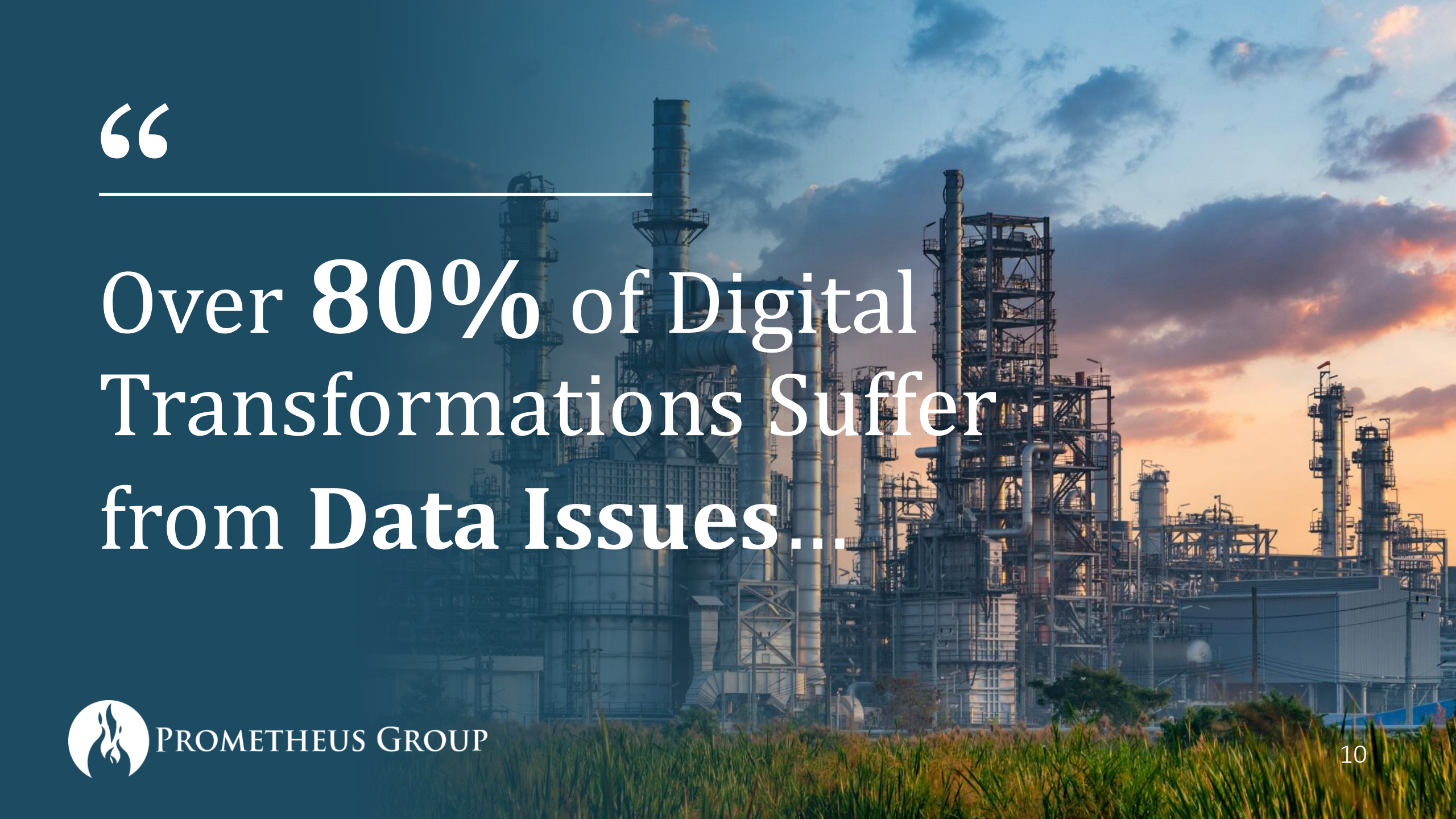
of company data meets a minimum threshold for data quality.

Sources

KPMG, 2017 Global CEO Outlook

Gartner, Survey Analysis: Traditional Approaches Dominate Data and Analytics Initiatives, Feb 5, 2018,

Harvard Business Review, Only 3% of Companies' Data Meets Basic Quality Standards, Sept 11, 2017



“

Over **80%** of Digital Transformations Suffer from **Data Issues**…

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Statistics

- **LESS THAN 20%** of equipment records contain manufacturer and model
- **LESS THAN 10%** of existing equipment with manufacturer and model have an MRO bill of material
- **Less than 25%** of required spare parts are available as a material record

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The Value

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Get Immediate Value ***Before*** Your Transformation

- **Maintenance**
  - Increase maintenance productivity by **25%**
  - Perform more effective STO's reducing capital costs by **1.5%**
- **Operations**
  - Increase Overall Equipment Effectiveness (OEE) and Plant Availability by **1%**
  - Maximize asset uptime/availability by **10%**
  - Reduce EH&S risk with annual savings of **$20-100M**
  - Improve regulatory compliance
- **MRO Supply Chain**
  - Cut spending on obsolete and unnecessary MRO spares by **15%**
- **IT**
  - Reduce resource requirements for data management and governance
  - De-risk digital transformation projects
  - Lower TCO of digital transformation projects

The Prometheus Master Data as a Service (MDaaS) Solution

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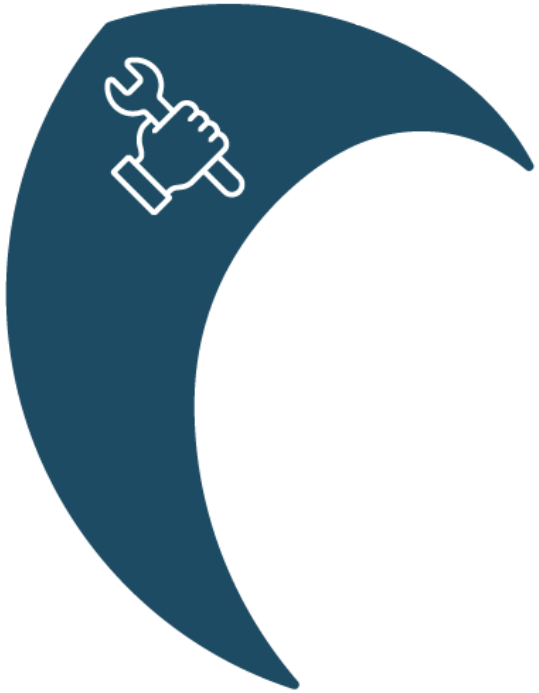
Prometheus Methodology: “Get it Clean, and Keep it Clean”



1

BUILD

- Internationally
- Recognized
- Standards
- Business Rules
- Enterprise Taxonomy
- Data Quality Culture

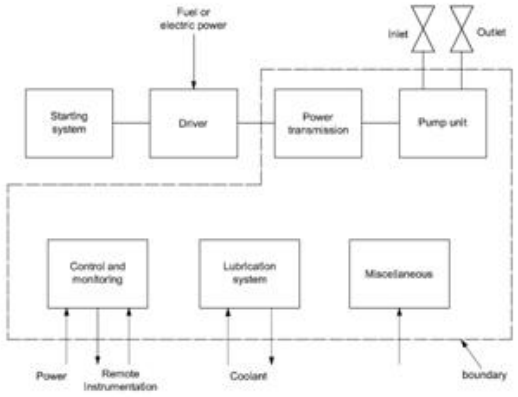
Establishing the Foundation with a Sound Taxonomy

EQUIPMENT AND SPARES TAXONOMY CENTRIFUGAL PUMP	Version	1.0
	Release Date	05-02-2013

EQUIPMENT CLASS (NOUN)	EQUIPMENT TYPE (MODIFIER)	UNSPSC	ISO 14224
PUMP	CENTRIFUGAL	40151503	PUCE

Definition: A non positive displacement device, which utilizes a rotating element with a vane or blade assembly known as an impeller, in an enclosure as a means of transferring a liquid from one place to another.

Pump – BOUNDARIES (As per ISO 14224)



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Establishing the Foundation with a Sound Taxonomy

EQUIPMENT AND SPARES TAXONOMY CENTRIFUGAL PUMP	Version	1.0
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Equipment Characteristics

Characteristic	Data Status	Data Type	Characteristic Description	UOM	Example Values	Suffix
Type	M	TEXT	The type of the Pump based on construction/operation		SELF PRIMING	
Drive Type	O	TEXT	The Type of drive which is coupled to the primary shaft		MOTOR	
Speed	M	NUM	The specific speed of the pump (impeller).	RPM	1800 RPM	
Case Material	O	TEXT	The surface treatment followed by the predominant base material of casing and material grades and/or specifications when available.		SS ASTM A216 GR WCB	
Impeller Material	O	TEXT	The surface treatment followed by the predominant base material of Impeller and material grades and/or specifications when available.		SS ASTM A216 GR WCB	
Number of stages	O	NUM	The numerical quantity of stages of the pump		5	
Head Range	O	NUM	The measurement of total or dynamic head.	MM, M	15 M	
Size	M	TEXT	The inlet and outlet size of the Pump		NPS 1, DN 50	
End Connection	O	TEXT	The type of end connection, along with the applicable Standard		THREADED,ASME B1.20.1, RAISED FACE,ANSI B16.5	
Flow Rate	M	NUM	The volume of fluid delivered per unit of time.	CFM, LPM	440 LPM	
Discharge Pressure	M	NUM	The rated pressure discharge of the Pump	PSI, BAR, KPSI	25 BAR	
Applicable Standard	O	TEXT	The applicable dimensional and referential standards of the Pump		API 610	
Additional Features	O	TEXT	Any other important features of the Pump			

Accurate Asset Information Aligned with ISO 14224 Standards

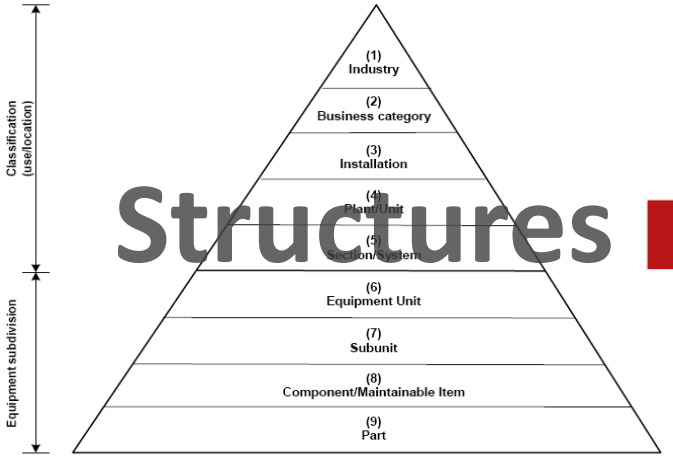
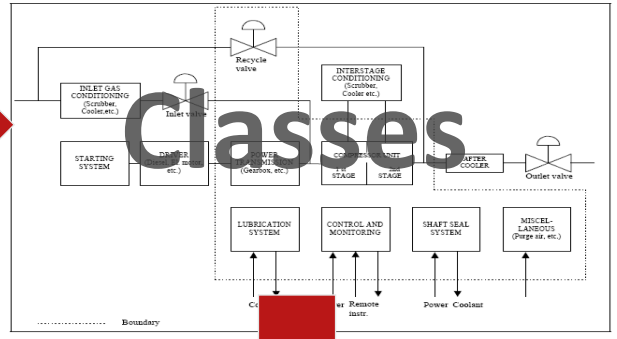


Figure 4 —Taxonomy classification

Structures

Equipment class		Equipment type	
Description	Code	Description	Code
Compressor	CO	Centrifugal	CE
		Reciprocating	RE
		Screw	SC
		Blowers/fans	BL
		Axial	AX



Classes

Equipment class	Co[illegible]ors					
Subunit	Power transmission	Compressor	Control and monitoring	Lubrication system	Shaft seal system	Miscel-laneous
Maintainable item / Part	Gearbox/variable drive Bearings Coupling to the driver Lubrication Seals Coupling to the driven unit	Casing Rotor with impellers Balance piston Interstage seals Radial bearing Thrust bearing Shaft seals Internal piping Valves Antisurge system including recycle valve and controllers Piston Cylinder liner Packing	Control Actuating device Monitoring Valves Internal power supply	Oil tank with heating system Pump with motor Check valves Coolers Filters Piping Valves Lube oil	Oil tank with heating Reservoir Pump with motor/gear Filters Valves Buffer gas Seal oil Dry gas seal Seal gas Scrubber	Base frame Piping, pipe support and bellows Control-isolation and check valves Coolers Silencers Purge air Magnetic bearing control system Flange joints Others

BOMs

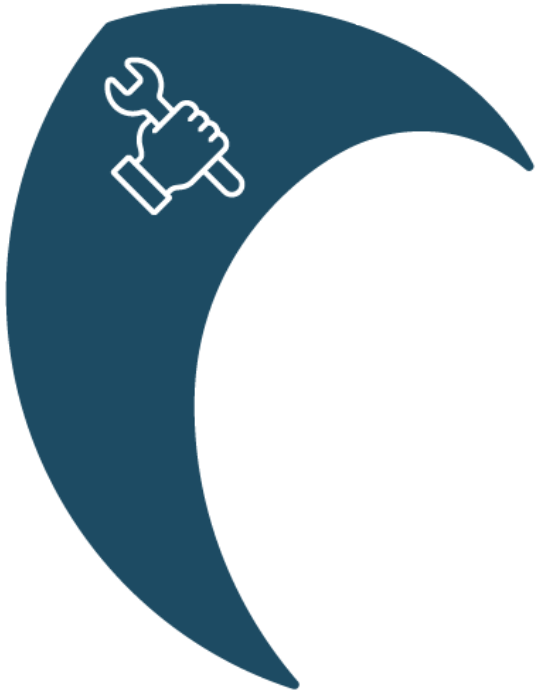
No.	Notation	Description
1.0	**Design-related causes - general**	Failure related to inadequate design for operation and/or maintenance, but no further details known
1.1	Improper capacity	Inadequate dimension/capacity
1.2	Improper material	Improper material selection
1.3	Improper design	Inadequate equipment design or configuration (shape, size, technology, configuration, operability, maintainability, etc.)
2.0	**Fabrication/installation-related causes - general**	Failure related to fabrication or installation, but no further details known
2.1	Fabrication error	Manufacturing or processing failure
2.2	Installation error	Installation or assembly failure (assembly after maintenance not included)
3.0	**Failure related to operation/maintenance - general**	Failure related to operation/use or maintenance of the equipment, but no further details known
3.1	Off-design service	Off-design or unintended service conditions, e.g. compressor operating outside envelope, pressure above specification, etc.
3.2	Operating error	Mistake, misuse, negligence, oversights, etc. during operation
3.3	Maintenance error	Mistake, errors, negligence, oversights, etc. during maintenance
3.4	Expected wear and tear	Failure caused by wear and tear resulting from normal operation of the equipment unit
4.0	**Failure related to management - general**	Failure related to management issues, but no further details known
4.1	Documentation error	Failure related to procedures, specifications, drawings, reporting, etc.
4.2	Management error	Failure related to planning, organization, quality assurance, etc.
5.0	**Miscellaneous - general** [a]	Causes that do not fall into one of the categories listed above
5.1	Unknown [a]	No information available related to the failure cause

[a] The data acquirer should judge which is the most important cause if more than one exist, and try to avoid the 5.0 and 5.1 codes.

Materials

Supply Chain

Prometheus Methodology: “Get it Clean, and Keep it Clean”



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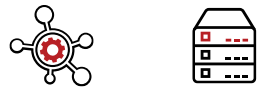
Master Data as a Service (MDaaS)

Capture **Collate** **Compare** **Crowd**

Combine **Classify** **Cleanse** **Create**

Connect **Control**



MDaaS Capture

- Mobile App for Image Capture
- Cloud-based Image Management
- Intelligent Image Processing
- Unstructured to Structured Data Extraction
- Crowd and AI-based Data Enrichment

MDaaS Enrich

- Standards-centric Classification
- Drawing-based and manufacturing website-based data mining
- Machine Learning-based Data Cleansing & enrichment

MDaaS Connect

- Comprehensive Connector Suite
- Data Governance accelerators
- Cross-System Integration and control

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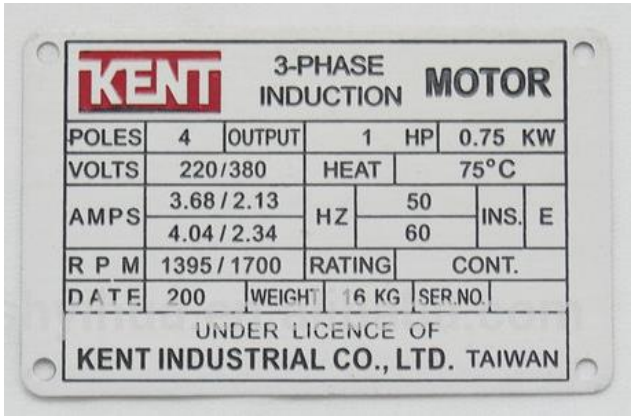
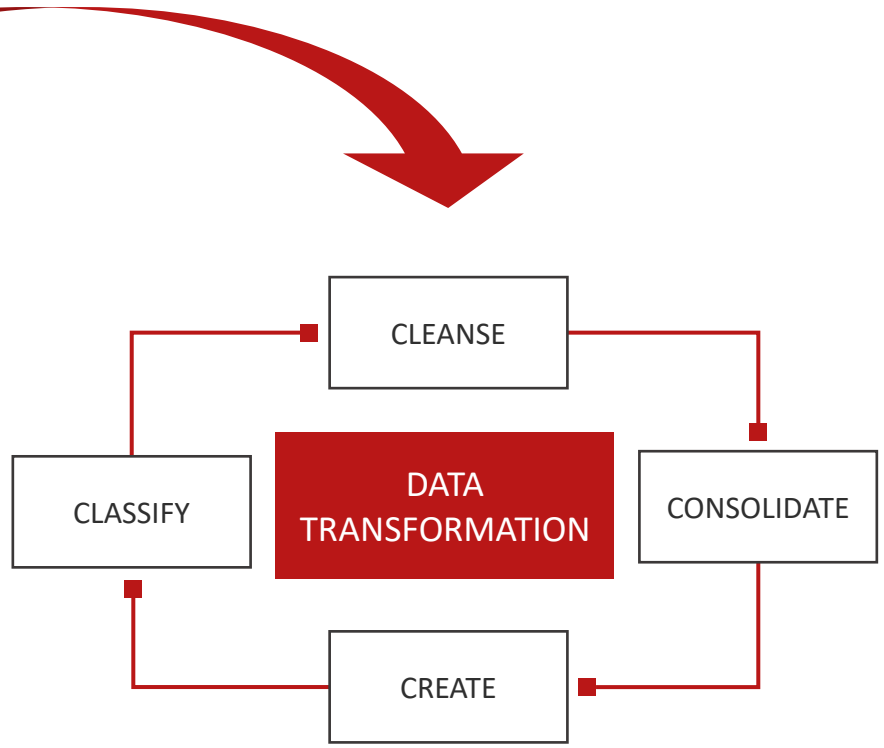
As-built Equipment Manufacturer/Model Information

Asset Master Data Enrichment via Prometheus' 4Cs Methodology



Equipment 'brass tag' information collected from plant walkdowns, engineering documents or other systems of record



Cleanse

- NMA identification (Noun, Modifier, Attribute) or Equipment Class identification
- Parse data into appropriate attributes
- Normalize and standardize

Create (Enrich)

- Create and/or enrich attributes (databases, web scraping, catalogs, contact with data source)
- Physical verification (onsite "boots on the ground")

Consolidate (De-Dupe)

- De-duplicate data within a database, |or among multiple databases
- Transfer history

Classify

- Industry standards (UNSPSC, PIDX, eClass, eOTD)
- ISO14224 and Prometheus Customized
- Customized smart numbering

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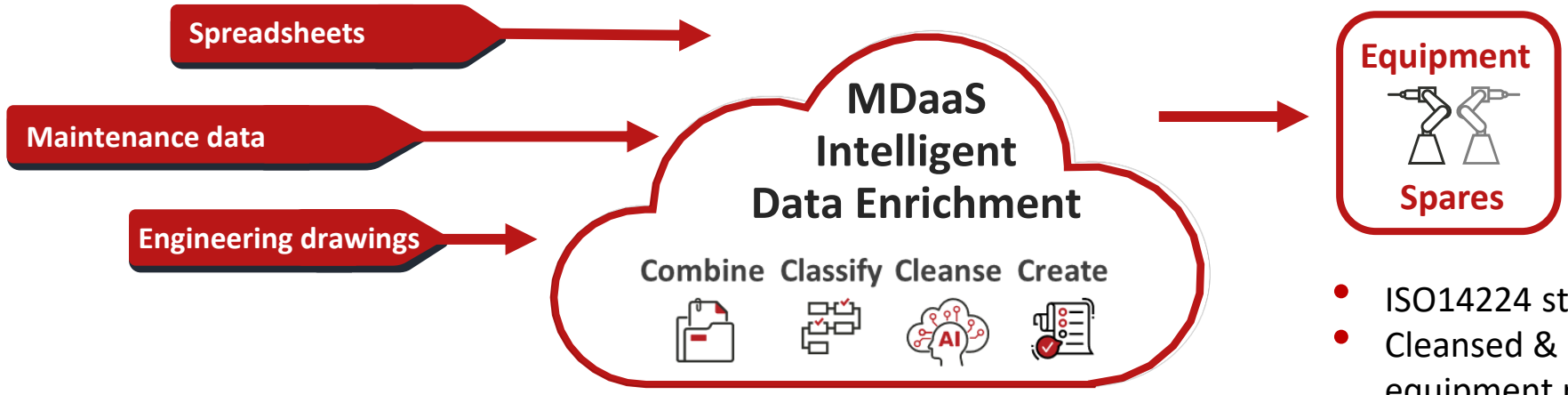
MDaaS Intelligent Data Enrichment

Validating, Transforming & Enriching Asset Master Data



- ISO14224 standard functional locations
- Cleansed & enriched ISO14224 standard equipment records
- Cleansed & enriched UNSPSC standard spares records
- Functionally equivalent equipment & spares
- Alternate suppliers

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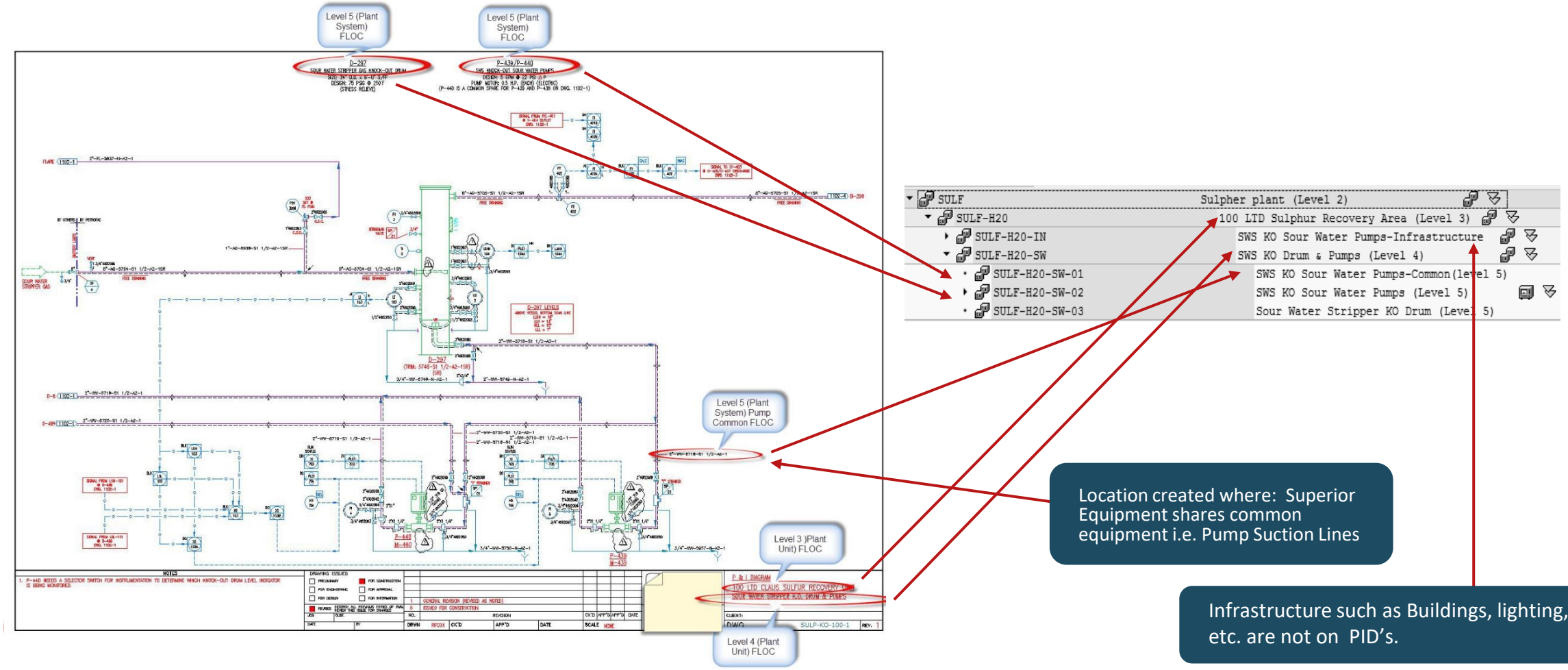
Data Enrichment Begins with the Most Trusted Information

- Engineering Drawing take-off to ISO 14224-based Location creation



MDaaS Intelligent Data Enrichment

Machine learning based asset master data enrichment

MANUFACT. NAME	MANUFACT. PART NO	SHORT DESCRIPTION	LONG DESCRIPTION	UNSPSC CODE	CLASS	CHARACTERISTIC NAME	CHARACTERISTIC VALUE
PARKER	16F24C6164AAFEC05	VALVE:SOL;1 IN,2-WAY,NC,1 IN,NPT	VALVE:SOLENOID;NOMINAL SIZE:1 IN,CONFIGURATION:2-WAY,NC,ORIFICE SIZE:1 IN,PORT CONNECTION:NPT,COIL RATING:120 V AT 60 HZ,110 V AT 50 HZ,BODY MATERIAL:316 STAINLESS STEEL,ENCLOSURE:NEMA 7/9,PRESSURE RANGE:100 PSI FOR OIL,150 PSI FOR AIR/WATER,SOFTGOODS:BUNA-N SEAL,ADDITIONAL FEATURES:PILOT-OPERATED,OFFSET DIAPHRAGM	Solenoid valves	VALVE_SOLENOID	NOMINAL SIZE	1 IN
						CONFIGURATION	2-WAY,NC
						ORIFICE SIZE	1 IN
						PORT CONNECTION	NPT
						COIL RATING	120 V AT 60 HZ,110 V AT 50 HZ
						BODY MATERIAL	316 STAINLESS STEEL
						MATERIAL SPECIFICATION	
						ENCLOSURE	NEMA 7/9
						PRESSURE RANGE	100 PSI FOR OIL,150 PSI FOR AIR/WATER
						SOFTGOODS	BUNA-N SEAL
						CERTIFICATION/STANDARD	
						ADDITIONAL FEATURES	PILOT-OPERATED,OFFSET DIAPHRAGM

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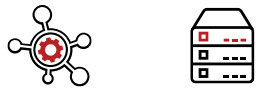

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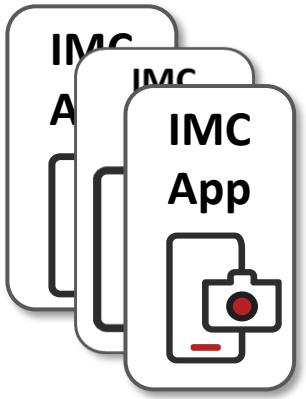
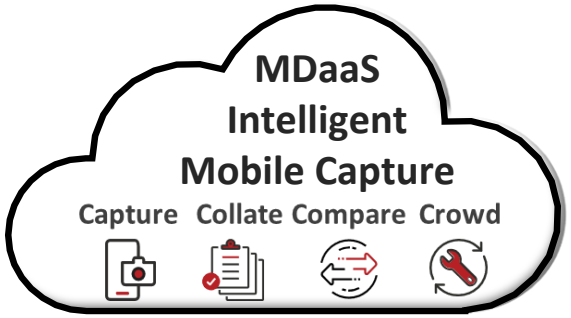
MDaaS Intelligent Mobile Capture

Automated Field Data Collection: When your asset data is missing or untrustworthy



IMC Mobile App

- Operates on any iOS (Apple) or Android device
- Runs in connected or disconnected mode
- Can be used by anyone (minimal training
- Captures, classifies & catalogs large volumes of asset photos



IMC Cloud-based Data Extraction

- Utilizes machine learning to orchestrate image recognition, optical character recognition & crowd sourcing to extract, standardize & organize equipment & spare parts data

GET IT ON Google Play

Download on the App Store

Enables Field Data Collection via photo capture and classification only

- No interpretation requiring extra time or specialized knowledge
- No transcription or manual annotation
- Streamlined process enables capture of 200-300 asset records per day

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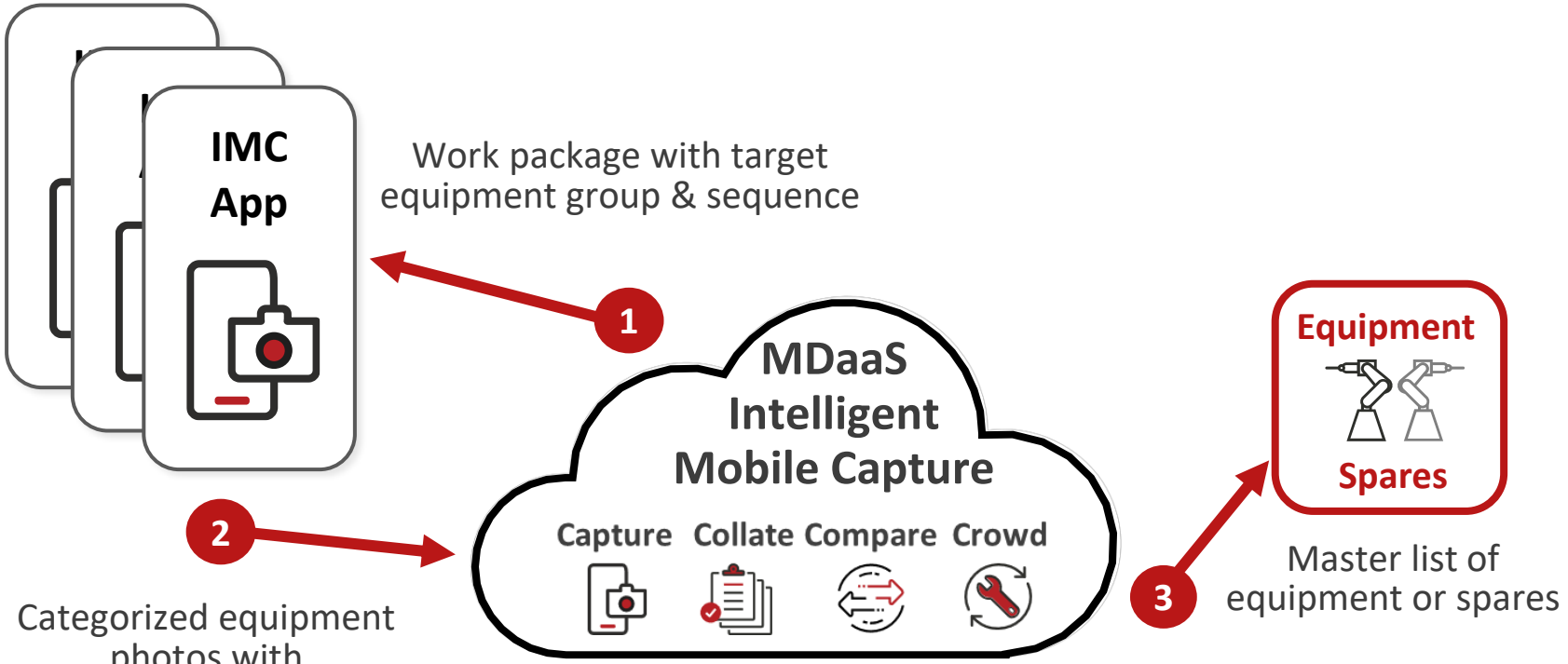

Manufacturer: ASCO
Product Family: 8320, Series EF8320
Actuation: Solenoid
Body Style: 3-Way
End 1 Size: 1/4 in.
Fluid: Gas, Water, Air
Function: Normally Closed
Max. Pressure: 115 PSIG
Max. Temperature: 150°F
Port Connection: FNPT
Port Size: 1/4 in.
Seal Material: Buna-N, NBR
Valve Type: 3-Way

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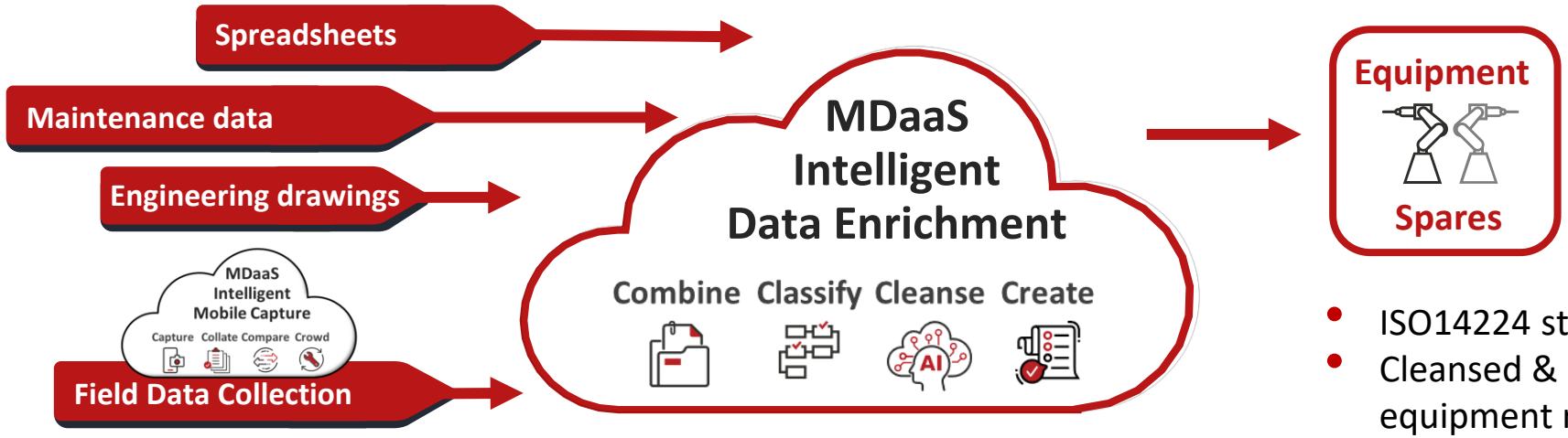

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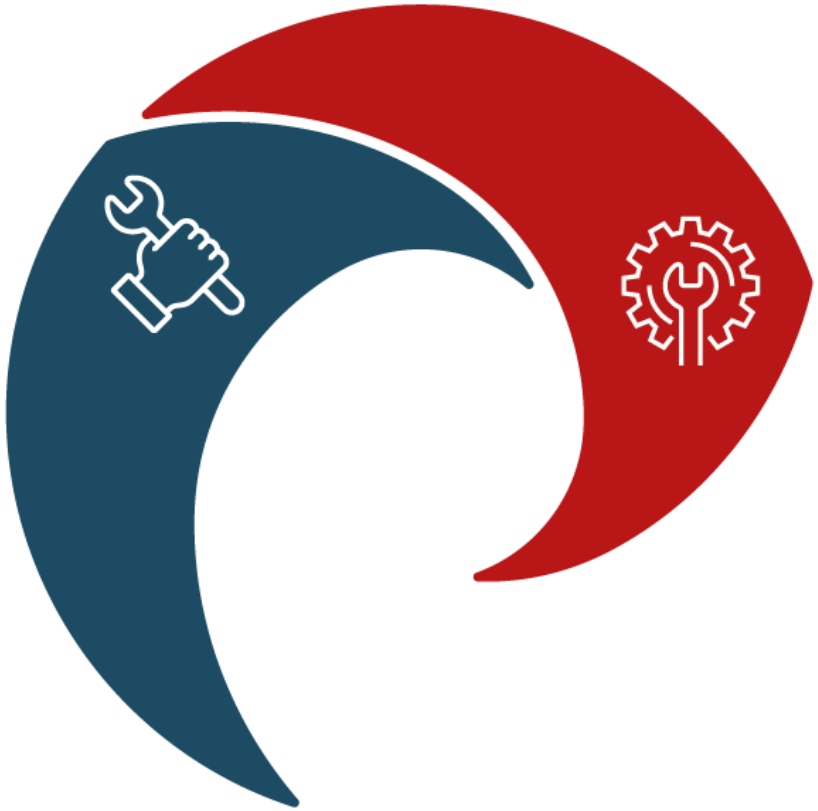
						SOFTGOODS	BUNA-N SEAL
						CERTIFICATION/STANDARD	
						ADDITIONAL FEATURES	PILOT-OPERATED,OFFSET DIAPHRAGM

MRO Spares Data Transformation

INPUT DATA	CLEANSED DATA	CLEANSED, STANDARDIZED AND CONSOLIDATED DATA	ENRICHED DATA
BALL BEARING 15x35x11	BALL BEARING, 15MM,35MM,11MM	BEARING,BALL, 15 MM,35 MM,11 MM	BEARING,BALL;DEEP GROOVE,15 MM ID,35 MM OD,11 MM W,6200 SERIES,1 ROW,1 SHIELD, STEEL,PRESSED CAGE,2 DEG MISALIGNMENT,8.06 KN DYNAMIC,3.75 KN STATIC
BALL BRG 15 X35 X11 MM	BALL BEARING, 15MM,35MM,11MM		
BALL BEARING Ø15X11X35 MM	BALL BEARING, 15MM,35MM,11MM		
15X11X35 BEARING BALL	15MM,35MM,11MM,BEARING BALL		
CARTRIDGE FUSE FAST ACTING 600 VAC 30 A	CARTRIDGE FUSE, FAST ACTING, 600 VAC, 30 A	FUSE,CARTRIDGE, FAST ACTING,600 VAC,30 A	FUSE,CARTRIDGE;FAST ACTING,600 VAC,30 A,200 KA,END CAP,NICKEL PLATED BRASS,MELAMINE TUBE,CSA
CARTRIDGE FUSES FAST ACTING 600 VAC 30 AMPERE	CARTRIDGE FUSE, FAST ACTING, 600 VAC, 30 A		
FAST ACTING CARTRIDGE FUSES 600 VAC 30 AMP	FAST ACTING CARTRIDGE FUSE, 600 VAC, 30 A		
CARTRIDGE FUSES 600 VAC 30 AMPERE, FAST ACTING	CARTRIDGE FUSE, 600 VAC, 30 A, FAST ACTING		
45 DEG ELBOW PIPE ADTPTR	45 DEG, ELBOW, PIPE, ADAPTER	ELBOW,PIPE,ADAPTER,45 DEG,1-1/2 IN	ELBOW,PIPE;ADAPTER,45 DEG,1-1/2 IN,SCH 40,200 PSI,CARBON STEEL,BLACK OXIDE,ASTM A106,1-1/2 IN NPS X 1-1/2 IN NPS,1.94 IN CENTER TO END DISTANCE
1-1/2 INCH X 45 DEGREE PIPE ELBOW	1-1/2 IN, 45 DEG, PIPE, ELBOW		
pipe elbow 45° 1 1/2“ n° 45	PIPE, ELBOW, 45 DEG, 1-1/2 IN		
45° 1 1/2“pipe elb	45 DEG, 1-1/2 IN, PIPE, ELBOW		
BUSH TAPER 4300 LB-IN TORQUE	BUSH,TAPER, 4300 LB-IN TORQUE	BUSHING,TAPER LOCK,1-5/8 IN,4300 LB-IN TORQUE	BUSHING,TAPER LOCK;1-5/8 IN BORE,1-1/2 IN L,3/8 X 1/8 IN KEYWAY,2-1/8 IN BOLT CIRCLE,3/8 X 5/8 IN LOCK SCREW,2 SCREW,STEEL,4300 LB-IN TORQUE
BUSHG 1-5/8 TAPER LCK	BUSHING, 1-5/8 IN, TAPER LOCK		
1-5/8” TAPER LOCK BUSHING	1-5/8 IN, TAPER LOCK BUSHING		
TORQUE 4300 LB-IN TAPER BUSHING LOCK	TORQUE 4300 LB-IN, TAPER BUSHING, LOCK		

Prometheus Methodology: “Get it Clean, and Keep it Clean”



1 BUILD

- Internationally
- Recognized
- Standards
- Business Rules
- Enterprise Taxonomy
- Data Quality Culture

2 FIX

- Data Quality
- Improvement
- Data Quality Monitoring
- Control Data Process
- De-Duplication
- Unstructured Data

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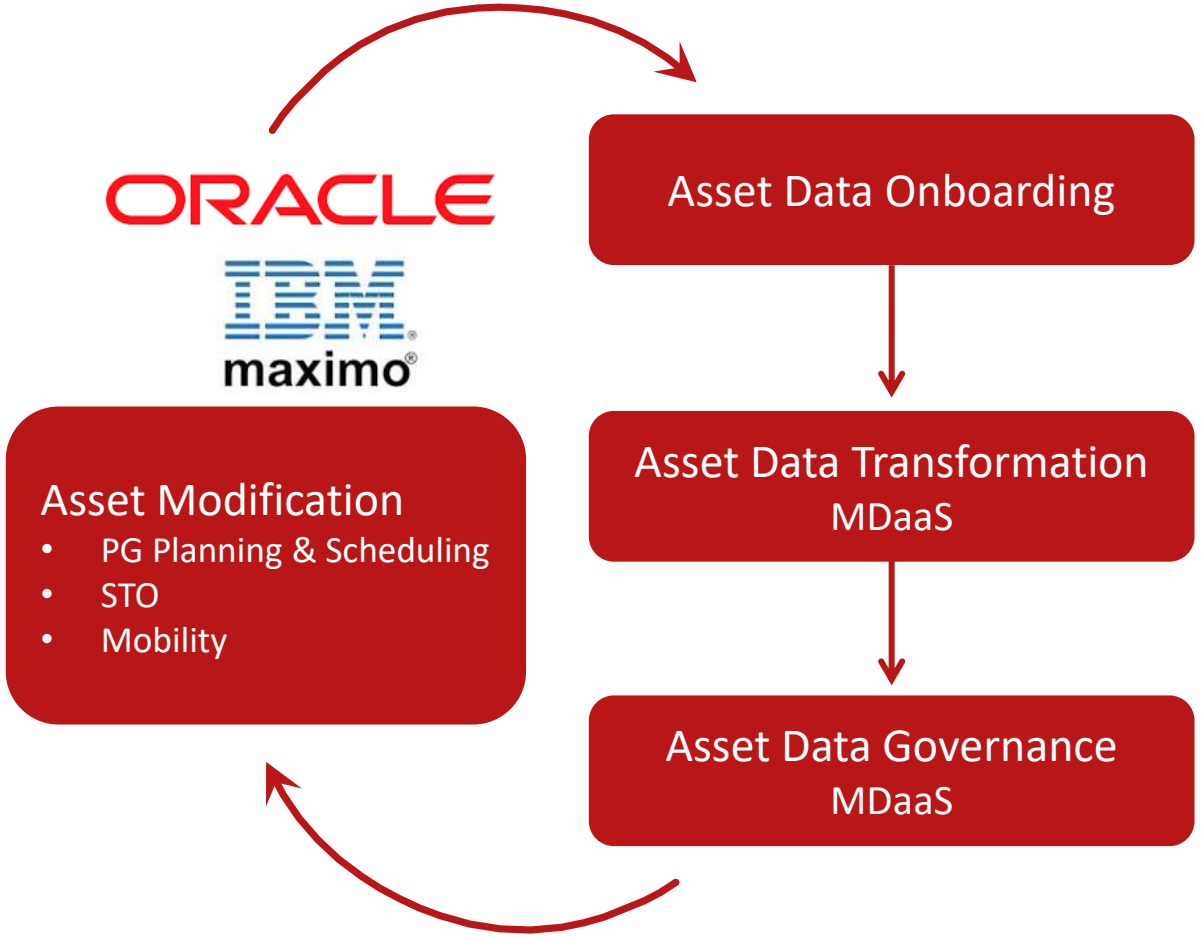
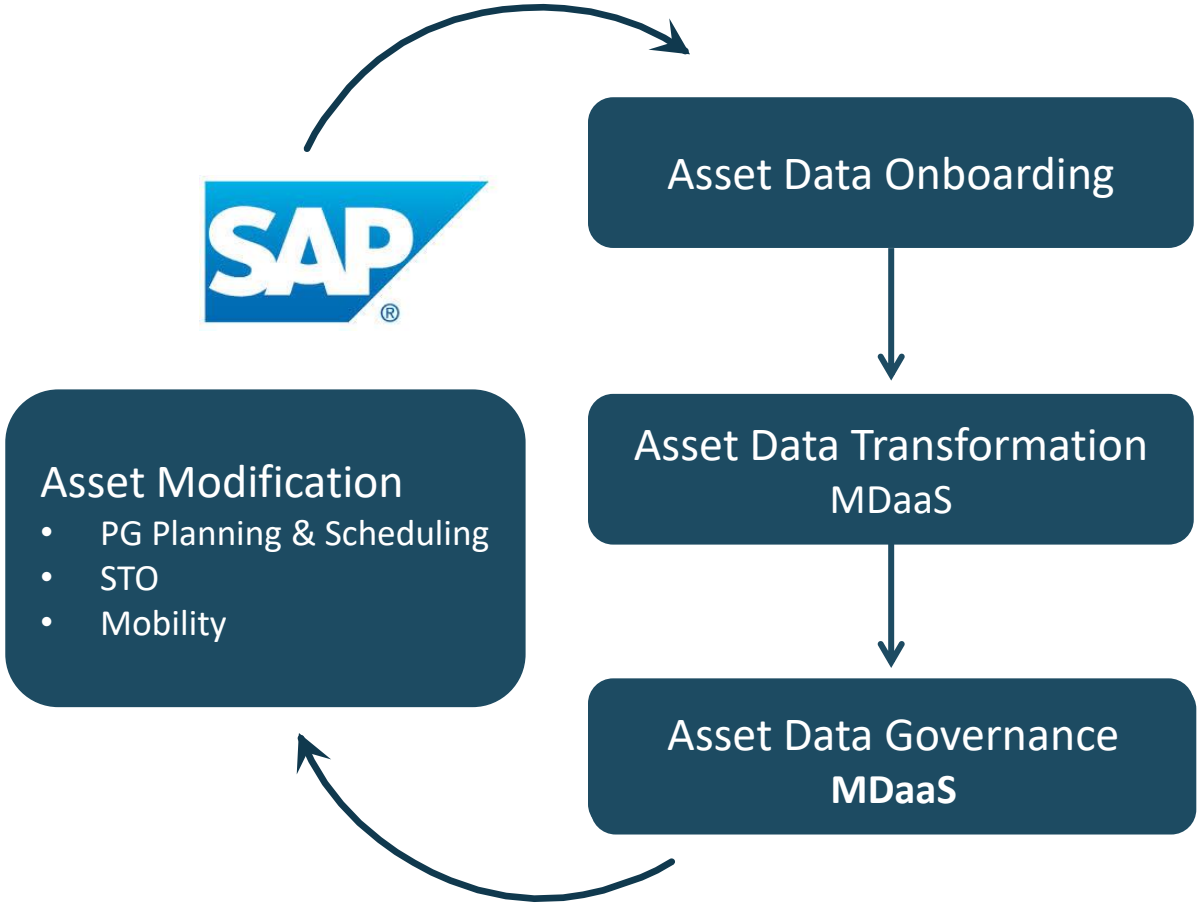
Prometheus Methodology: “Get it Clean, and Keep it Clean”





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Getting Started

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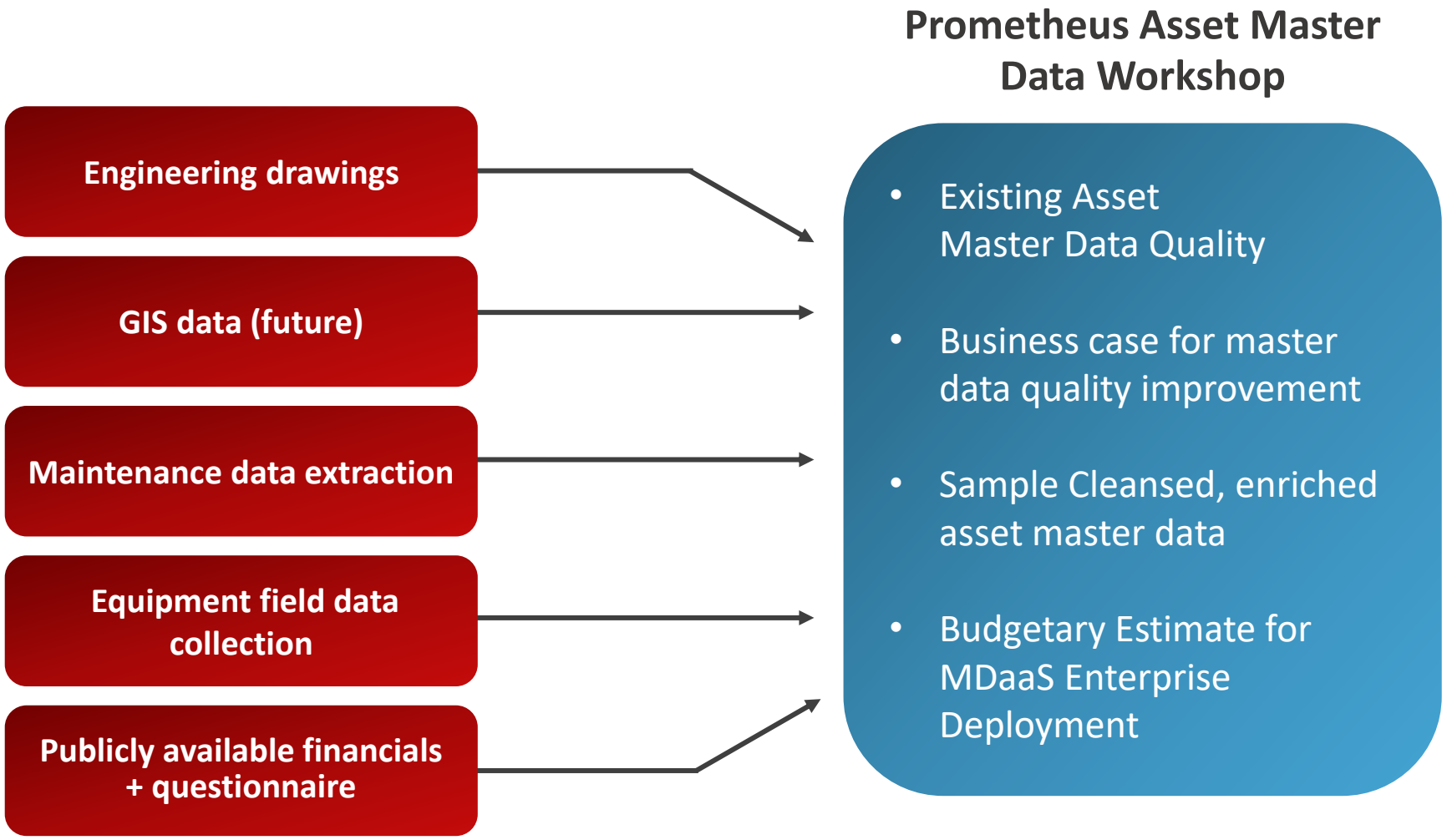
MDaaS Phase 1 Project



The Prometheus Best Practice for Asset Master Data Transformation

- Asset data extraction, cleansing, enrichment from legacy systems, documents & drawings
  - Prometheus Master Data as a Service (MDaaS)
- Establish Master Data Staging Area and load with cleansed, enriched ISO 14224 compliant asset data
- Maintain currency of legacy asset data until next generation EAM deployment
- Load accurate, complete asset master data upon next generation EAM deployment
- Maintain accuracy of asset master data during ongoing plant modifications

Questions?

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