

Understanding Your Master Data: The Vision vs. the Reality

March 14, 2023

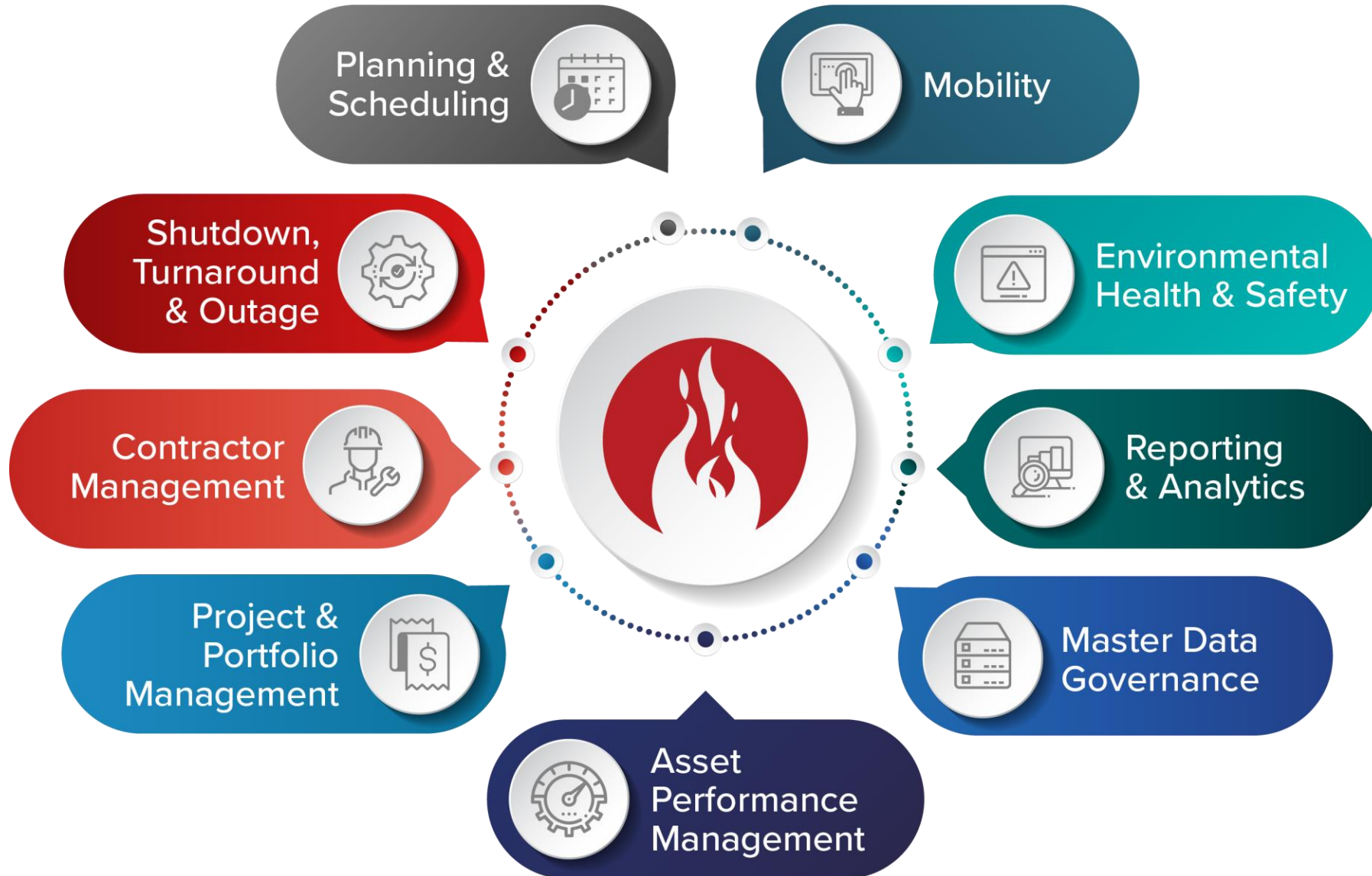
Erik Klein – Master Data Team Lead

Mike Jordan – VP of Master Data

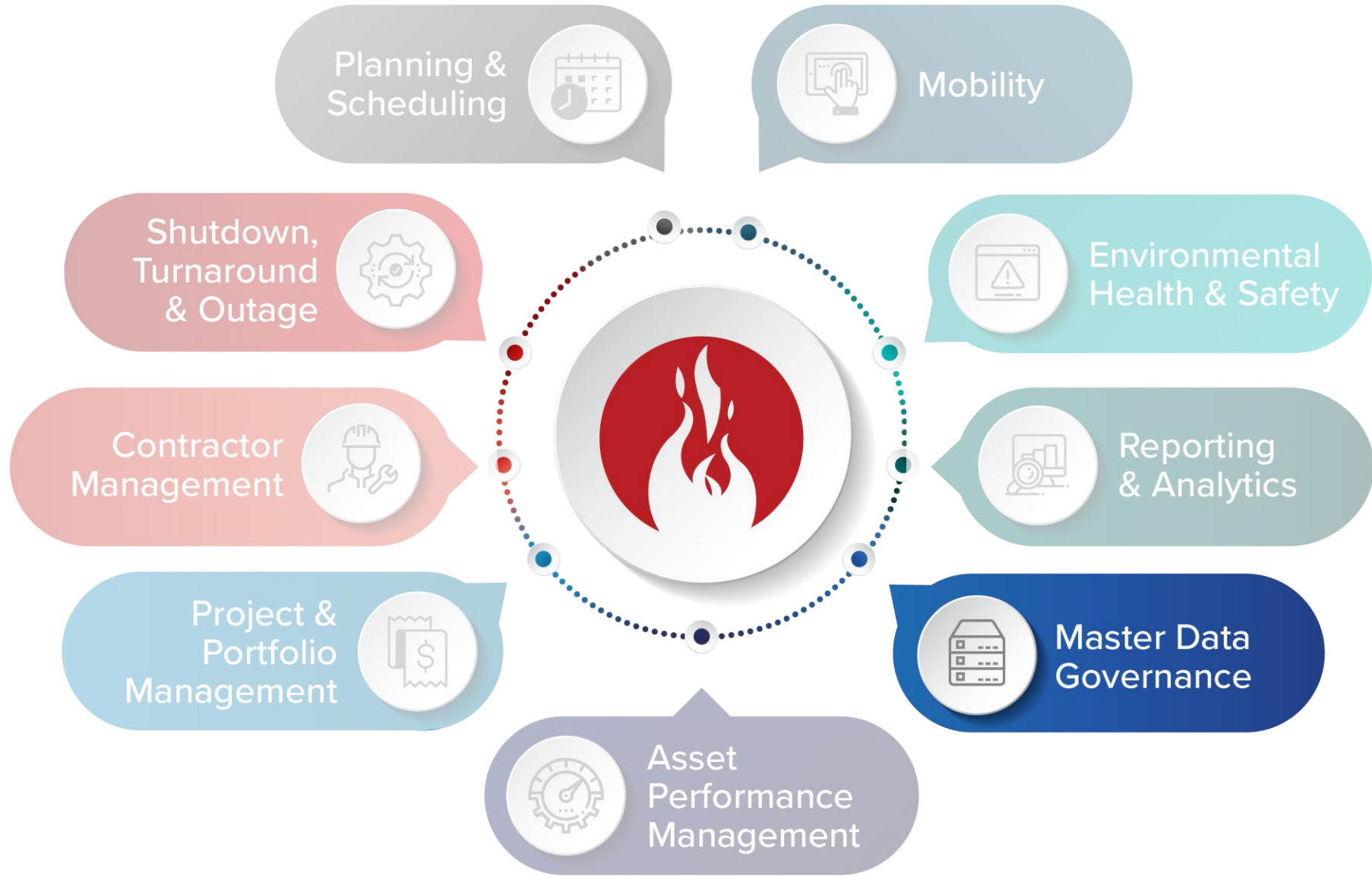
Agenda

- Dirty data and business impact
 - What happens to the data?
 - Why does it matter?
- Best practice for Master Data
- The Prometheus offering and what's new

The Prometheus Platform



The Prometheus Platform



What Does Having 'Dirty Data' Mean for You?

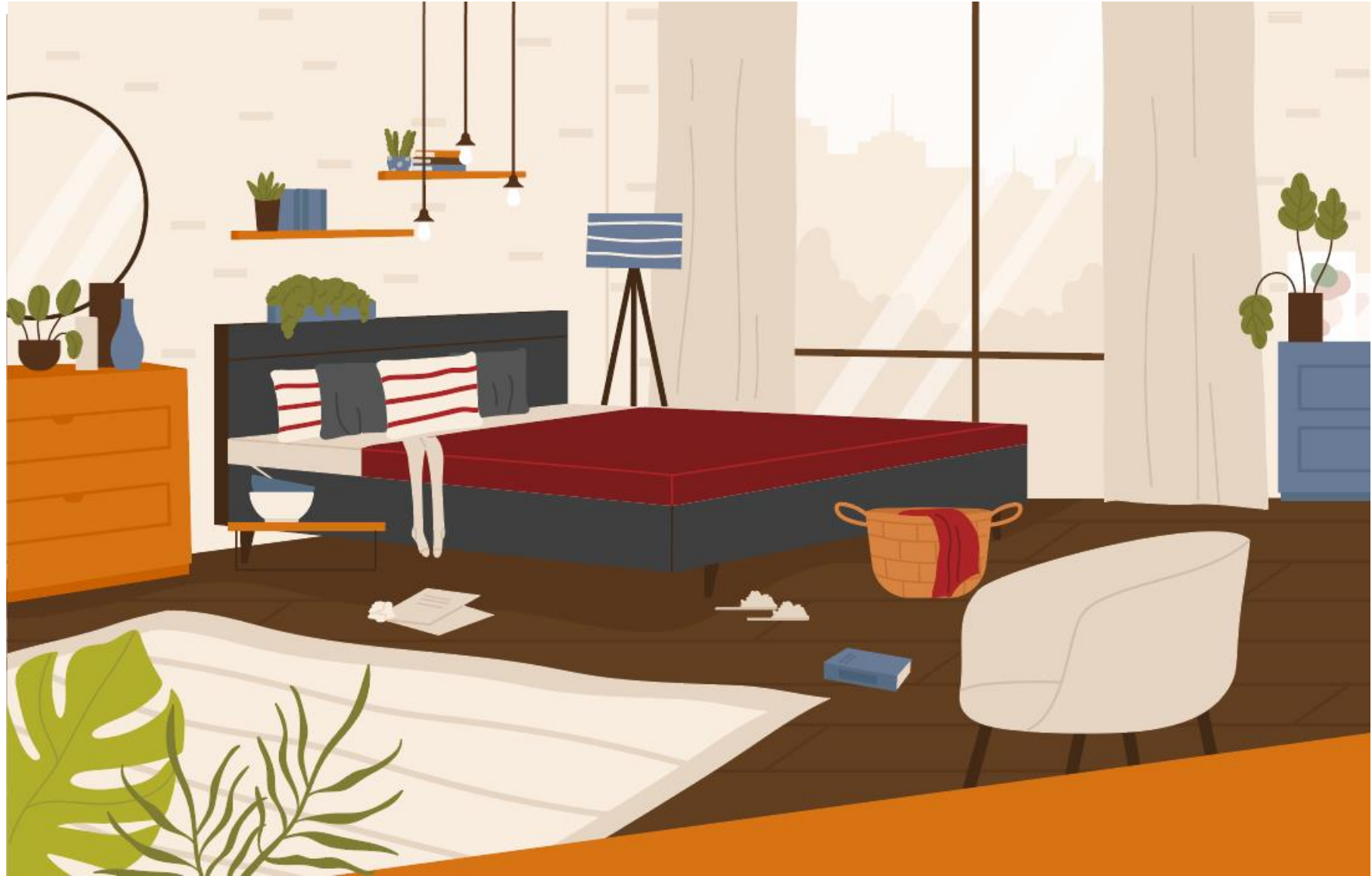
Data Year 1

- Don't clean your room for a day



Data Year 2

- Don't clean your room for a month
 - Bed
 - Bookshelf
 - Paperwork
 - Nightstand
 - Clothes

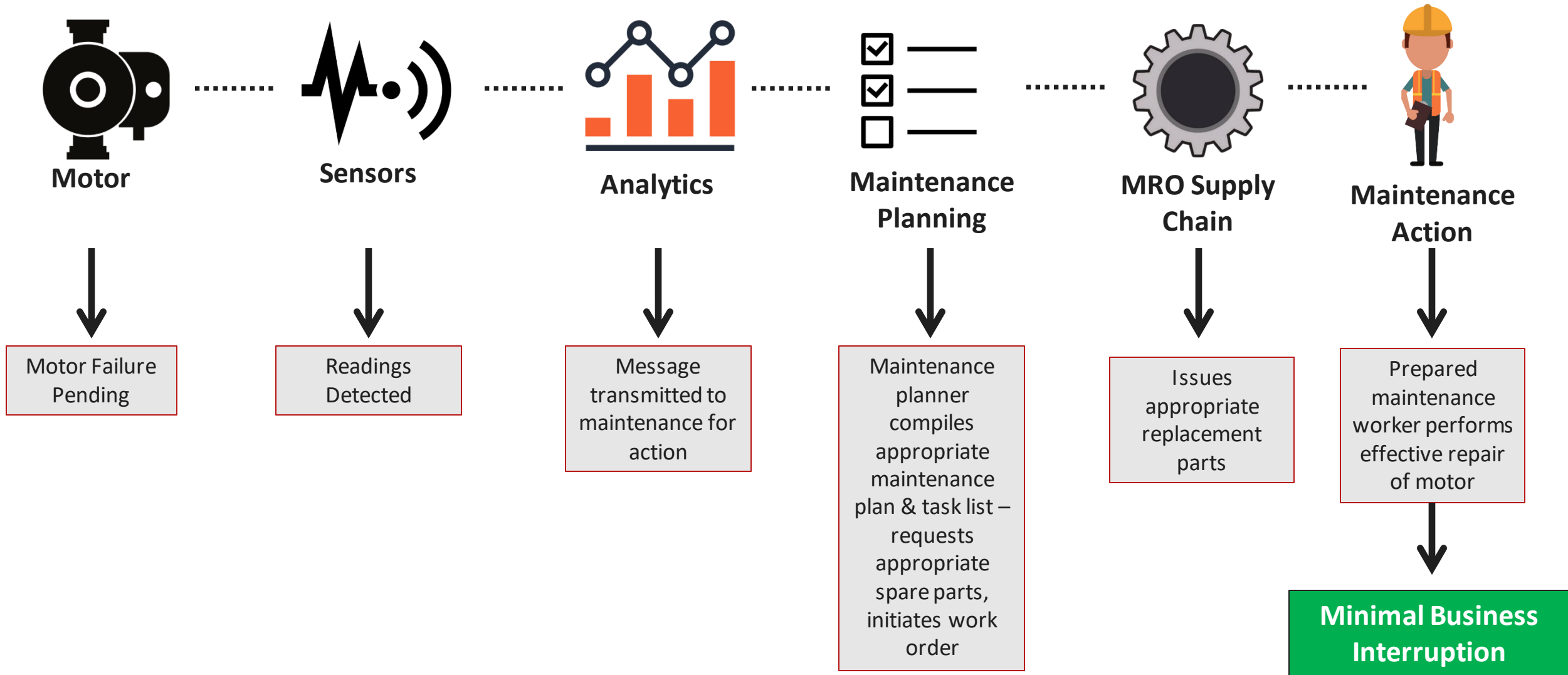


Data Year 3

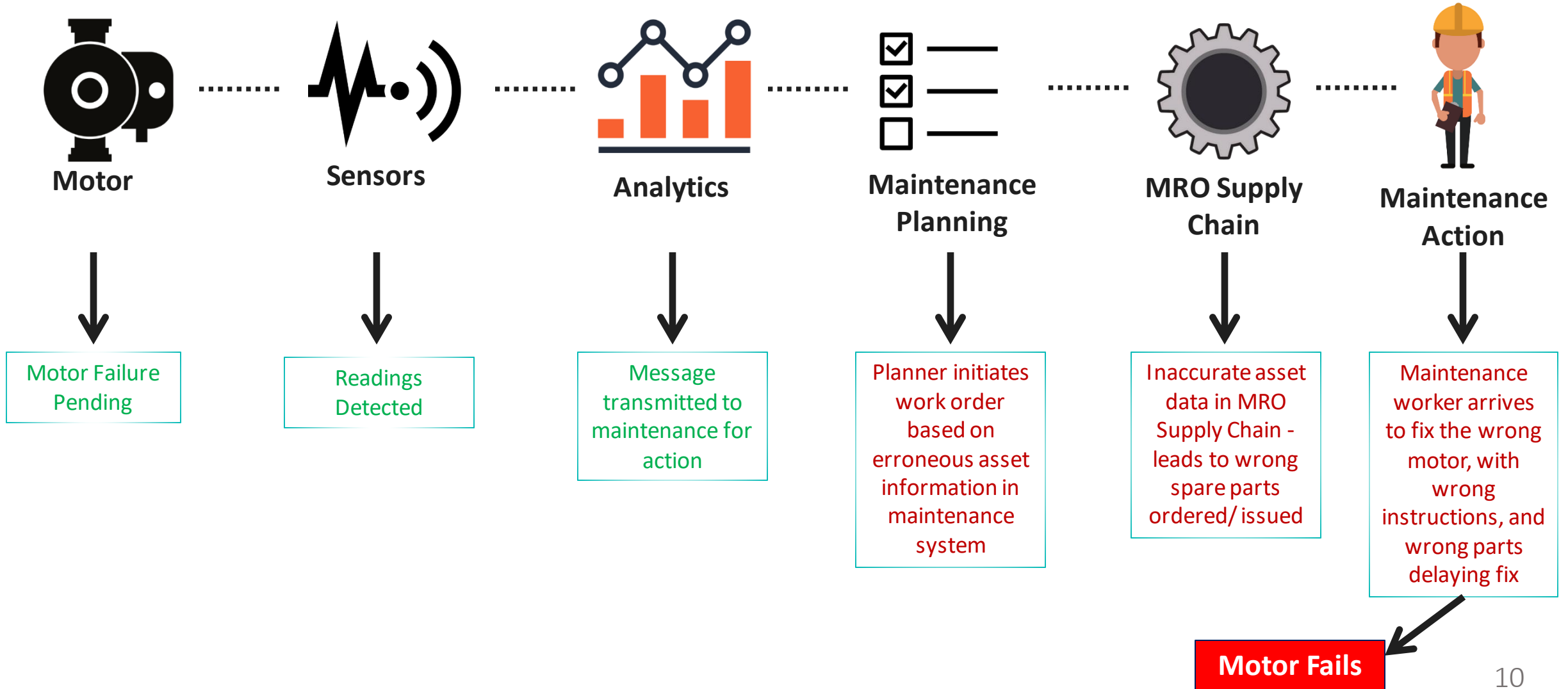
- Don't clean your room for half a year
 - Now if you trade rooms with someone else can they find the right items in your system?



Internet of Things (IoT) - The Vision



Internet of Things (IoT) - The Reality



Scoping

Align with corporate strategy and agree on a plan of attack

Planning

Scoping



Planning

Align with corporate strategy and agree on a plan of attack

Bad Data Creates Headaches



The Business Impact

Improved Maintenance Productivity



- Increase maintenance 'wrench-time'
- Added cycles for deferred maintenance
- Improved asset information context for informed troubleshooting & repair

Increased Operational Efficiency



- Reduce downtime from equipment failure
- Lower mean-time-to-repair
- Increase asset availability

Reduced MRO Supply Chain Costs



- Enables accurate prediction of spares needs
- Facilitates identification of obsolete inventory
- Minimizes expedited procurement

Decreased EH&S Risks



- Accurate, complete information enables informed decisions, reduces risks for maintenance staff and operators

Improved Auditability



- Improved financial accountability
- Ensures regulatory compliance
- Reduces product liability risks from quality

Achievement of Operational Excellence

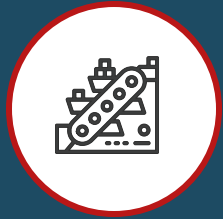


- Enables achievement of top quartile performance through advanced maintenance techniques such as reliability-centered-maintenance, risk-based inspection, performance analytics

Ensuring accurate, complete asset master data can have a direct impact on reducing environmental, health & safety risks, improving operational performance and maintaining regulatory compliance.

A Typical Business Case

As Modeled in Collaboration with SAP Value Engineering



Manufacturing Industry Client

- \$21B USD Revenue
- 54,000 Employees
- Benchmark data from 2 typical facilities

Obsolete Inventory Analysis

MRO Spares Balance Sheet	\$600,000,000.00
Annual Carrying Cost (25%)	\$150,000,000.00
MRO Spares Annual Spend	\$1,500,000,000.00

MRO Material Count	58,393
Materials on a BOM	29,914
Potential Obsolete Materials	28,479
% of Total	48.77%
Legitimate due to critical spares or lack of inventory	75.00%
Potential Impact	12.19%

Potential for All Locations	\$73,156,885.25
Annual Carrying Cost (25%)	\$18,289,221.31

First Call Resolution (Work Orders)

Total Equipment Master Records	65,200
Totally Criticality 9's and 5's	34,500
Criticality 9's and 5's with BOM	10,400
Current First Time Call Resolutions %	30.14%

Impact of Prometheus BOM Initiative	
New BOM's added to Equipment	11,500
Criticality 9's and 5's with BOM	21,900
Future First Time Call Resolution %	30.14%
Prometheus Impact	110.58%

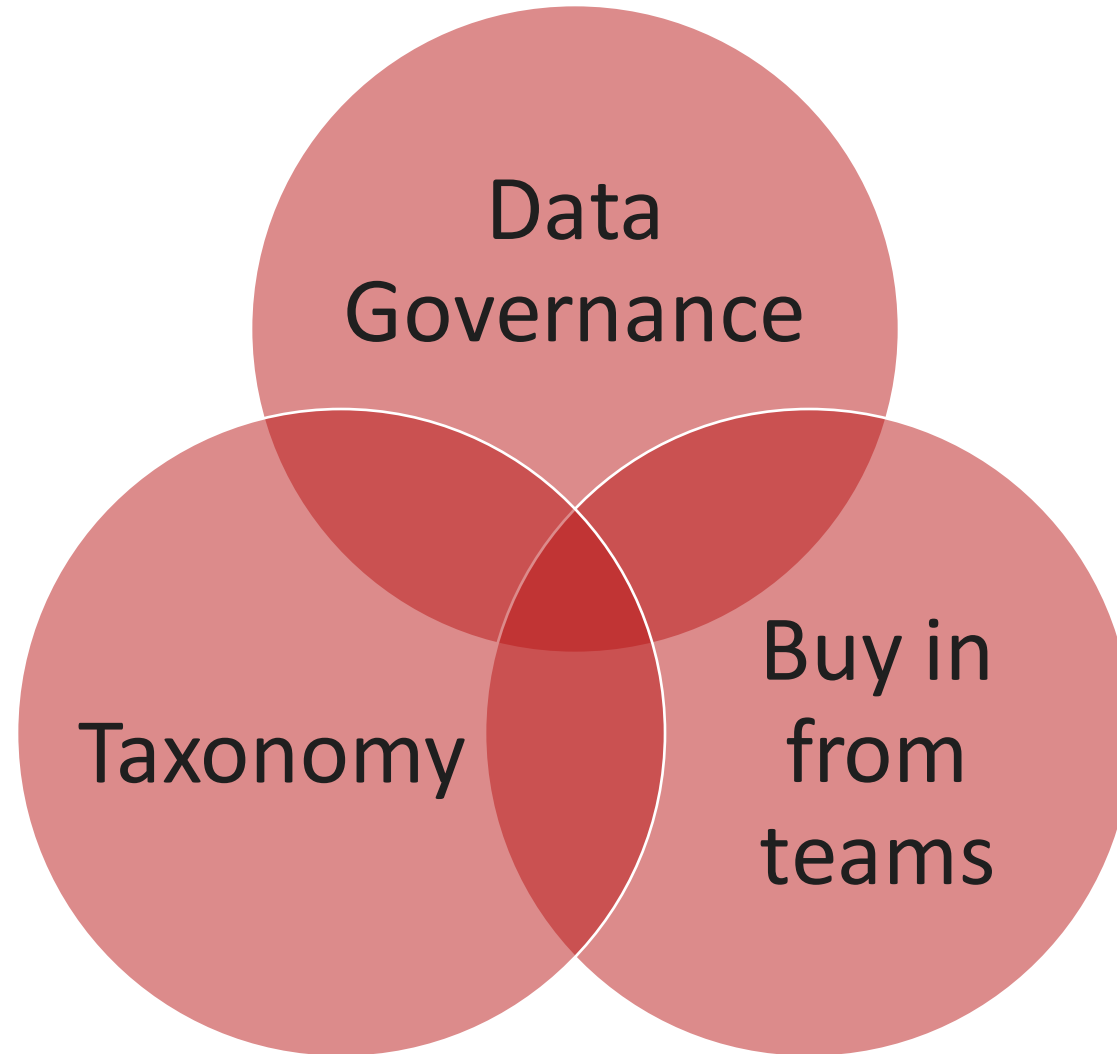
Wrench Time/ Asset Availability Analysis

Total Equipment Master Records	65,200
Total Criticality 9's and 5's	34,500
Criticality 9's and 5's with BOM	10,400
Current First Time Call Resolution %	30.14%
Equipment missing BOM's	21,100
Industry Average Wrench Time	40%

Impact of Prometheus BOM Initiative	
New BOM's added to Equipment	11,500
Criticality 9's and 5's with BOM	21,900
New First Time Call Resolution %	63.48%
Equipment Missing BOM's	12,600
Potential Wrench Time Improvement	47.74%
Potential Wrench Time	59.09%

How Do We Get Our Data Back on Track?

Create the Right Process



Back the Process up With Software

Master Data as a Service (MDaaS)



Capture

Collect

MDaaS **CAPTURE**

Mobile app for photo-based field data collection

Intelligent image processing and data extraction

Crowd and AI-based data enrichment



Cleanse

Classify

Crowd

MDaaS **ENRICH**

Standards-centric classification

Drawing and manufacturer's website-based data mining

Machine learning-based data cleansing & enrichment



Combine

Create

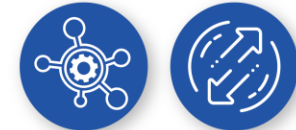
Control

MDaaS **SUSTAIN**

Master Data Management best practice templates

Workflow-driven review & approval

Automated business rules for data validation



Compare

Connect

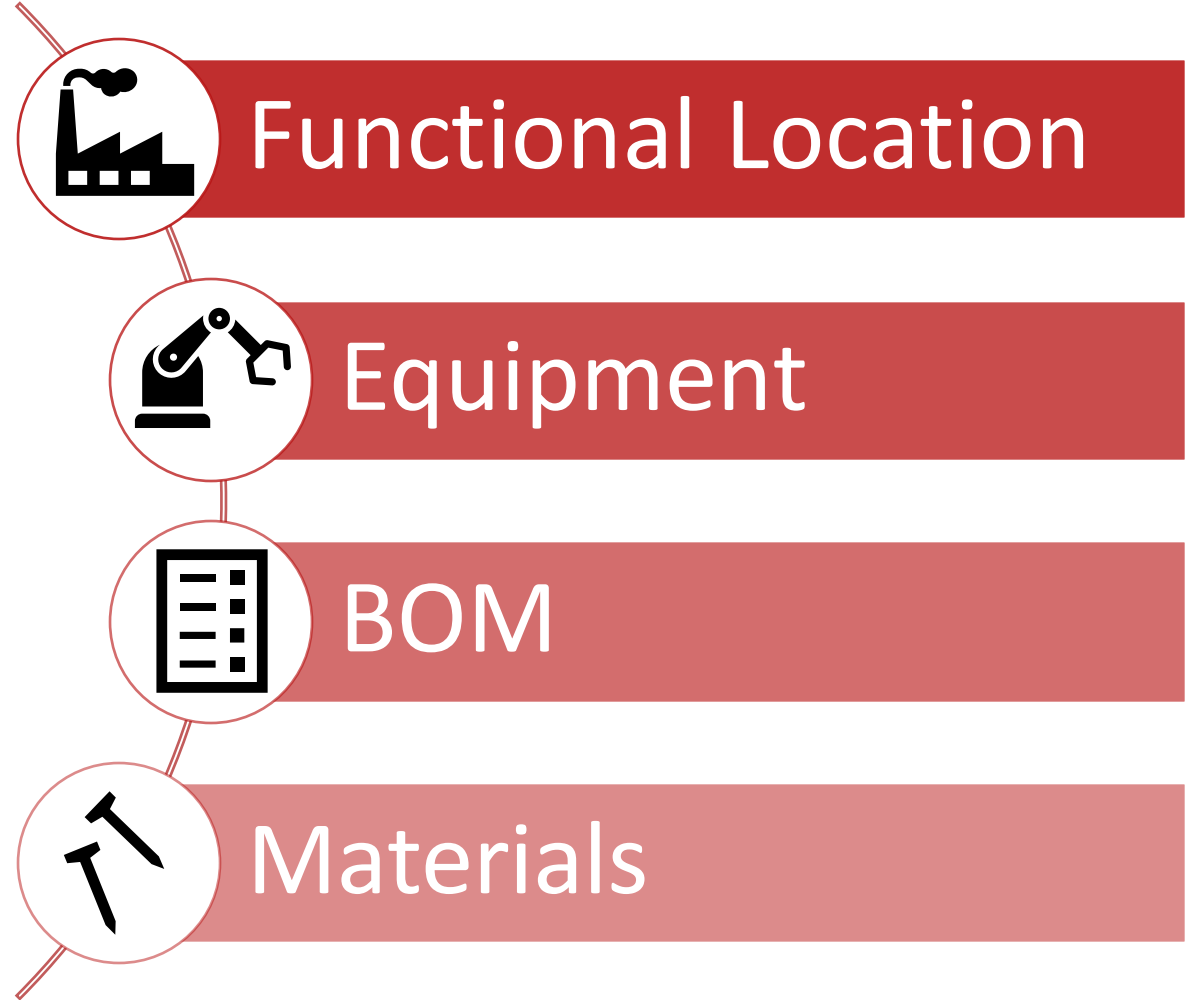
MDaaS **MIGRATE**

Auditable file comparison and tracking

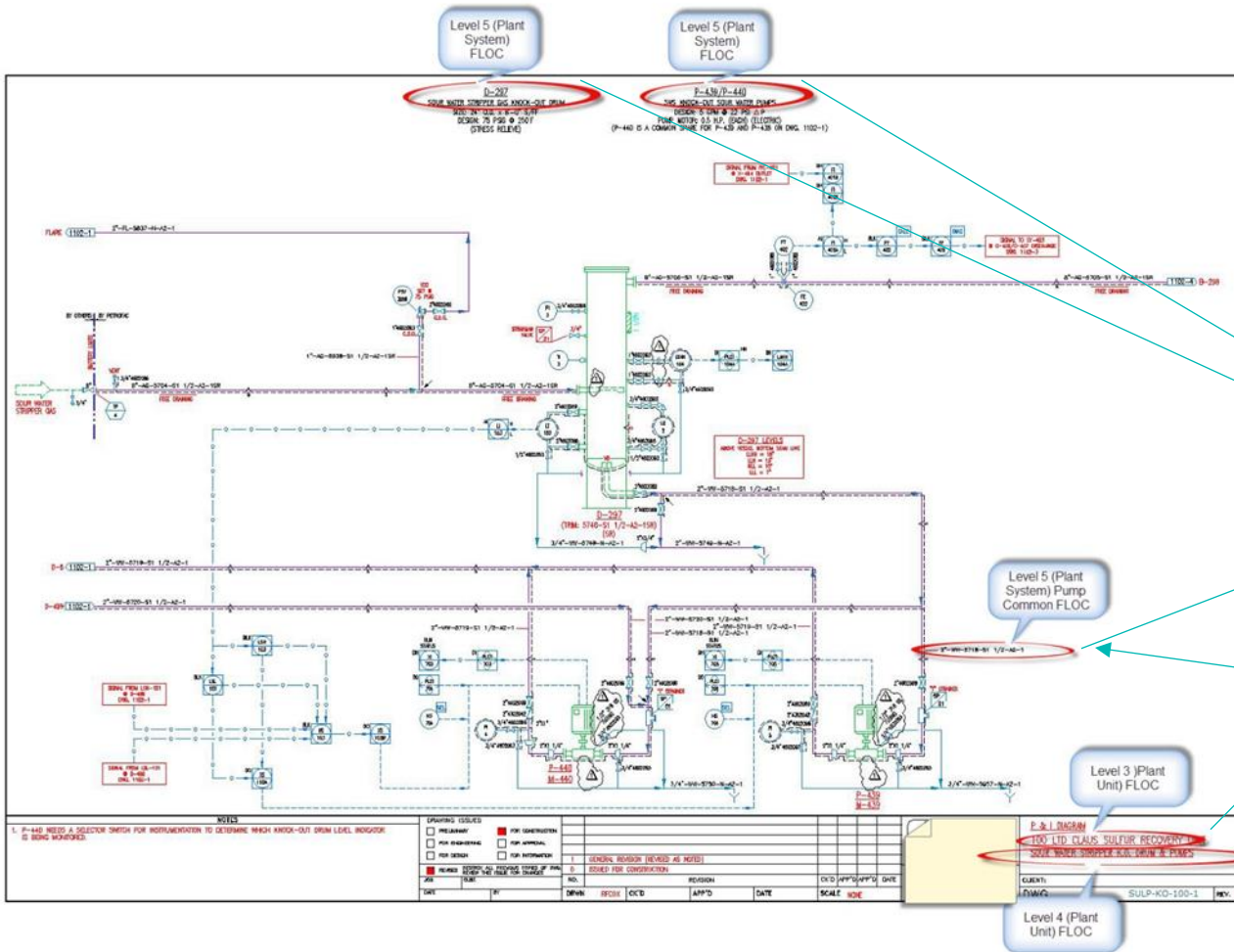
Integrates with commercial ETLs

Supports all major ERPs

Going Top to Bottom



P&ID to FLOC Hierarchy



SULF	Sulphur plant (Level 2)
SULF-H20	100 LTD Sulphur Recovery Area (Level 3)
SULF-H20-IN	SWS KO Sour Water Pumps-Infrastructure
SULF-H20-SW	SWS KO Drum & Pumps (Level 4)
SULF-H20-SW-01	SWS KO Sour Water Pumps-Common(level 5)
SULF-H20-SW-02	SWS KO Sour Water Pumps (Level 5)
SULF-H20-SW-03	Sour Water Stripper KO Drum (Level 5)

FLOC Created where:
Superior Equipment shares
common equipment
i.e. Pump Suction Lines

Infrastructure such as Buildings,
lighting, Fans etc. are not on PID's.

Equipment Taxonomy

Noun (Class): A unique and lowest common set or group of products

- Ex: Motors, Pumps, Compressor, etc.

Modifier (Sub-Class): Primary type of the Product within a Noun, based on:

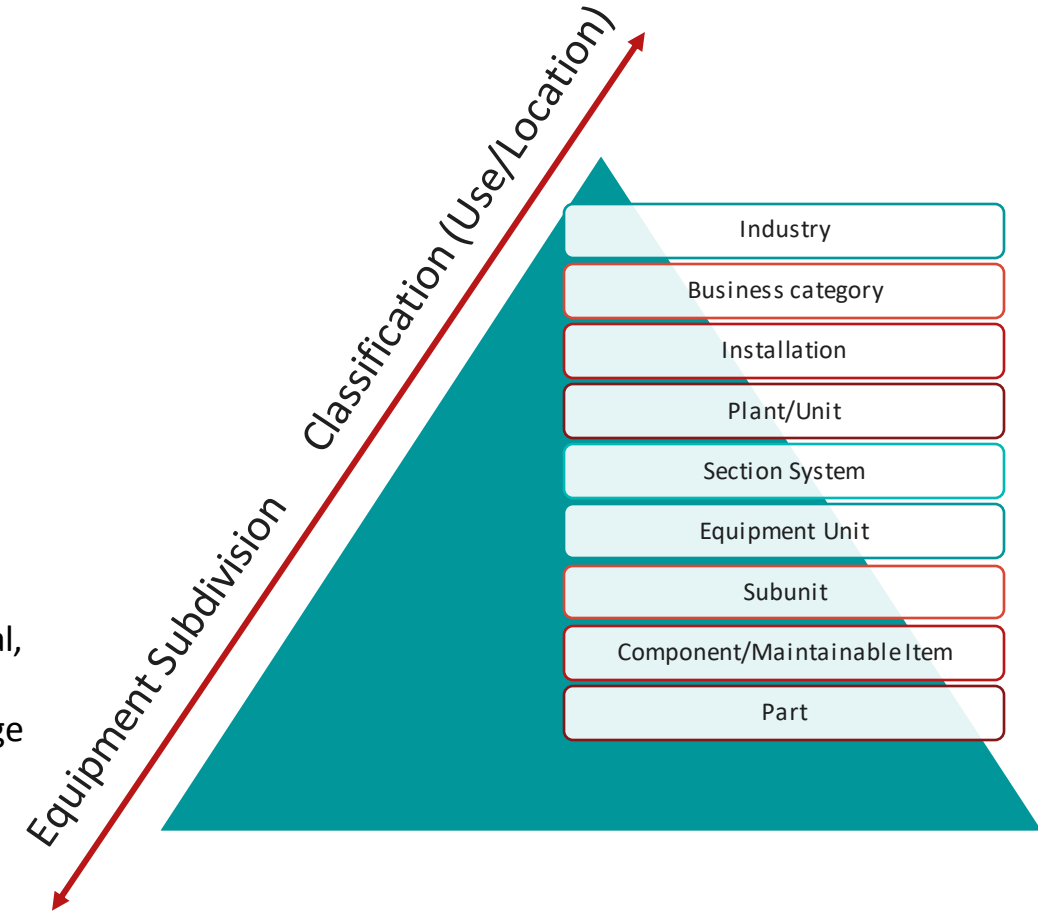
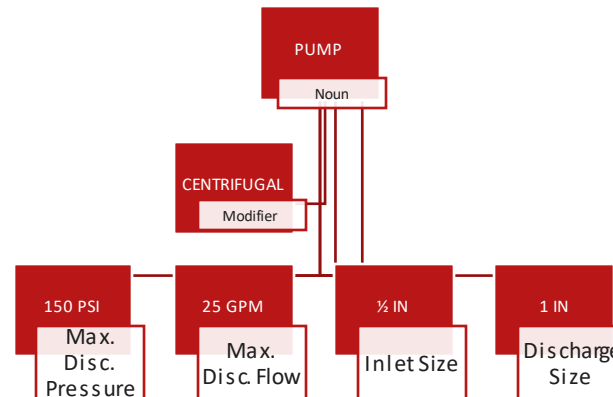
- Product Type (What is it?): Rotary, Centrifugal... (*Recommended*)
- Usage (Where is it used?): Distillation, Debutanizer...
- Functionality (How is it used?): Vertical, Horizontal...
- Custom Specs, if any

Every Modifier should have a distinct and unique critical attribute

Ex: Motor, Induction; Pump, Submersible etc.

Attribute: A specification, feature or a characteristic of the product that defines the physical, compositional, structural or performance information of an Equipment



- Ex: Size Dimensions, Material Specifications, Product Standards, Current/ Voltage Ratings, Load Ratings, Weight





























Centrifugal_Pump

Sourced Manuals

Manufacturers Manual

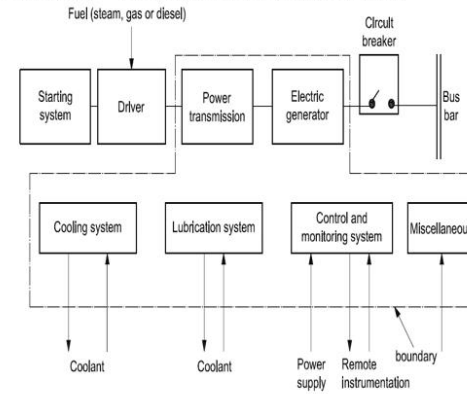
ASSETNUM	Manual
69327	 P400-1(4PP)GB(112).pdf
99073	 copeland-stream-ies-of-semi-herme

Other Manuals

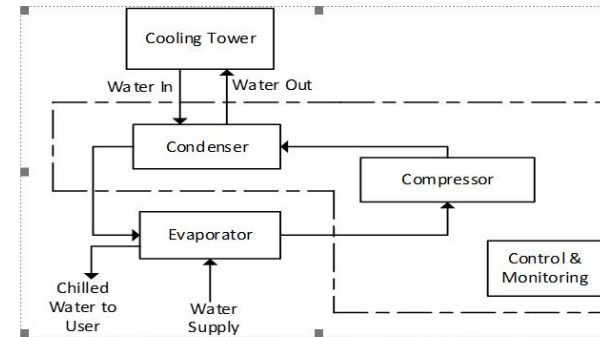
 Archive	 38HK.PDF	 38QC.pdf	 38QG15-H.pdf	 38QG36-H.pdf	 38QH38.pdf	 38QHA012.pdf
 38QHA024.pdf	 38QHA027.pdf	 38QHCT24.pdf	 38QHET.pdf	 38QHMP24.pdf	 38QHMT24.pdf	 38QHSR24.pdf
 38QHST.pdf	 38QHST24.pdf	 42QHST24-708.pdf	 93PM-80(100)-IS-BB-MBS-6	 3412C	 3512	 CATERPILLAR_ENGINE_C2.2.pdf
 CATERPILLAR_ENGINE_C4.4.pdf	 CATERPILLAR_ENGINE_C15.pdf	 CATERPILLAR_ENGINE_C32.pdf	 GEP150	 SACE EMAX		

Diagrams

Electric Generator – BOUNDARIES (As per ISO 14224)



CHILLER UNIT Boundaries and Images:



Equipment Data Transformation Sample

OEM Data Sheet

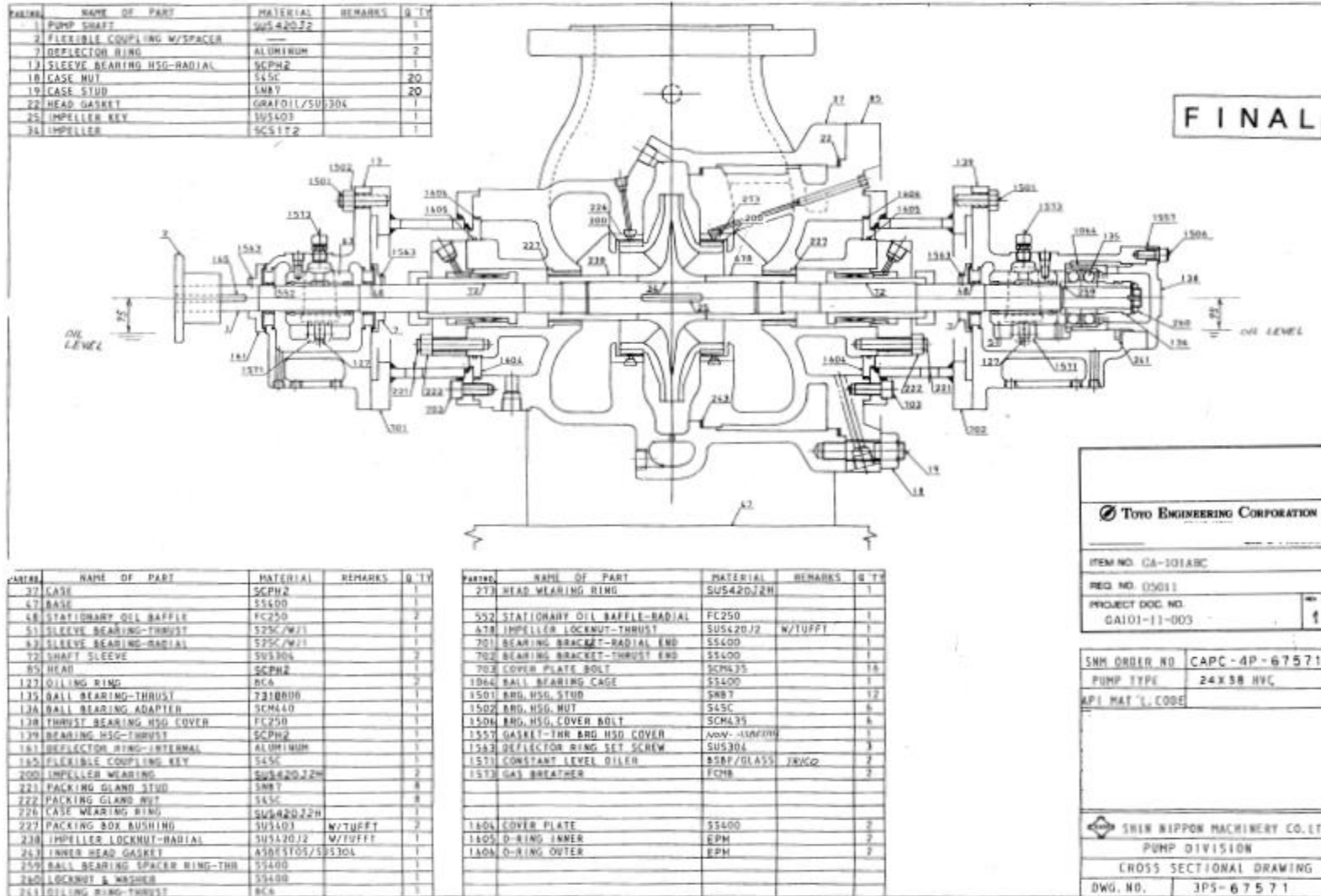
ASSETNUM	DESCRIPTION	LOCATION	ASSETTAG	CUSTCODE	MANUFACTURER	MODEL
99073	AIR CONDITIONING, SPLIT UNIT	13871	BUH-SPLITUNIT10149	LCV000	CARRIER	42QHA024VS

SHORT_DESCRIPTION	LONG_DESCRIPTION	UNSPSC	UNSPSC DESCRIPTION	CATALOG PROFILE
AIR CONDITIONER;INDR SPLT UNIT	AIR CONDITIONER;TYPE:INDOOR SPLIT UNIT,CAPACITY:22000 BTU/HR,COMPRESSOR TYPE:DC INVERTER ROTARY,DESIGN AIR FLOW:485 TO 685 CFM,REFRIGERANT TYPE:R410A,ELECTRICAL RATING:220 TO 240 V, 50/60 HZ,1 PH,OVERALL SIZE:1080 LG X 335 DP X 226 HT MM	40101701	AIR CONDITIONER	PMHVAC

ID	CLASS	ATTRIBUTE_NAME	ATTRIBUTE_STANDARDIZED_VALUE	SEQ
		TYPE	INDOOR SPLIT UNIT	1
		CAPACITY	22000 BTU/HR	2
		COMPRESSOR TYPE	DC INVERTER ROTARY	3
		DESIGN AIR FLOW	485 TO 685 CFM	4
		REFRIGERANT TYPE	R410A	5
		VENTILATION SYSTEM		6
		ELECTRICAL RATING	220 TO 240 V, 50/60 HZ,1 PH	7
		CONDENSER EFFICIENCY		8
		DESIGN TOTAL HEAT LOSS		9
		PROTECTION CLASS		10
99073	AIR CONDITIONER	OVERALL SIZE	1080 LG X 335 DP X 226 HT MM	11
		ADDITIONAL FEATURES		12

Indoor Unit		Unit	HEAT PUMP			
			42QHA018VS	42QHA024VS	42QHA024VS	42QHA030VS
Unit Size		TR	1.0	1.5	2.0	2.5
Rated Capacity at T1	Cooling	BTU/h	12000	18,000	22,000	27000
		kW	3.51	5.25	6.45	7.90
Rated Capacity at T3	Cooling	BTU/h	10600	16,400	19,200	23,200
		kW	3.09	4.80	5.61	6.80
Rated Capacity	Heating	Watts	3,500	5,450	7,600	8,300
Power Supply		V-Ph-Hz	220-240V- 50/60Hz, 1Ph			
Total System Power Input at T1	Cooling	Watts	870	1,300	1,570	2160
Total System Power Input at T3	Cooling	Watts	1,080	1,630	1,970	2605
Total System Power Input	Heating	Watts	950	1,390	2,100	2100
EER at T1	Cooling	Btu/W-h	13.75	13.85	14.00	12.50
EER at T3	Cooling	Btu/W-h	9.80	10.05	9.75	8.85
COP	Heating	w/w	3.65	3.90	3.60	3.95
Air Filter Type			Washable air filter			
Air Flow Rate (High/ Medium/ Low Speed)		CFM	356 / 280 / 230	685 / 535 / 485	685 / 540 / 485	765 / 645 / 575
Indoor Noise Level (High/ Medium/ Low Speed)		dBA	41 / 37 / 33	49 / 43 / 41	49 / 45 / 41	51 / 48 / 45
Net / Gross Weight		Kg	8.7 / 11.1	13.5 / 17.1	13.8 / 17.4	20 / 25.9
Dimensions (W x D x H)		mm	802 x 189 x 297	1080 x 335 x 335	1080 x 226 x 335	1259 x282 x362
Pipe Connection Size		Liquid	inch		1/4"	3/8"
		Suction	inch		1/2"	5/8"
		Drain	inch			5/8"
Outdoor Unit		Unit	HEAT PUMP			
			38QHA012VS	38QHA018VS	38QHA024VS	38QHA030VS
Power Supply		V-Ph-Hz	220-240V- 50/60Hz, 1Ph			
Compressor Type			DC Inverter Rotary			
Refrigerant			R410a			

BOM Part List Document



TOYO ENGINEERING CORPORATION

ITEM NO. GA-3018BC
 REQ. NO. 05011
 PROJECT DOC. NO. GA101-11-005

SNN ORDER NO. CAPC-4P-67571
 PUMP TYPE 24X38 HVC
 API MAT'L CODE

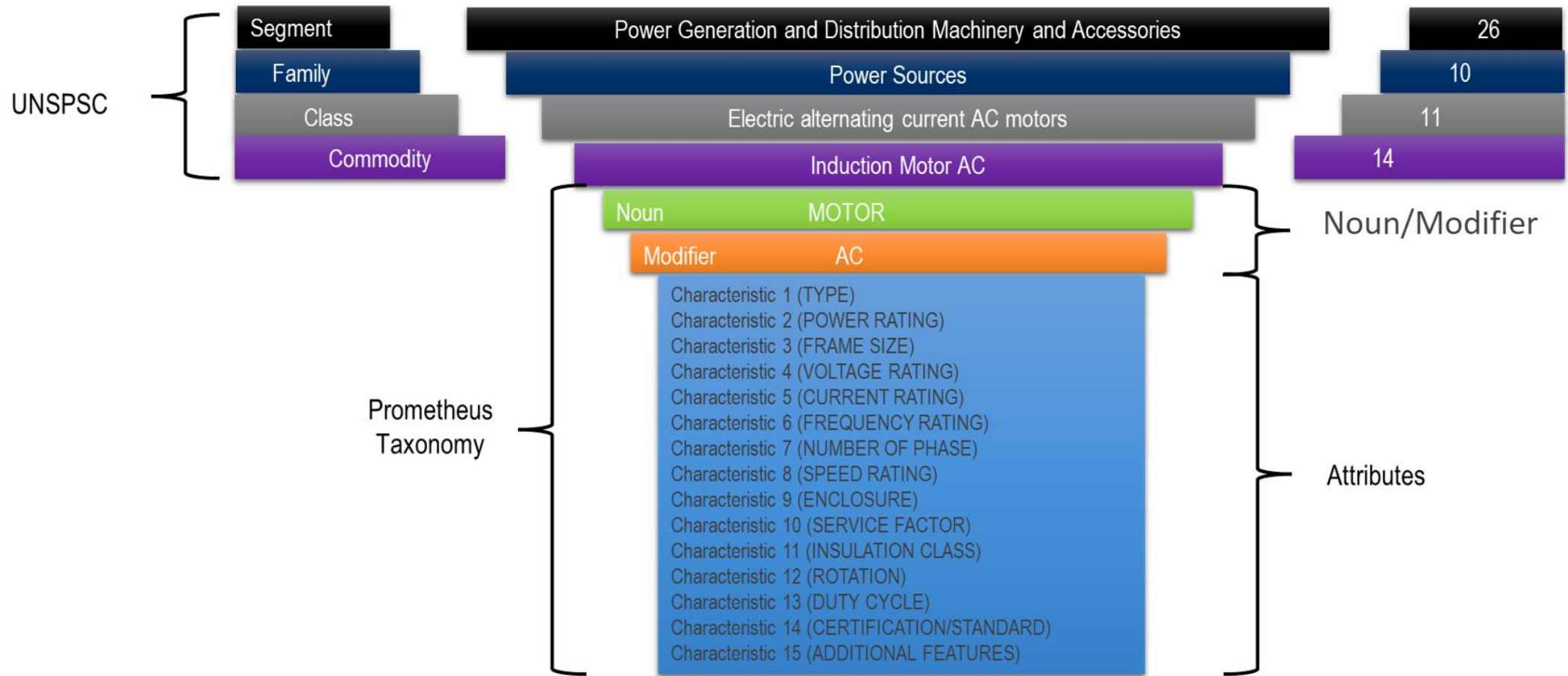
SHIN NIPPON MACHINERY CO. LTD.
 PUMP DIVISION
 CROSS SECTIONAL DRAWING
 DWG. NO. 3PS-67571

BOM Enrichment

H- Header
I - Assembly
T- Text Item
L- Legacy item

BOM_ID	ASSEMBLY_ID	MATERIAL_ID	ITEM CATEGORY	SEQUENCE	INSTALLED QUANTITY	UOM	BOM_COMPONENT_DESCRIPTION	BOM_COMPONENT_TEXT2 (OEM PN OPM PN DWG POS)
B0000001	-	-	H	010	1	EA	BOM;PUMP,SHIN NIPPON,24X38 HVC,26 X 24IN	-
B0000001	A1000001	-	I	010	1	EA	PMA;PUMP ASSEMBLY	-
B0000001	A1000001	M0000001	T	010	1	EA	SHAFT:PMP;SST GR SUS420J2	SHIN NIPPON - - 3PS-67571 1
B0000001	A1000001	M0000003	T	020	2	EA	RING:DFTR;AL	SHIN NIPPON - - 3PS-67571 7
B0000001	A1000001	M0000004	T	030	1	EA	HOUSING:BRG;RDL SLV,CS GR SCPH2	SHIN NIPPON - - 3PS-67571 13
B0000001	A1000001	M0000005	T	040	20	EA	NUT;CASE,CS GR S45C	SHIN NIPPON - - 3PS-67571 18
B0000001	A1000001	M0000006	T	050	20	EA	STUD;CASE,ALY STL GR SNB7	SHIN NIPPON - - 3PS-67571 19
B0000001	A1000001	M0000007	T	060	1	EA	GASKET;HD,GRAFOIL/SST GR SUS304	SHIN NIPPON - - 3PS-67571 22
B0000001	A1000001	M0000008	T	070	1	EA	KEY:IMPLR;SST GR SUS403	SHIN NIPPON - - 3PS-67571 25
B0000001	A1000001	M0000009	T	080	1	EA	IMPELLER;CLSD,SST GR SCS1T2	SHIN NIPPON - - 3PS-67571 34
B0000001	A1000001	M0000010	T	090	1	EA	CASE;CS GR SCPH2	SHIN NIPPON - - 3PS-67571 37
B0000001	A1000001	M0000011	T	100	1	EA	BASE;400 SST	SHIN NIPPON - - 3PS-67571 47
B0000001	A1000001	M0000012	T	110	2	EA	BAFFLE:OIL;STATNRY,CI GR FC250	SHIN NIPPON - - 3PS-67571 48
B0000001	A1000001	M0000013	T	120	1	EA	BEARING:SLV;THRST,CS GR S25C/WJ1	SHIN NIPPON - - 3PS-67571 51
B0000001	A1000001	M0000014	T	130	1	EA	BEARING:SLV;RDL,CS GR S25C/WJ1	SHIN NIPPON - - 3PS-67571 63
B0000001	A1000001	M0000015	T	140	2	EA	SLEEVE:SHFT;SST GR SUS304	SHIN NIPPON - - 3PS-67571 72
B0000001	A1000001	M0000016	T	150	1	EA	HEAD;CS GR SCPH2	SHIN NIPPON - - 3PS-67571 85
B0000001	A1000001	M0000017	T	160	2	EA	RING;OILING,BRZ GR BC6	SHIN NIPPON - - 3PS-67571 127
B0000001	A1000001	M0000018	T	170	1	EA	BEARING:BALL;ANGLR CONT,THRST,90X190X86	SHIN NIPPON - - 7318BDB 3PS-67571 135
B0000001	A1000002	-	I	010	-	EA	PMA;PUMP COUPLING ASSEMBLY	-
B0000001	A1000002	M0000002	T	010	1	EA	COUPLING:FLEX;W/ SPCR	SHIN NIPPON - NIPPON PILLAR 71 3PS-67571 2
B0000001	A1000002	M0000023	T	020	1	EA	KEY;FLEX CPLG,CS GR S45C	SHIN NIPPON - - 3PS-67571 165

Prometheus Material Taxonomy



Prometheus industry expertise mapped Standard Noun Modifiers to UNSPSC to build a data dictionary to enhance Material Descriptions, attribution for search capability, standardized reporting and material management

Material Data Sample Showcasing

PG_ID	ITEM_CATEGORY	EQUIPMENT_MAKE_(OEM)	EQUIPMENT_MFR_PART_NUMBER_(OEM)	BOM_COMPONENT_TEXT1
PGLCVS-20002471	T	CATERPILLAR	7N-2156	BEARING

SHORT_DESCRIPTION	LONG_DESCRIPTION	UNSPSC	UNSPSC_DESCRIPTION
BRG:SLV:BSHNG,0.879 IN,1.266 IN	BEARING:SLEEVE;TYPE:BUSHING,INSIDE DIAMETER:0.879 IN,LENGTH:1.266 IN, MATERIAL: STEEL BACKED ALUMINUM,OUTSIDE DIAMETER:1.06 IN	31171509	Sleeve bearings

WEB_URL_LINK_1	WEB_URL_PAGE_NO_1	OTHER_SOURCE	OTHER_SOURCE_PAGE_NO	STATUS_CLEANSSED/ENRICHED
https://parts.cat.com/en/catcorp/7N-2156				ENRICHED

ID	CLASS	ATTRIBUTE_NAME	ATTRIBUTE_VALUE	SEQ
PGLCVS-20002471	BEARING:SLEEVE	TYPE	BUSHING	1
		INSIDE DIAMETER	0.879 IN	2
		LENGTH	1.266 IN	3
		MATERIAL	STEEL BACKED ALUMINUM	4
		OUTSIDE DIAMETER	1.06 IN	5
		THICKNESS		6
		CERTIFICATION/STANDARD		7
		ADDITIONAL FEATURES		8

7N-2156: BEARING

Brand: Cat

WILL IT FIT?
Add your equipment to see if this part fits.

[CHECK PRICE](#) [LOGIN TO VIEW YOUR CUSTOMER PRICE](#)

[WARRANTY INFORMATION](#) | [RETURN POLICY](#)

DESCRIPTION FOR STRAIGHT SLEEVE BEARINGS

Cat® Sleeve Bearing

Description:
Cat service parts offer simple repair and replacement of the internal bearings used during oil pump rebuild and maintenance.

Attributes:

- Steel backed aluminum sleeve bearing
- OD: 27.013 mm (1.06 in)
- ID: 22.333 mm (0.879 in)
- Length: 32.16 mm (1.266 in)

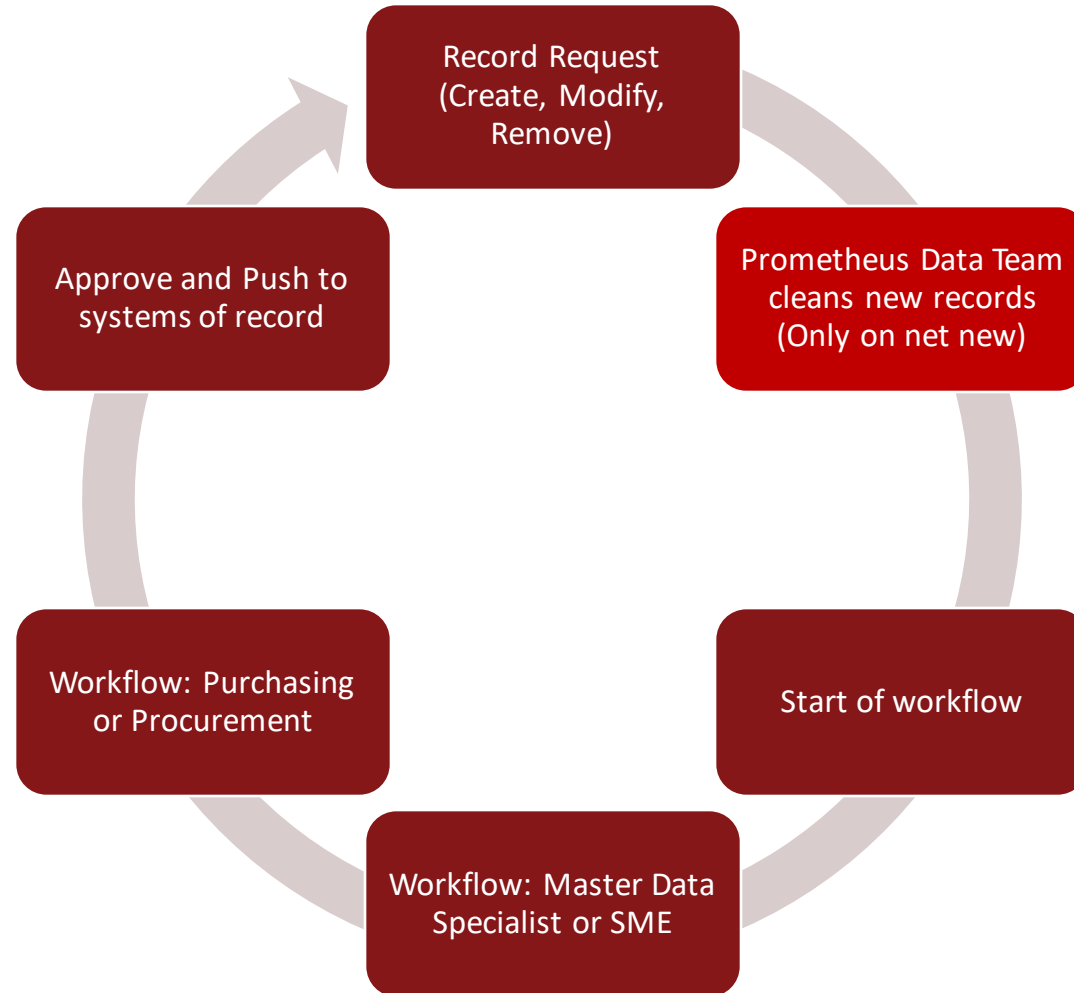
Application:
Consult your owner's manual or contact your local Cat dealer for more information.

INPUT DATA	CLEANSSED DATA	CLEANSSED, 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 FASTACTING 600 VAC 30 A	CARTRIDGE FUSE, FASTACTING, 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, FASTACTING, 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 W/ KEYWAY 2-1/8 IN DIA X 1-1/2 IN X 1/8 IN KEYWAY 2-1/8 IN DIA X 1/8 IN LOCK	BUSHING,TAPER LOCK W/ KEYWAY 2-1/8 IN DIA X 1-1/2 IN X 1/8 IN KEYWAY 2-1/8 IN DIA X 1/8 IN LOCK
BUSHING	BUSHING		
TORQUE LOCK	TORQUE LOCK		
TORQUE	TORQUE		



MDaaS Sustainment

- Increase visibility across teams
 - Increase communication and quality by bringing the right teams into the room
 - Dashboards
- Configurable workflows
 - Role specific actions
- Process is on rails
 - Required fields
 - Business rules



MDaaS Sustain Value Creation

- Audit capability: Digitalization of processes
- Guarantee records will always be clean & accurate
 - Mitigates continual cleansing
- ERP Integration (optional)
 - Visualize records currently in your ERP system
 - Direct record creation in ERP
- Rules in place to ensure adherence to standards
 - Sustain New Hires & New Facilities
- Dashboarding to provide overview of all records in your ERP system
 - Missing record information
 - Project tracking KPIs (translations, work progression, etc.)

Demonstration

Questions?

PROMETHEUS
GROUP | USER
CONFERENCE

Erik Klein – Master Data Team Lead
Mike Jordan – VP of Master Data