

# **3MIS:** **a Magnetic Measurement Management and Information System**

Eleni Tournaki

*on behalf of  
the TE-MS-C-MM Team*



# Structure of Presentation

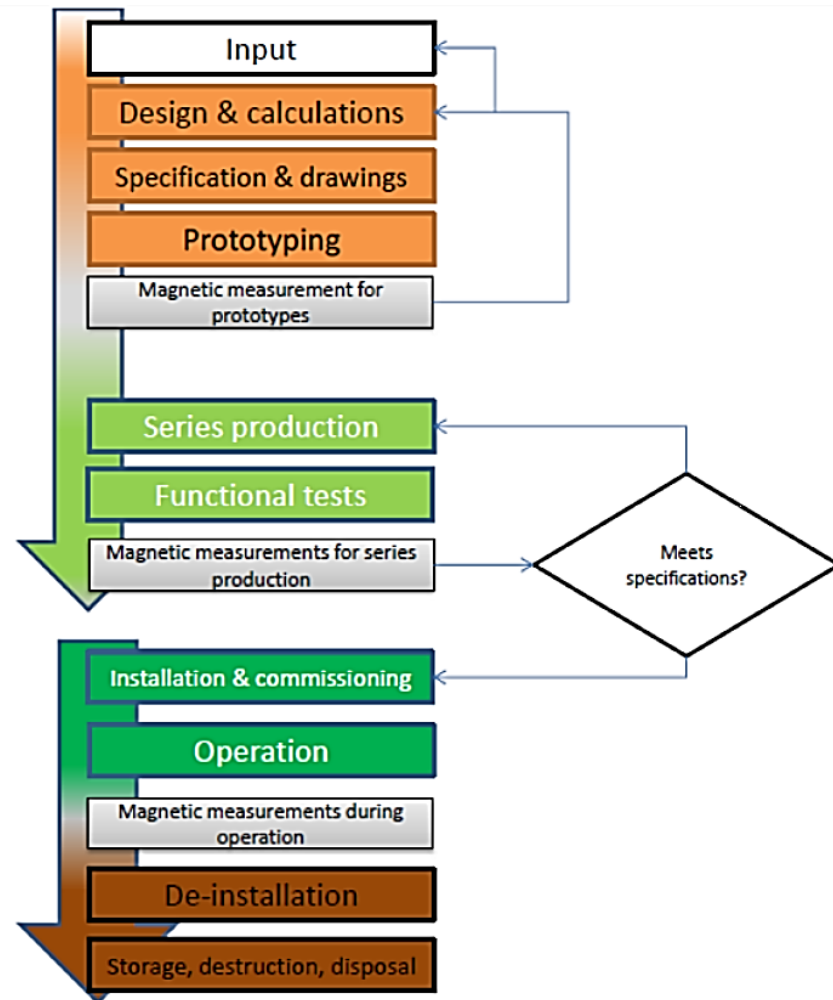
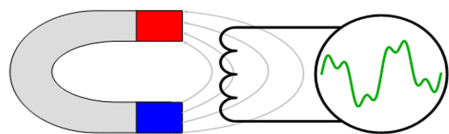
1. Introduction
2. Project Description
3. Implemented Solution: Architecture & Features
4. Benefits
5. Future Road-Map
6. Conclusions



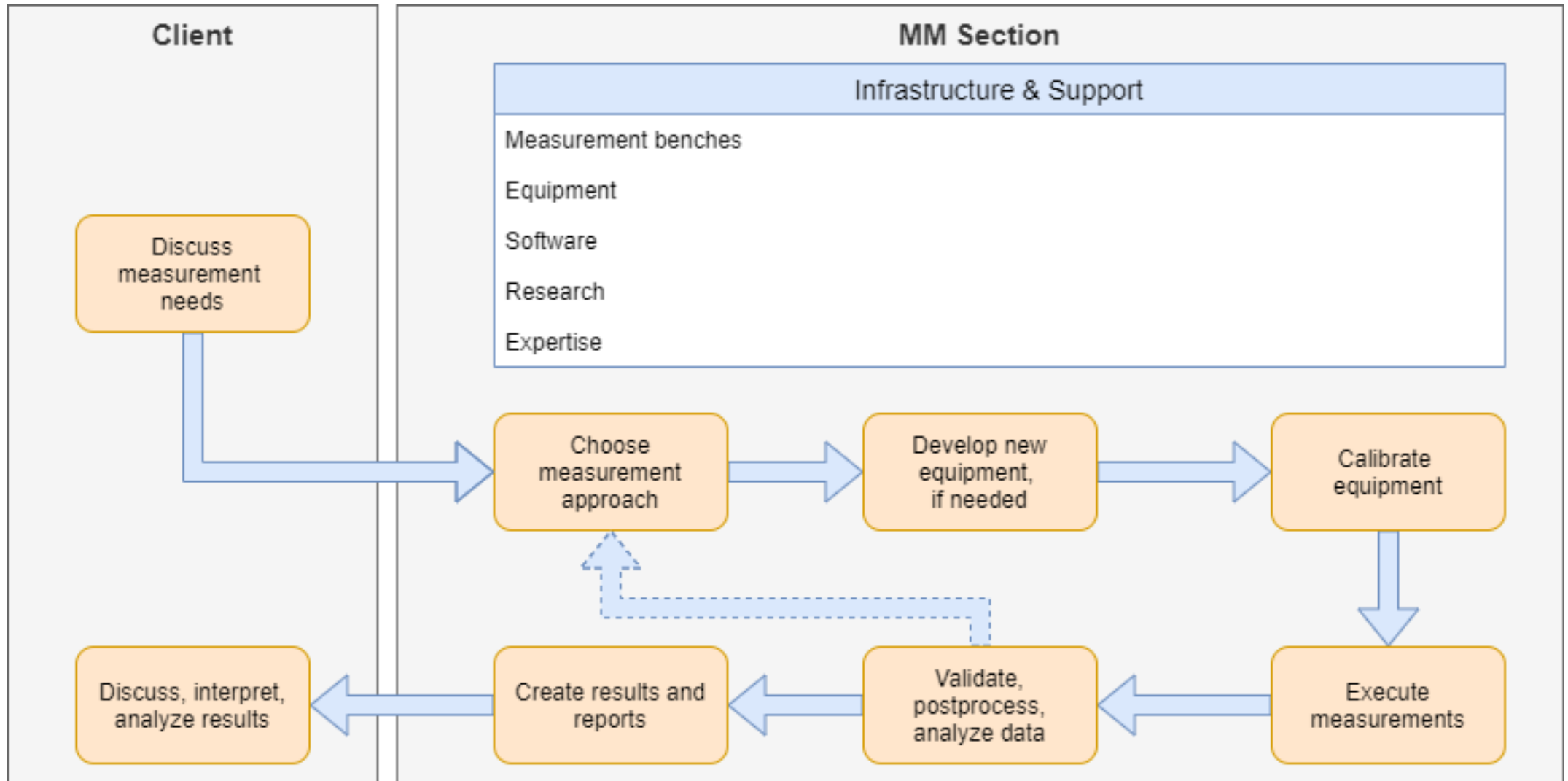
# Introduction

## Magnetic Measurements (MM) Section:

- Responsible for carrying out MMs to assure the correct performance of various accelerator magnets
- Critical for the success of the accelerators operation at CERN



# The TE-MS-C-MM Value Shop Model



Source: Bonora, M. (2020). *An Integrated Software Framework for Magnetic Measurements - From Raw Data to Assets*. TE-MS-C Seminar, CERN, Geneva.

# Project Description

## Problem

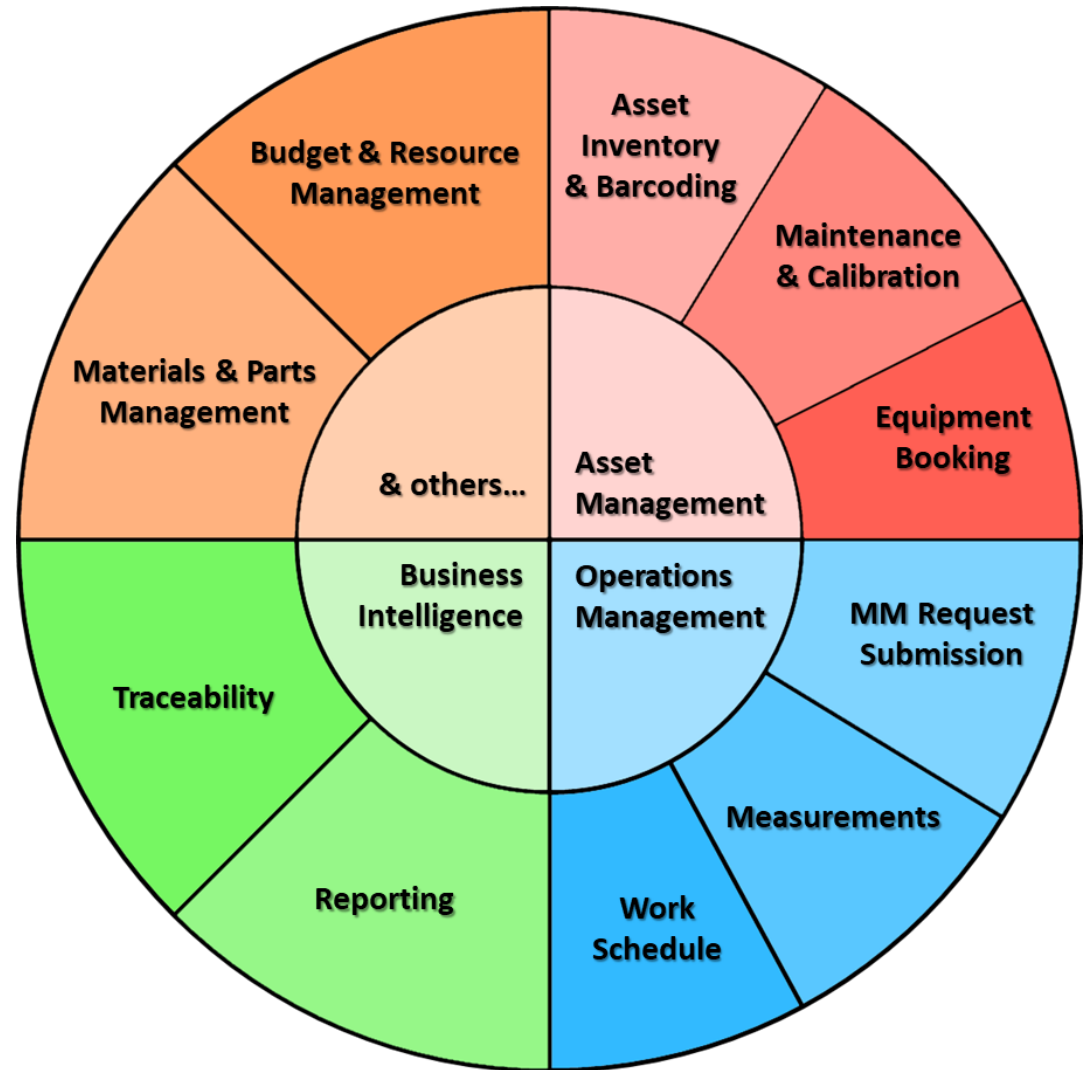
Use of various tools, that do not exchange information



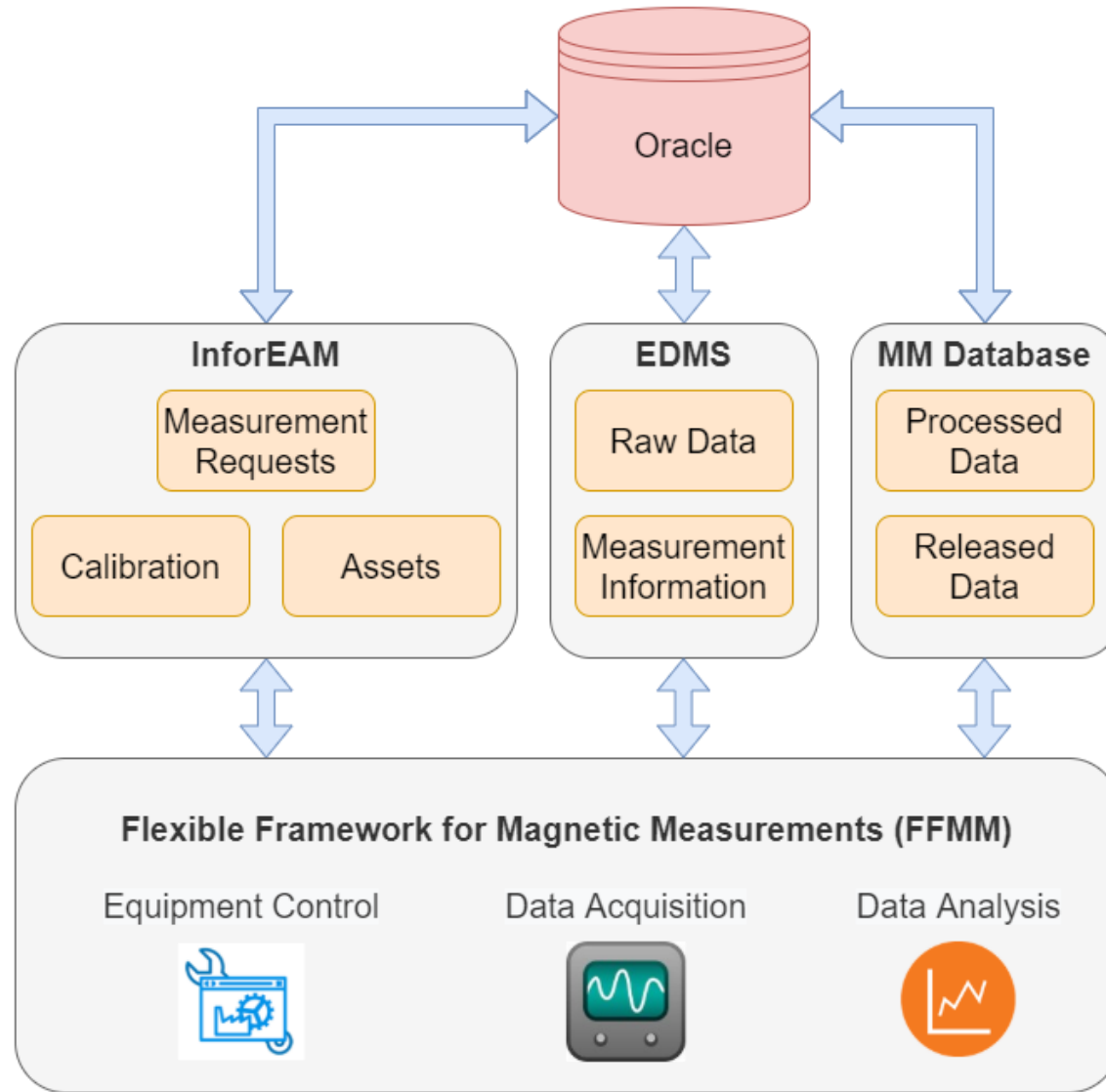
- Lack of centralised database
- Information not accessible easily
- Manual entry/retrieval of data

## Solution

**3MIS: Magnetic Measurement  
Management & Information System**



# Architecture of Solution



Source: Bonora, M. (2020). *An Integrated Software Framework for Magnetic Measurements - From Raw Data to Assets*. TE-MSc Seminar, CERN, Geneva.

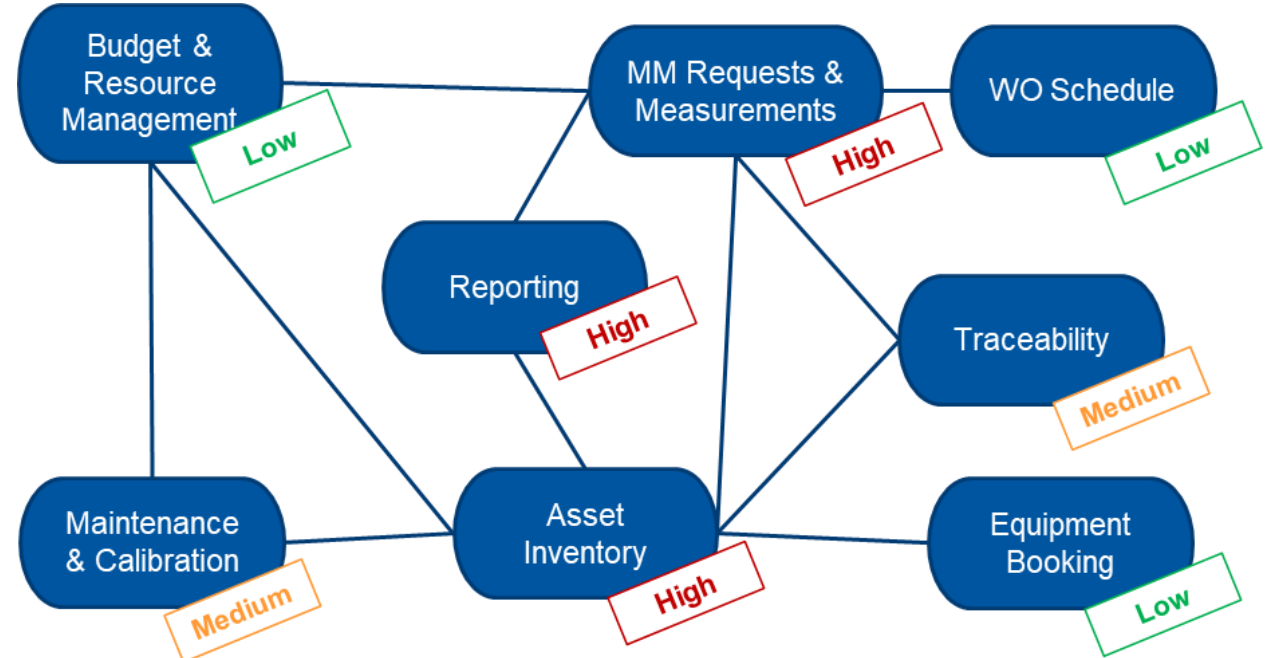
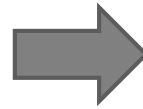
# Why Infor EAM and EDMS?

- ✓ Used throughout CERN
- ✓ Service, maintenance & support provided by dedicated Sections at CERN
- ✓ Available solutions for common problems
- ✓ Already integrated with each other and with other CERN systems & applications (*GIS, MTF, TREC, etc.*)
- ✓ Can be integrated with other systems (*web-services*)
- ✓ No extra costs implied
- ✓ Quickly and easily customisable, but with some restrictions & limitations



Source: Steenstrup, K., Foust, N. (2019, October 14).  
Gartner's Magic Quadrant for Enterprise  
Asset Management Software.  
Retrieved from [www.infor.com](http://www.infor.com)

# Prioritization of Work





# Asset Inventory & Barcoding



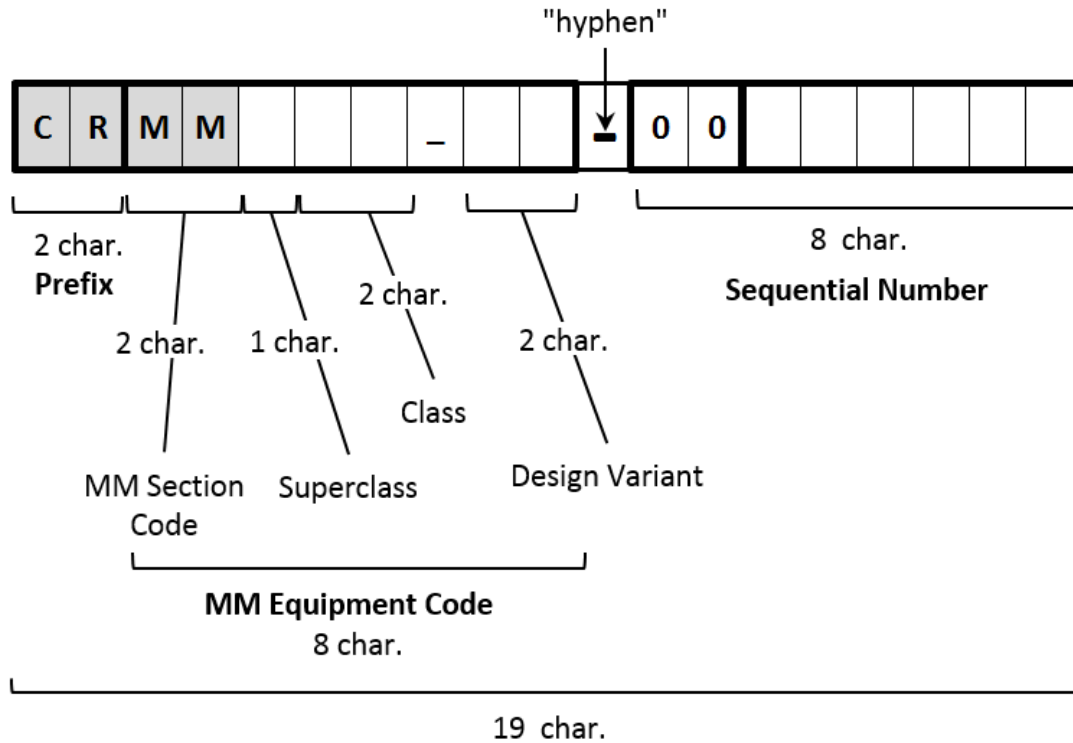
# Criteria to Register an Asset in the Database

A piece of equipment:

- ✓ Relevant or crucial for magnetic measurement **OR**
- ✓ Holds/pushes data required in FFMM **OR**
- ✓ Requires regular maintenance, calibration, checks **OR**
- ✓ Exceeds a defined financial value **OR**
- ✓ Unique & frequently used



# MM Equipment Codes



## Accelerators Naming Portal

Search...

Search also in description

- ▼ **MMM** Magnetic field sensor
  - ▶ **MMMAR** Array
  - ▶ **MMMCO** Wound Coil
  - ▶ **MMMER** Electron Spin Resonance (ESR) probe
  - ▶ **MMMFG** Fluxgate
  - ▶ **MMMFM** Fluxmeter
  - ▼ **MMMHA** Hall probe
    - MMMHA\_AA** Hall probe - Projekt Elektronik - FM210
    - MMMHA\_AB** Hall probe - METROLAB - THM7025
    - MMMHA\_AC** Hall probe - NIKHEF - AS PROBE
    - MMMHA\_AD** Hall probe - CERN - ISR 2070
    - MMMHA\_AE** Hall probe - Projekt Elektronik - AS-NTM-2
    - MMMHA\_AF** Hall probe - Projekt Elektronik - AS-LTM
    - MMMHA\_AG** Hall probe - Projekt Elektronik - AS-NAP
    - MMMHA\_AH** Hall probe - Projekt Elektronik - AS-NTM
    - MMMHA\_AI** Hall probe - METROLAB - 1176-HF
    - MMMHA\_AJ** Hall probe - METROLAB - THS7025-10

- ✓ MM Section's Equipment Naming Convention Report published in [EDMS](#)
- ✓ MM Equipment Codes published on the [Accelerators Naming Portal](#)

# MM Assets Creation & Printing Application

Asset Inventory & Barcoding

AssApp - Create new assets | User: Eleni Tournaki

File Edit Tools Help

Mandatory

- \* Superclass: Magnetic field sensor
- \* Class: PCB Coil
- \* Status: Installe et Maintenu
- \* Location: Laboratory 311 (311)
- \* Responsible Person: Thomas Zicler
- \* Manufacturer: CERN
- \* Available Models: L497W13.T24.N12.S250

Optional

- Equipment Value: 0.00 CHF
- Alias:
- Serial number:
- CERN Inventory:
- Parent Asset:
- Comments:

Printing

- Printing
- Big  Small  Medium
- Preview:
- Quantity: 1
- Printer connection: Network connection

Documents

Use this region to upload documents (e.g. drawings, specifications, etc.) related to the new asset.

Name	Path

Asset Information

- Asset Description: PCB Coil - CERN - L497W13.T24.N12.S250
- Asset Code: CRMMMPB\_AC-00000076

History

	Date Created	Asset Code	Details
1	2020-07-28	CRMMMAR_AK-00000004	<a href="#">Details</a>
2	2020-07-27	CRMMMMH_AG-00000001	<a href="#">Details</a>
3	2020-07-27	CRMMMAR_AM-00000001	<a href="#">Details</a>

Actions

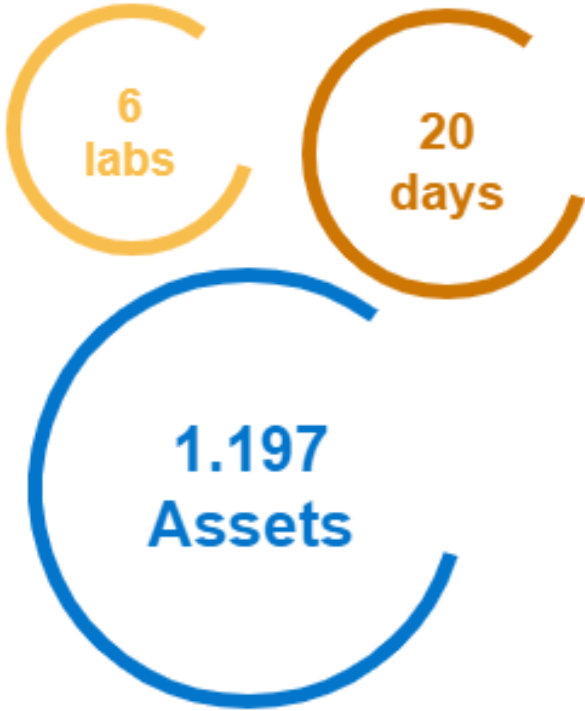
Create Clear Exit



Courtesy: R. Martinez Estebanez, S. Gutzeit, M. Bonora

# Progress of Inventory Process

## First Campaign (Q3, 2017)

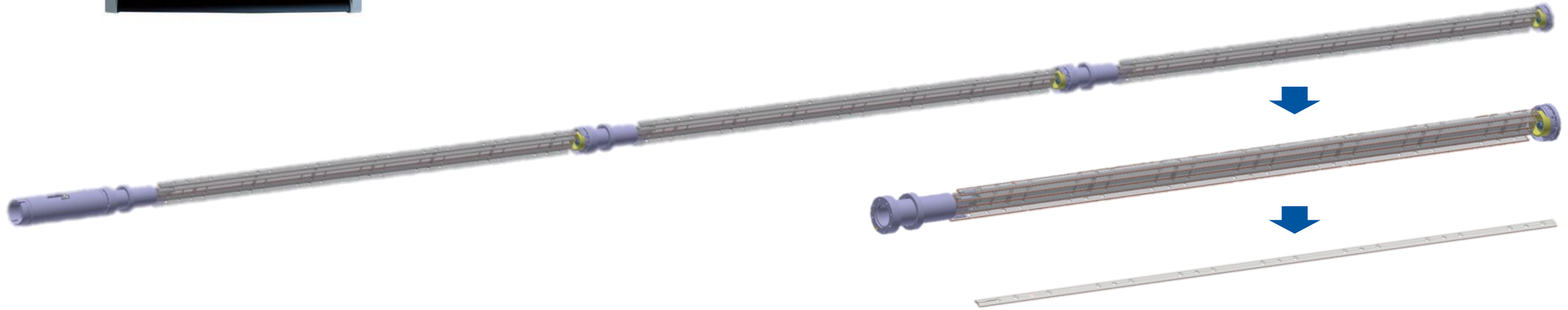


## Now



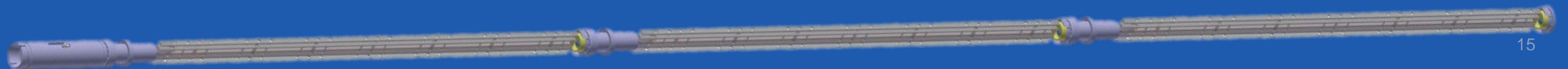
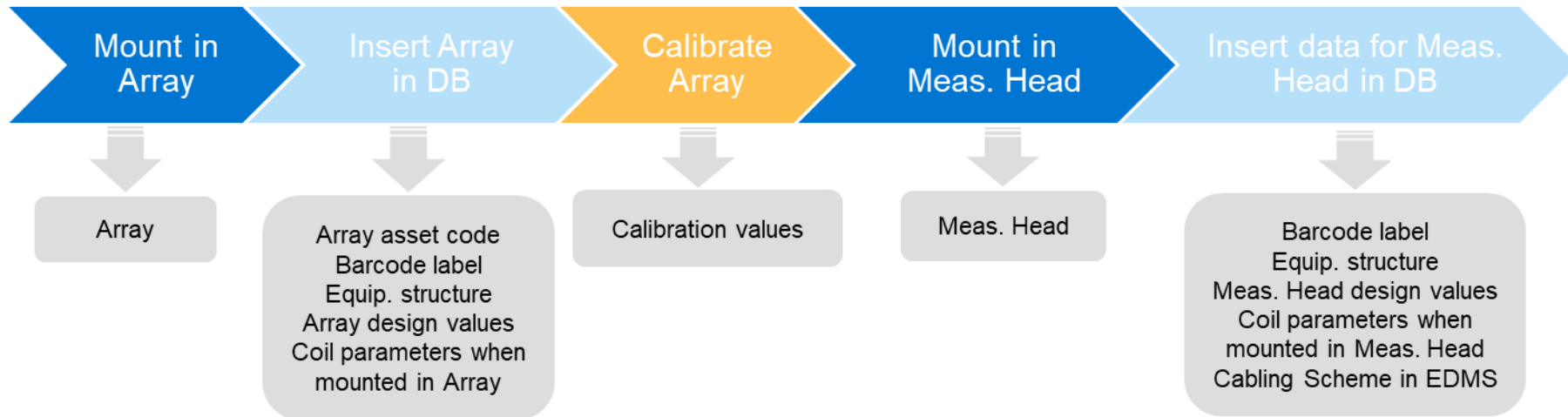
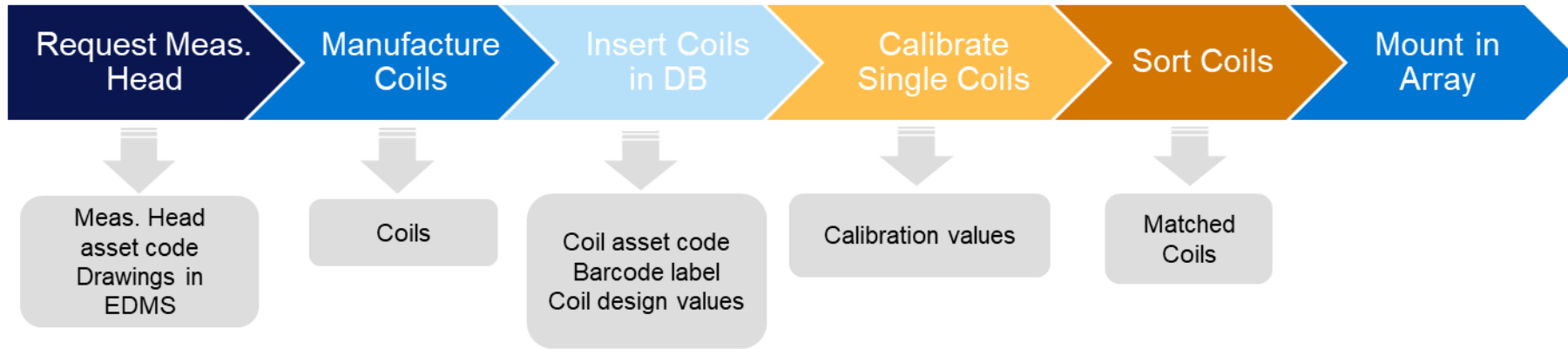
# Examples of MM Assets

Asset  
Inventory  
& Barcoding



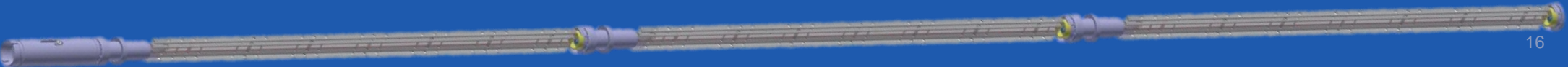
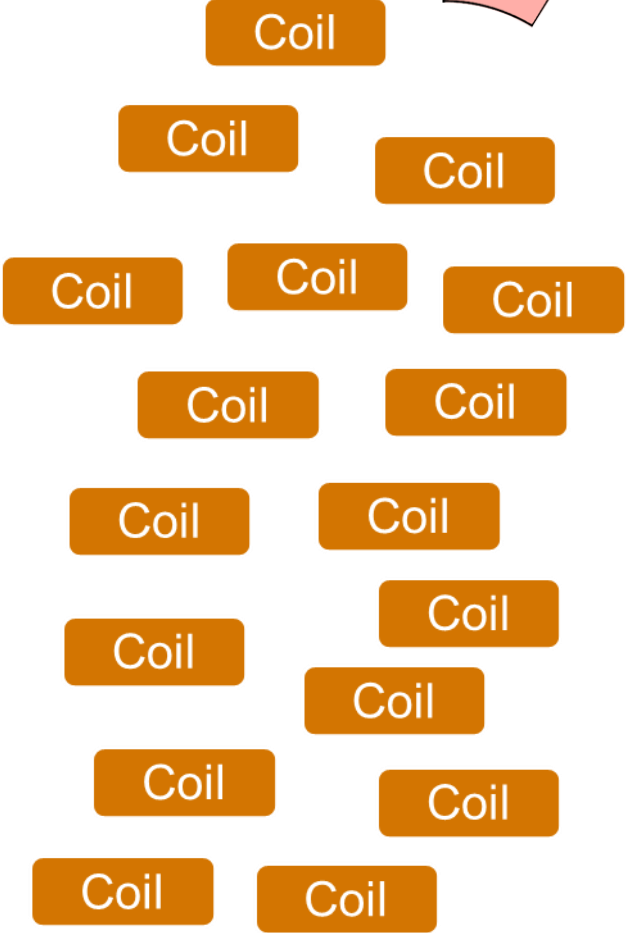
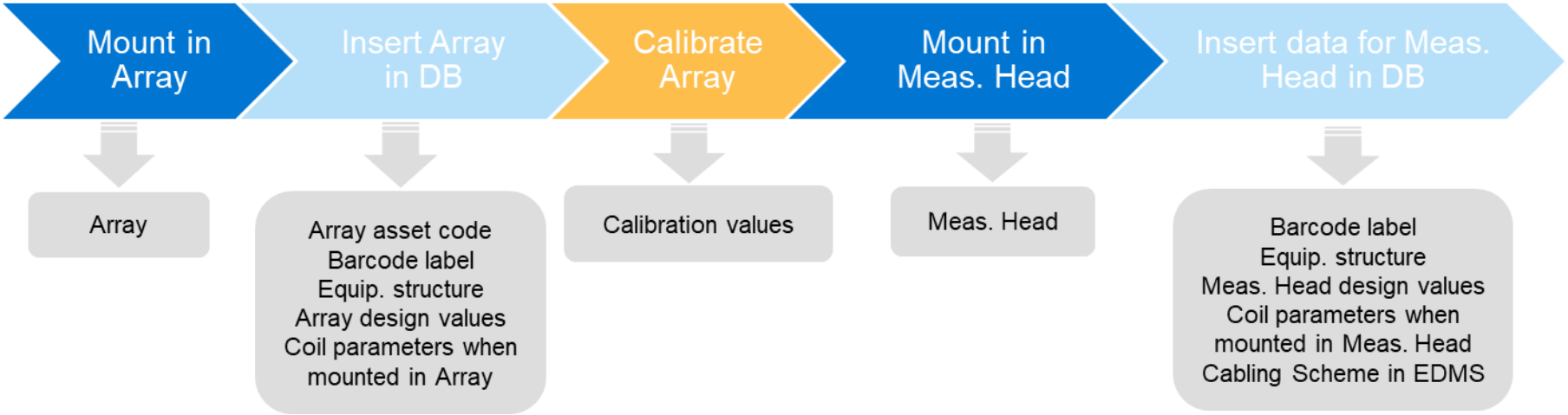
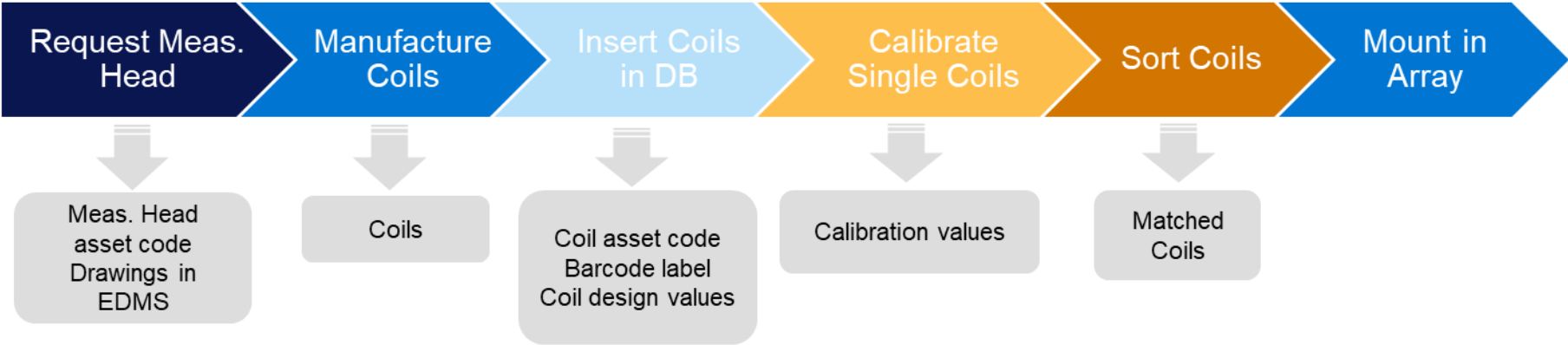
# MM Low-Level Equipment

Asset  
Inventory  
& Barcoding



# MM Low-Level Equipment

Asset  
Inventory  
& Barcoding

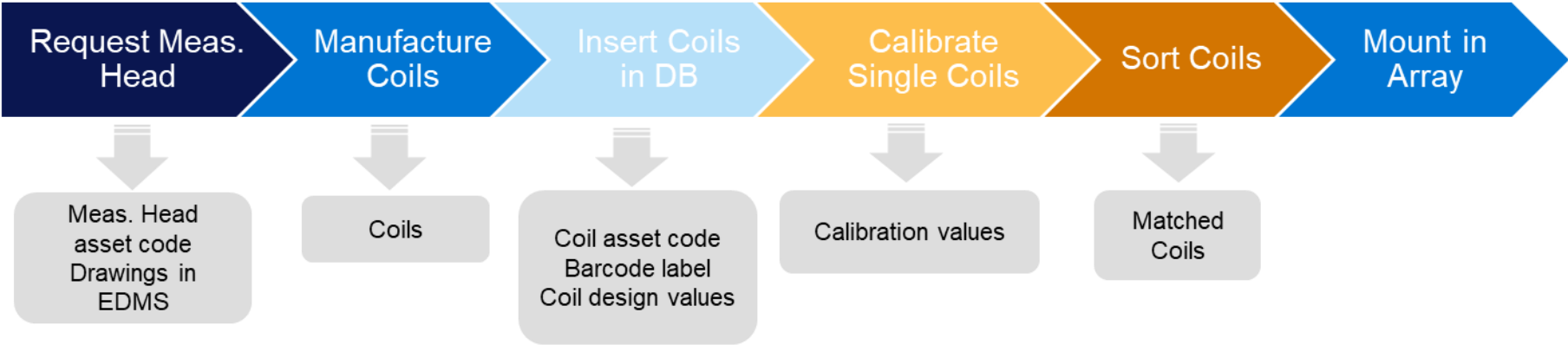




# MM Low-Level Equipment

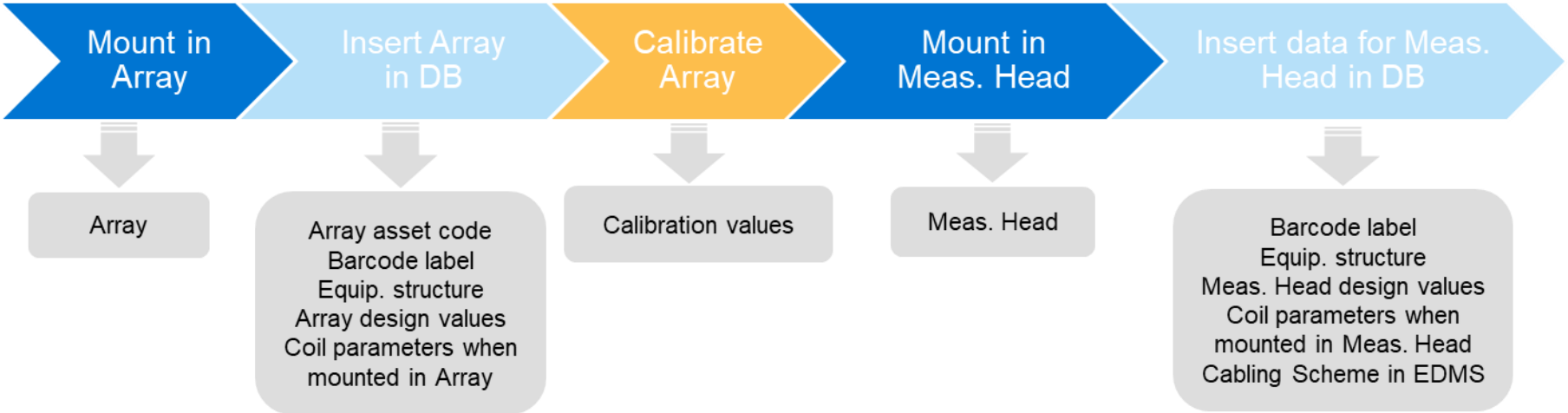
Coil

Asset Inventory & Barcoding



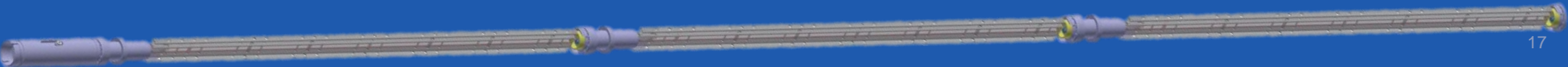
- Coil
- Coil
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- Coil

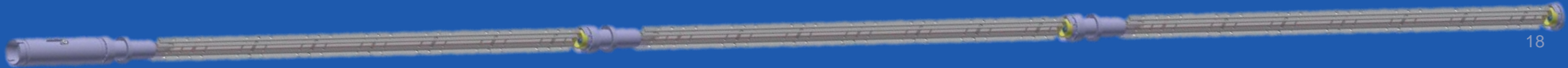
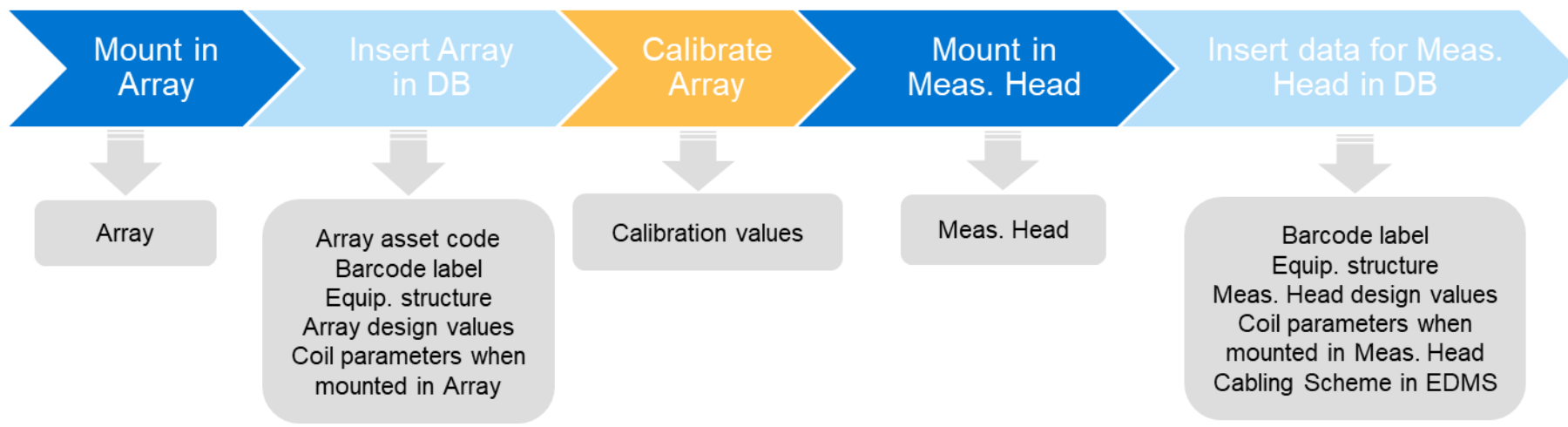
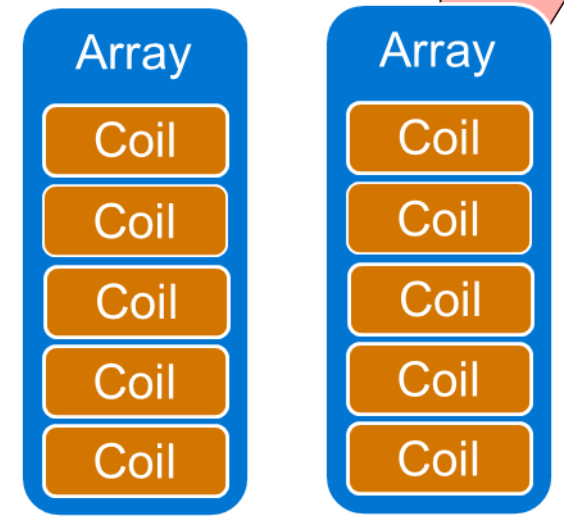
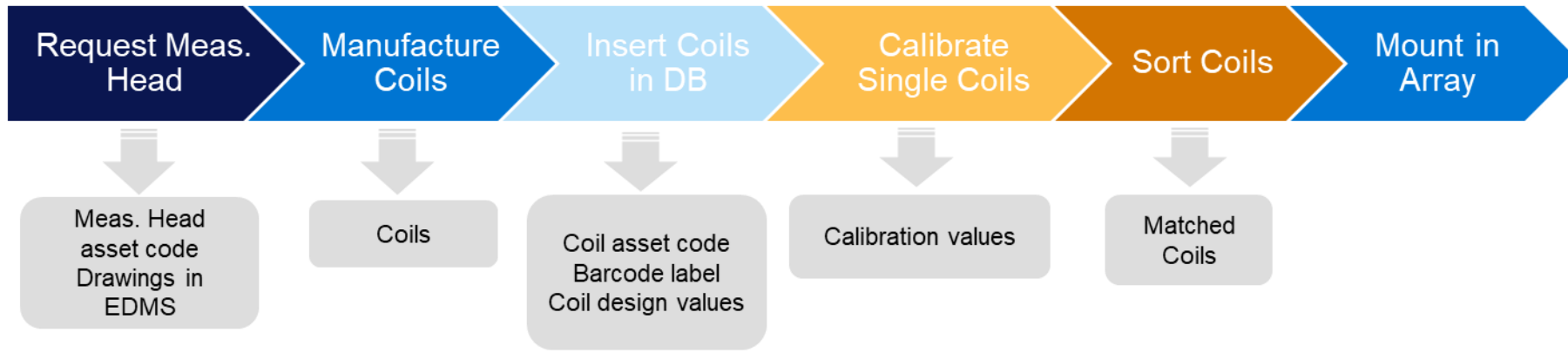


- Coil
- Coil
- Coil
- Coil
- Coil

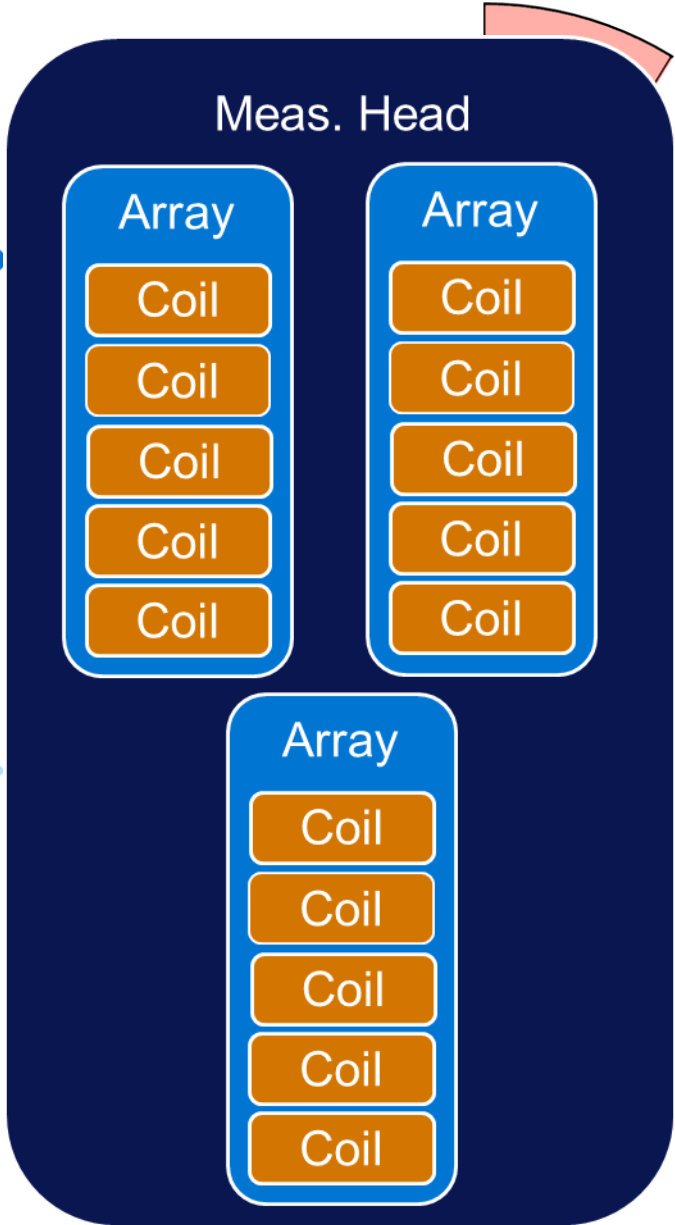
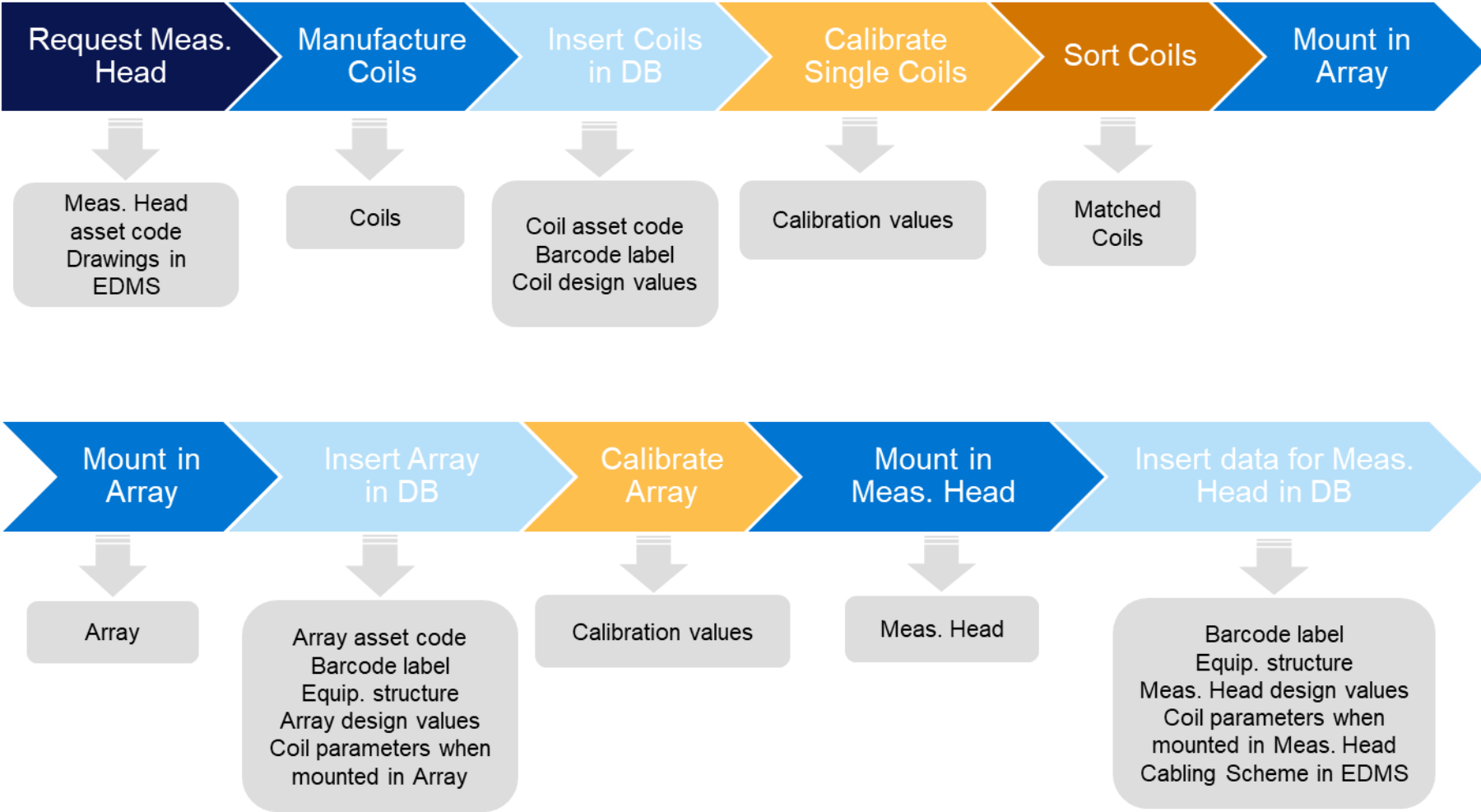
Coil



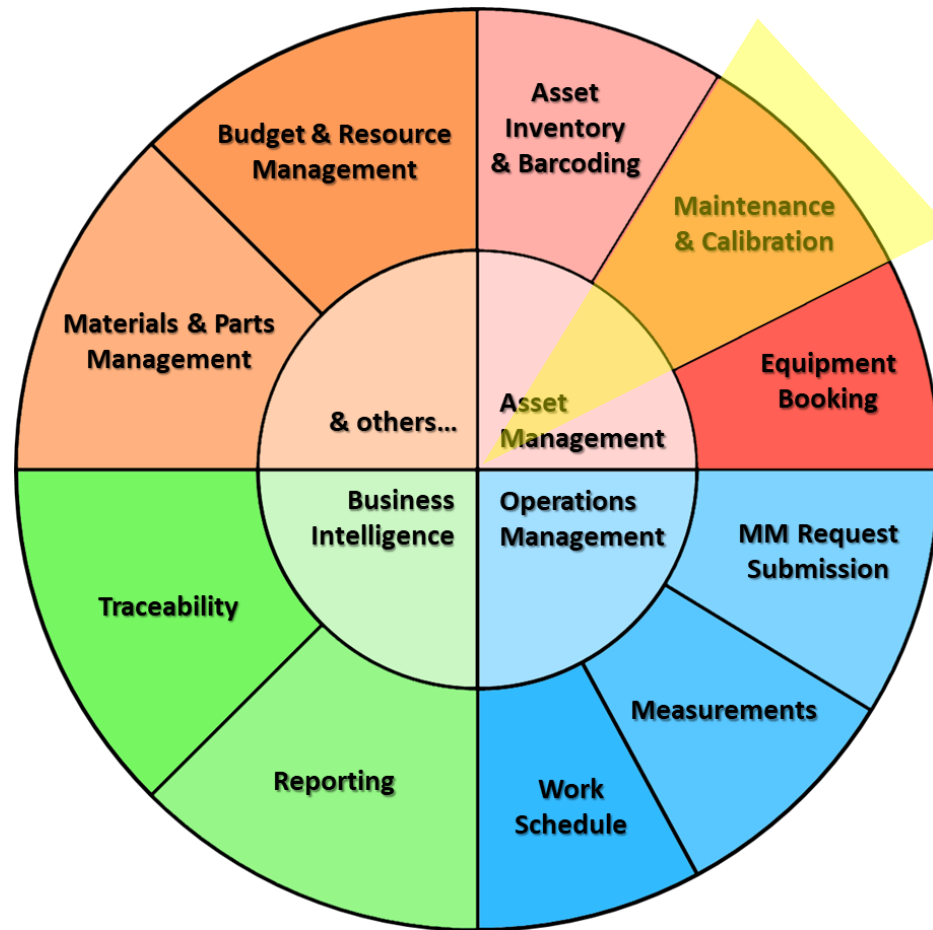
# MM Low-Level Equipment



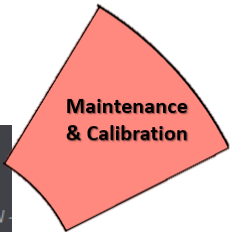
# MM Low-Level Equipment



# Maintenance & Calibration



# MM Equipment Lifecycle



**infor EAM**

Work Equipment PRODUCTION

Asset: CRMMSTM\_AB-00000001 Teslameter - METROLAB - THM7025

Record View Comments Events Equipment Graph EDMS Documents Show on Map

Asset: CRMMSTM\_AB-00000001 \* Teslameter - METROLAB - THM7025

Alias: [ ]

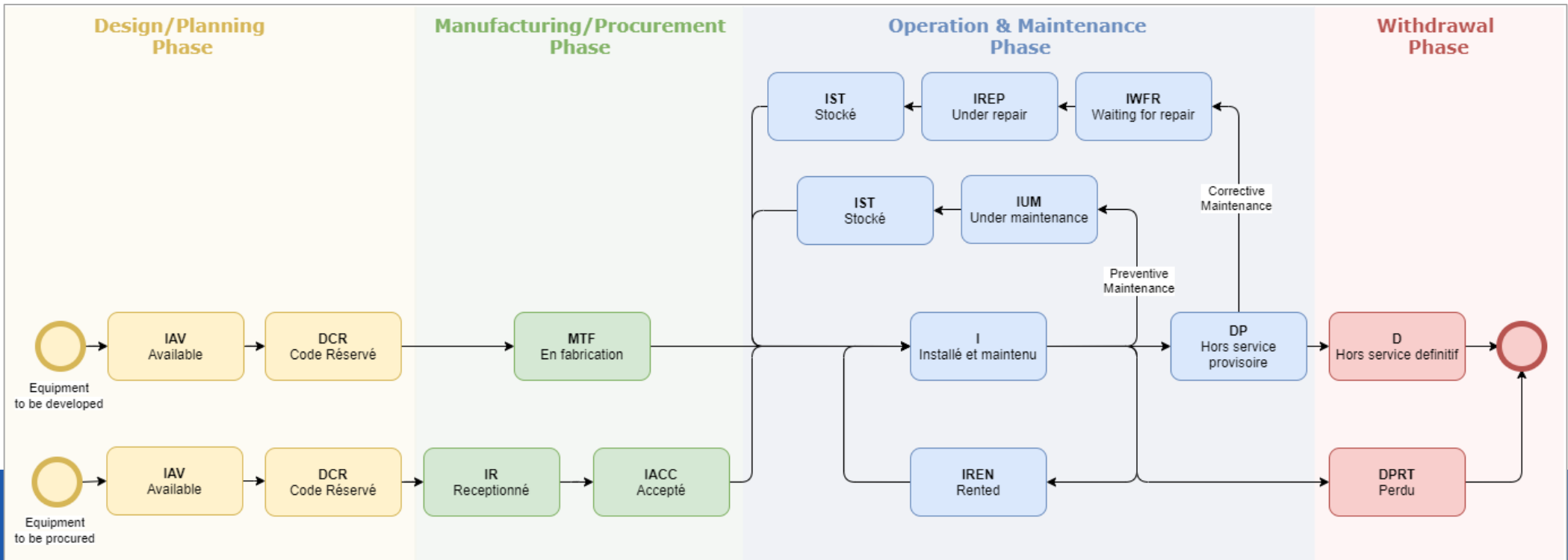
Department: MM-S

Equipment Details

Class: MM-STM

Status: **Installe et Maintenu**

- Hors service provisoire
- Installe et Maintenu
- Perdu
- Rented
- Under Maintenance

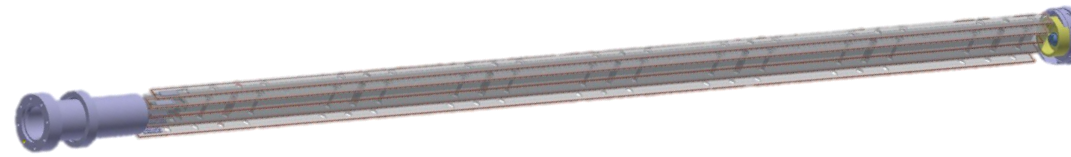


# Calibration (1/2)

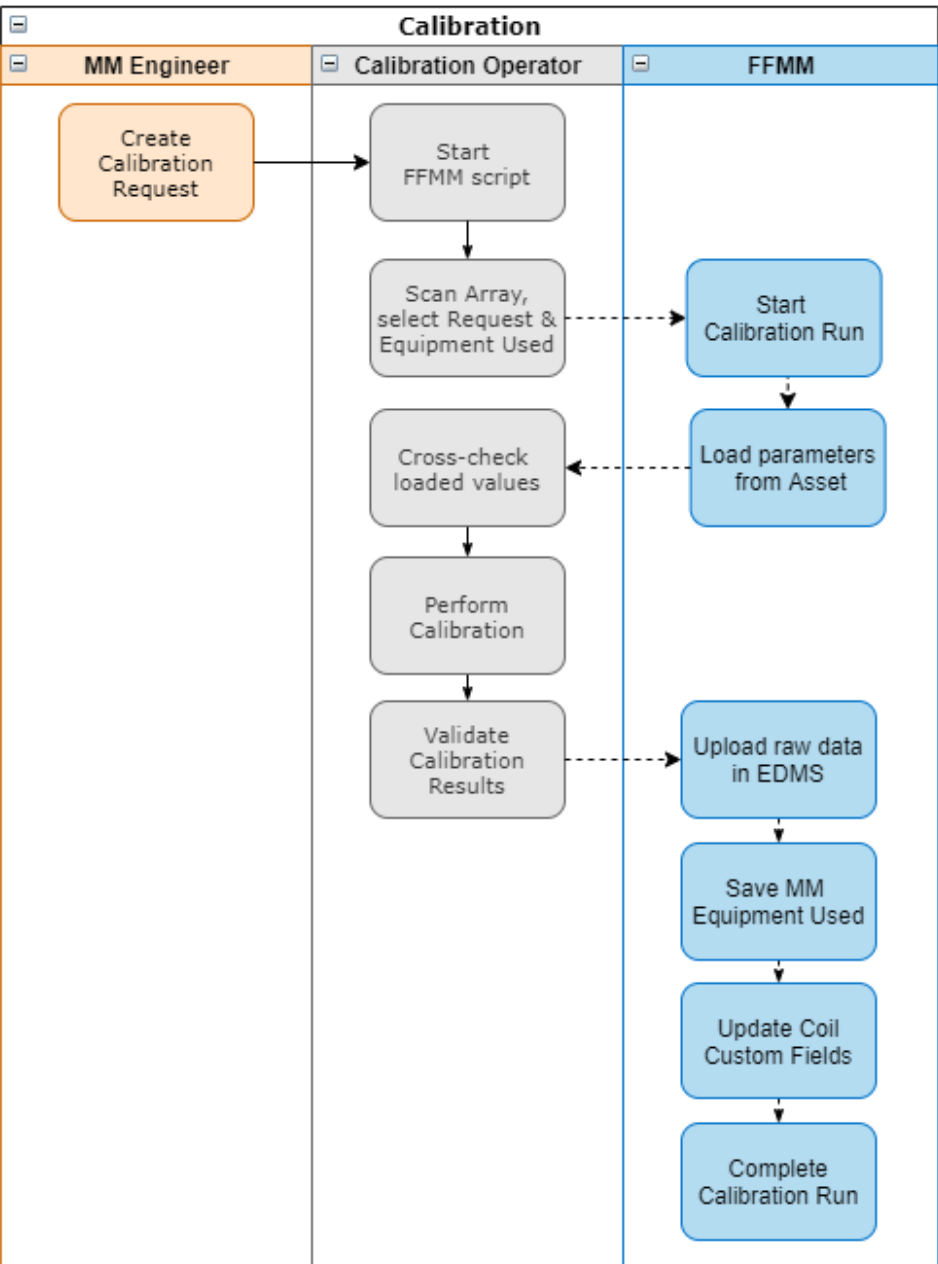
Required for many reasons:

- New instrument
- After an event (*repair/modification, shock*)
- After a specified time period/usage
- Before a critical measurement
- Whenever observations appear questionable
- As specified by a requirement

# Calibration (2/2)



- ✓ Manual entry of data minimized
- ✓ Automatic retrieval of design values & structure
- ✓ Automatic archiving of results
- ✓ History of calibration values available



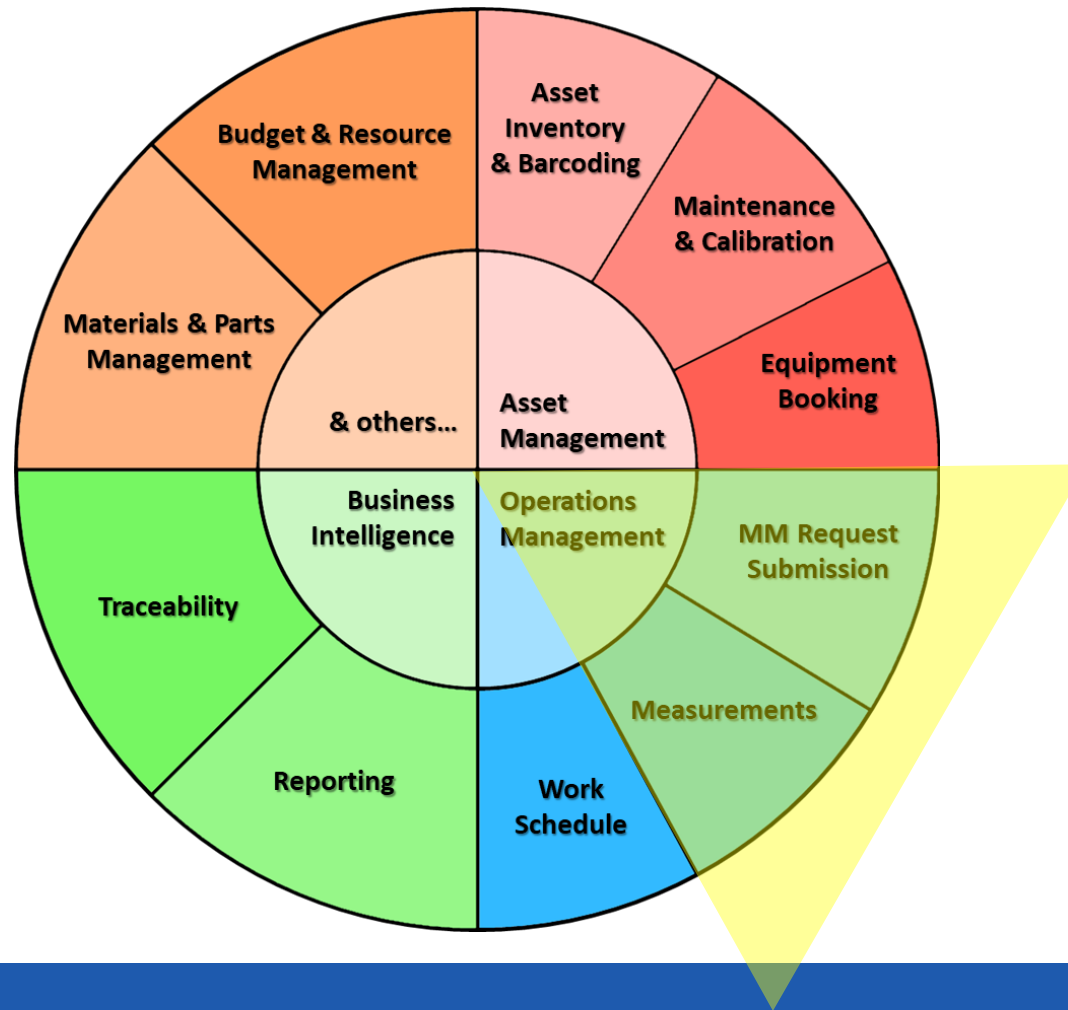
Audit Trail

(default) Edit Date = Run

Date	Field	Old Value	New Value	Changed By	Action	Recorded in Mobile	Audit Trail Description
03-JUN-2020 13:37	MM0113		0.178544197916867	MMEASURE	Insert	<input type="checkbox"/>	Efficient Coil Area (single calib.) [m^2]
03-JUN-2020 13:37	MM0114		03-06-2020 13:36	MMEASURE	Insert	<input type="checkbox"/>	Calibration Date (single)
03-JUN-2020 13:37	MM0148		403	MMEASURE	Insert	<input type="checkbox"/>	Impedance [Ohm]
03-JUN-2020 13:43	MM0113	0.17854419791...	0.178536608396261	MMEASURE	Update	<input type="checkbox"/>	Efficient Coil Area (single calib.) [m^2]
03-JUN-2020 13:43	MM0114	03-06-2020 13:36	03-06-2020 13:41	MMEASURE	Update	<input type="checkbox"/>	Calibration Date (single)

Show Filter Row:

# Operations Management

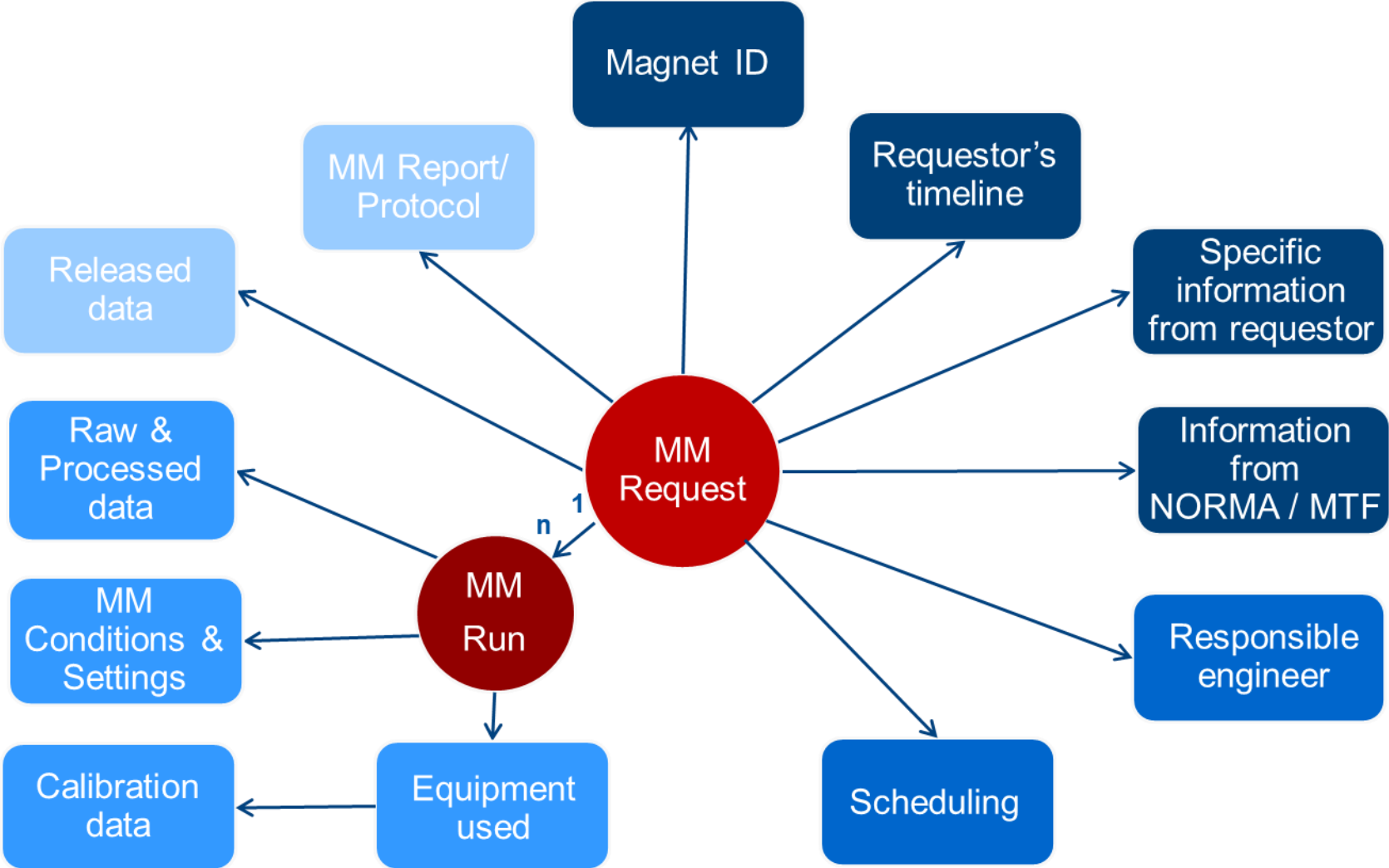




# MM Requests: the Central Point of our New IS

Post-processing  
Phase

Request  
Phase



Execution  
Phase

Preparation  
Phase



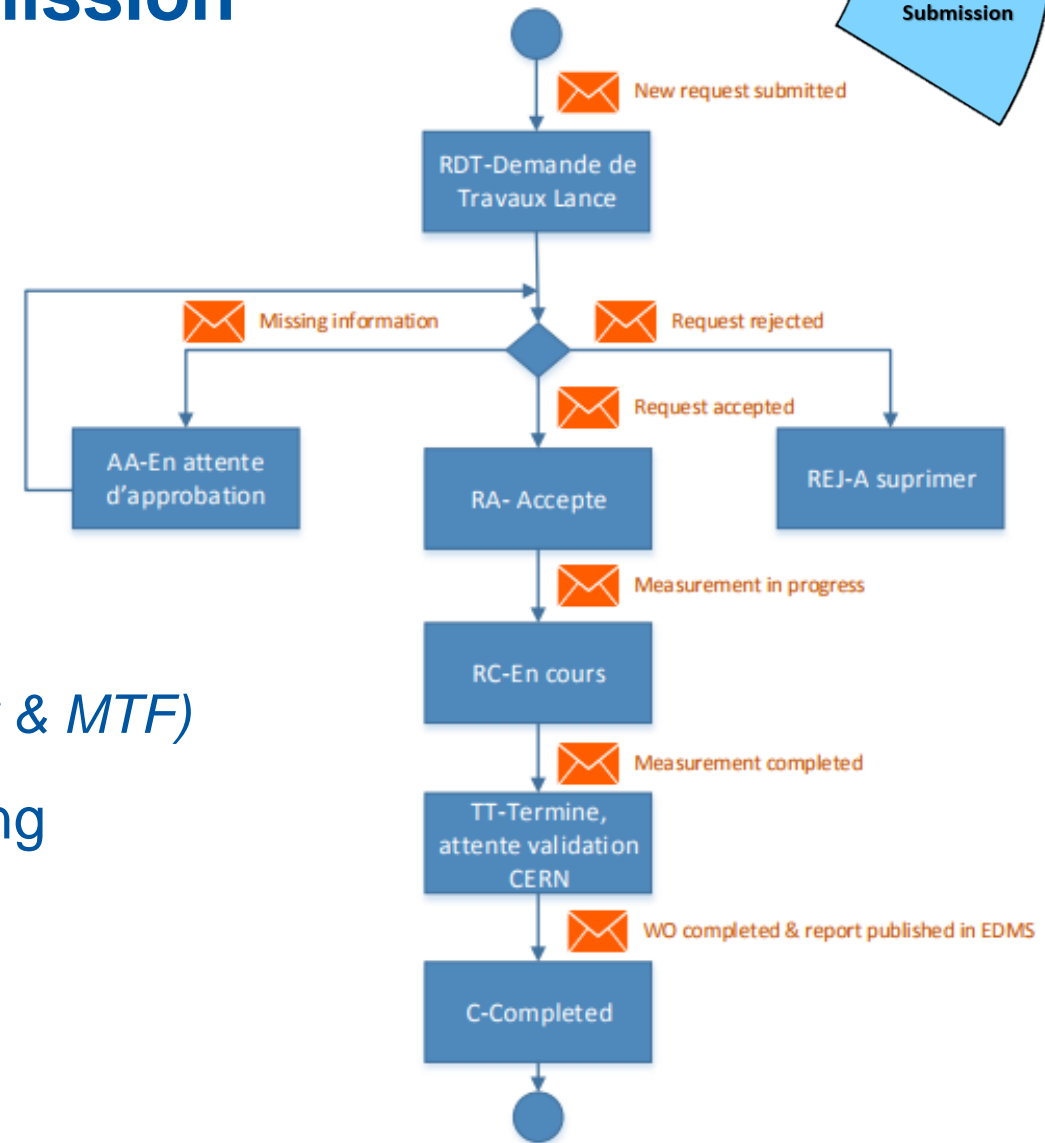
# MM Request Submission



# MM Request Submission

MM Request Submission

- ✓ Requests created by the MM Clients:
  - Need for clear, simple & easy way to request information
- ✓ Change in philosophy wrt the past:
  - Less information required (*integration with EDMS & MTF*)
  - Request acts as trigger for discussion & planning
- ✓ Real-time notifications to MM Clients



# MM Request Submission Interface

MM Request Submission

**EAM Light** | TESTTOUR | WSJB29

Work Order 26356708 | SAVE | NEW | DELETE | [Icons]

### DETAILS

**Description**  
MM Request Form for Normal-conducting/Permanent Magnets

**Equipment \***  
PXMQSAAIAP-00000123 – PXMQSAAIAP - Quadrupole magnet, skew, type 404

**Status**  
RDT - Demande de Travaux Lance

**Class**  
MME01 – Normal-Conducting/Permanent MM Request - MM Section

### SCHEDULING

**Reported By**  
145295 – TOURNAKI ELENI 64631

**Assigned To**

**Req. Start Date \***  
12-Apr-2019

**Req. End Date \***  
13-Apr-2019

**Sched. Start Date**  
12-Apr-2019

**Sched. End Date**  
19-Apr-2019

**Date Completed**

### EDMS DOCUMENTS

No documents

ID	Title	Status
No documents		

Per page 5 | 0-0 of 0

### COMMENTS

TE Enter new comment here

### CHECKLISTS

Activity

1 – Please provide general information here: [CREATE FOLLOW-UP WO](#)

TESTP – TEST POSITION

Project (Root Project) [Dropdown]

Measurement Scope [Dropdown]

Is the magnet radioactive?  Yes  No

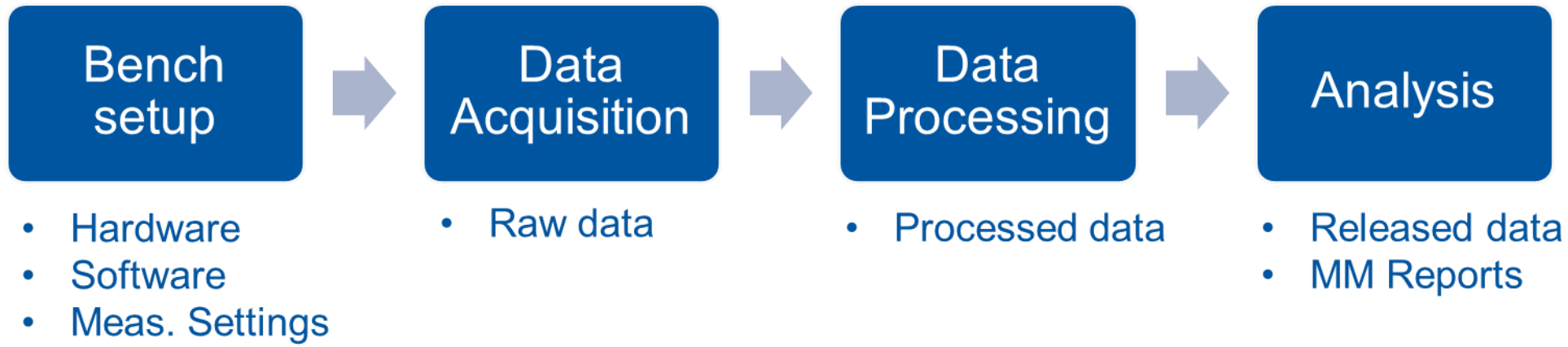
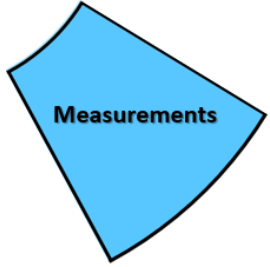
Does the magnet have a Thermal Interlock?  Yes  No

Does the magnet follow the LHC Polarity Convention?  Yes  No

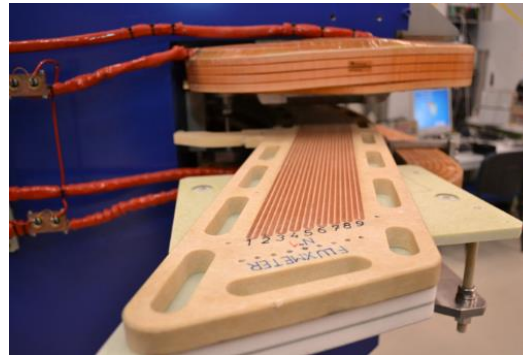
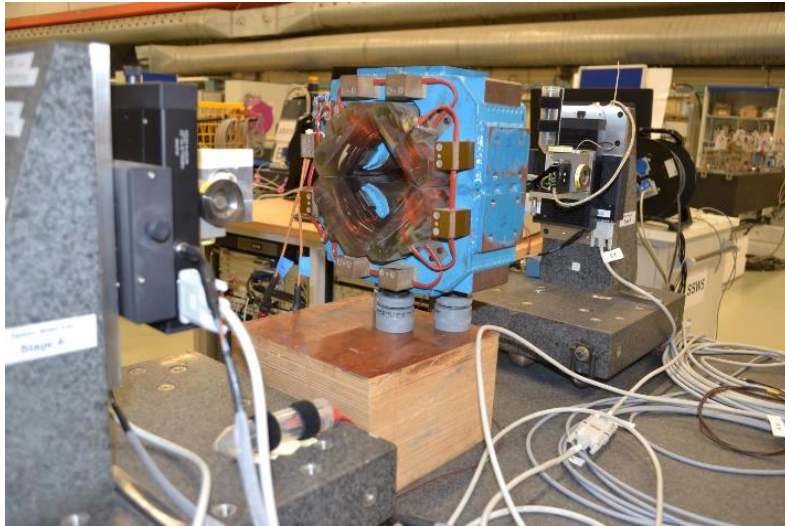
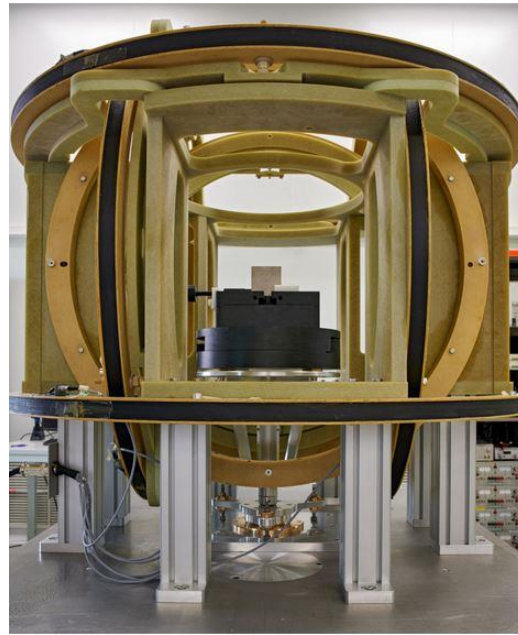
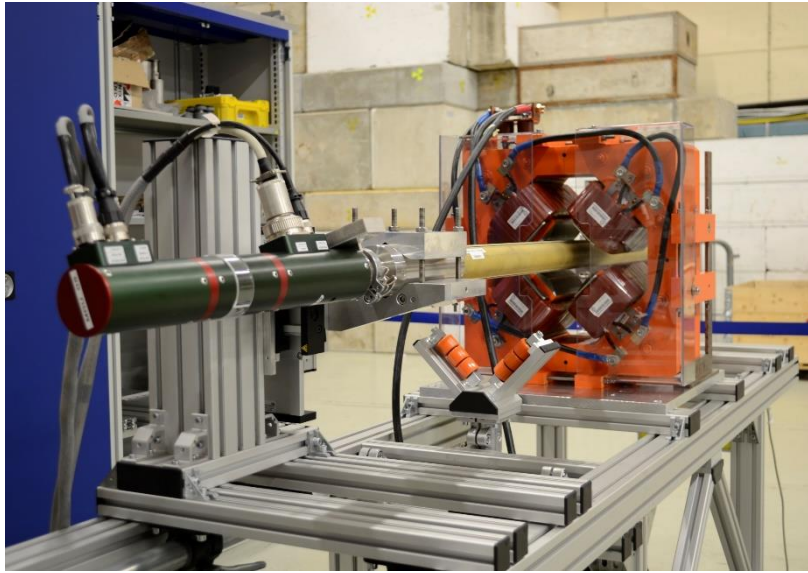
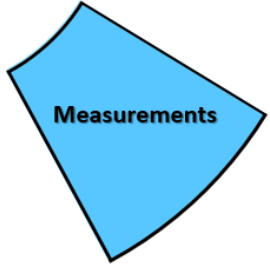
# Measurements



# Measurement Bench

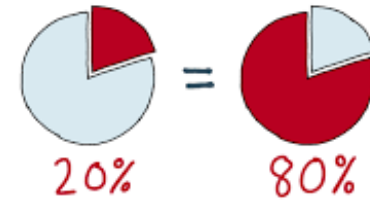


# Measurement Systems



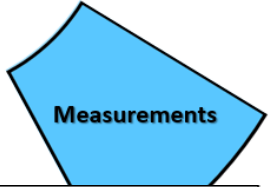
THE PARETO PRINCIPLE

EFFORT → RESULTS

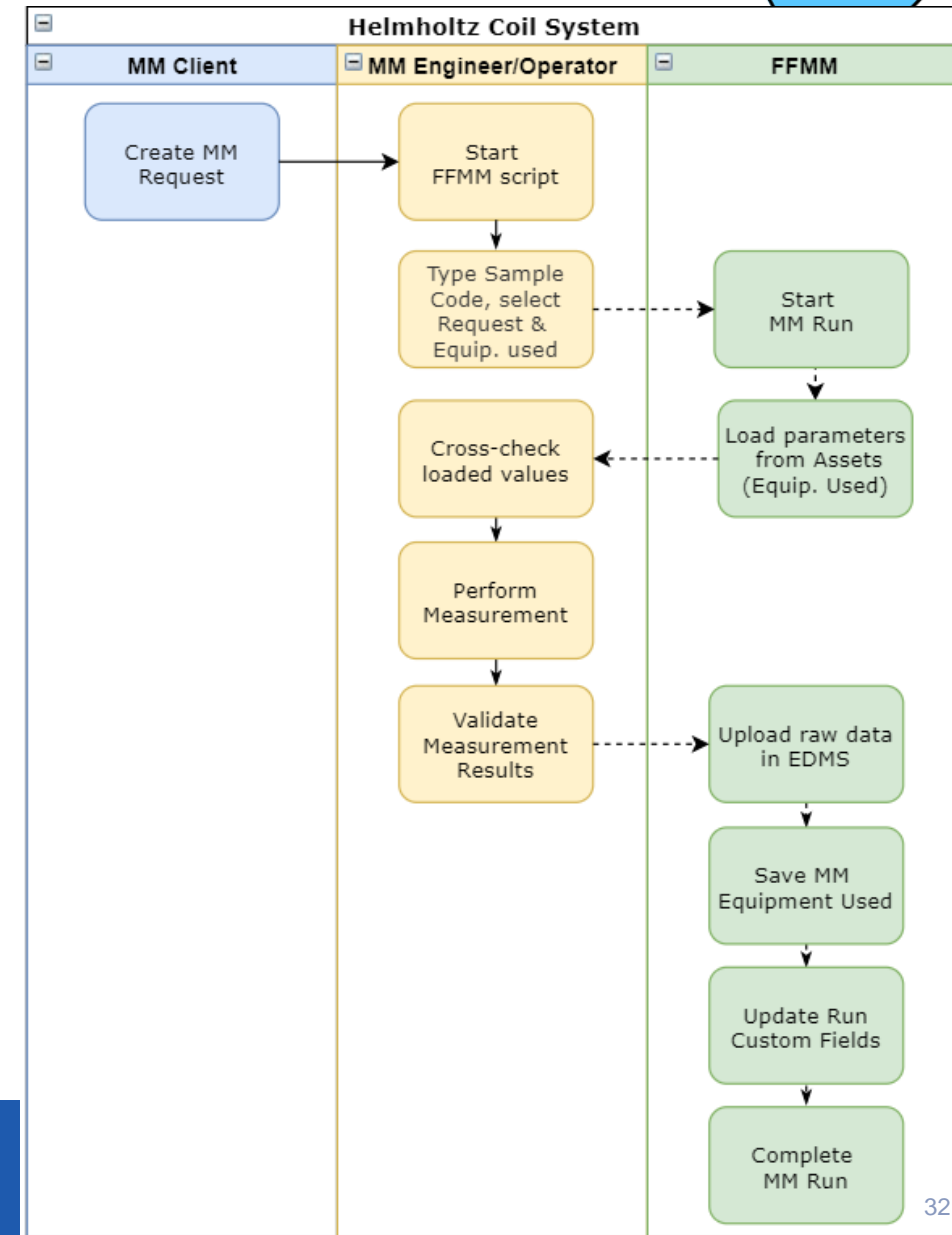
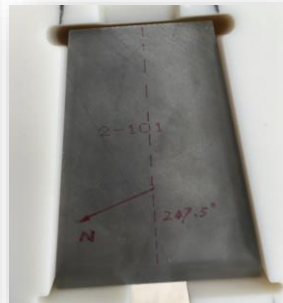
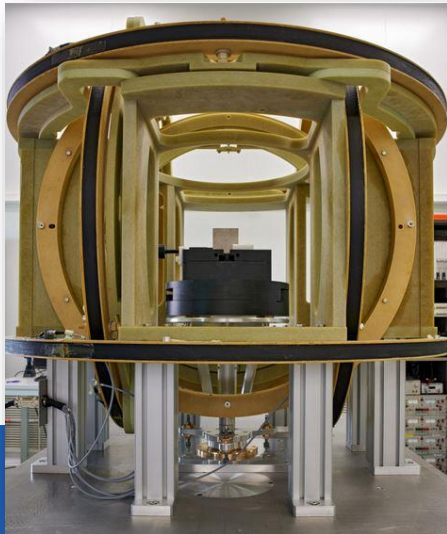


LEAD

# Measurements: Helmholtz Coil System



- ✓ MM Campaign for FASER Project  
(690 permanent magnet blocks)
- ✓ Good candidate as a pilot project (simple & quick MM)
- ✓ Workflow similar to calibration
- ✓ Instructions & feedback provided to the operator
- ✓ Results available immediately & with one click



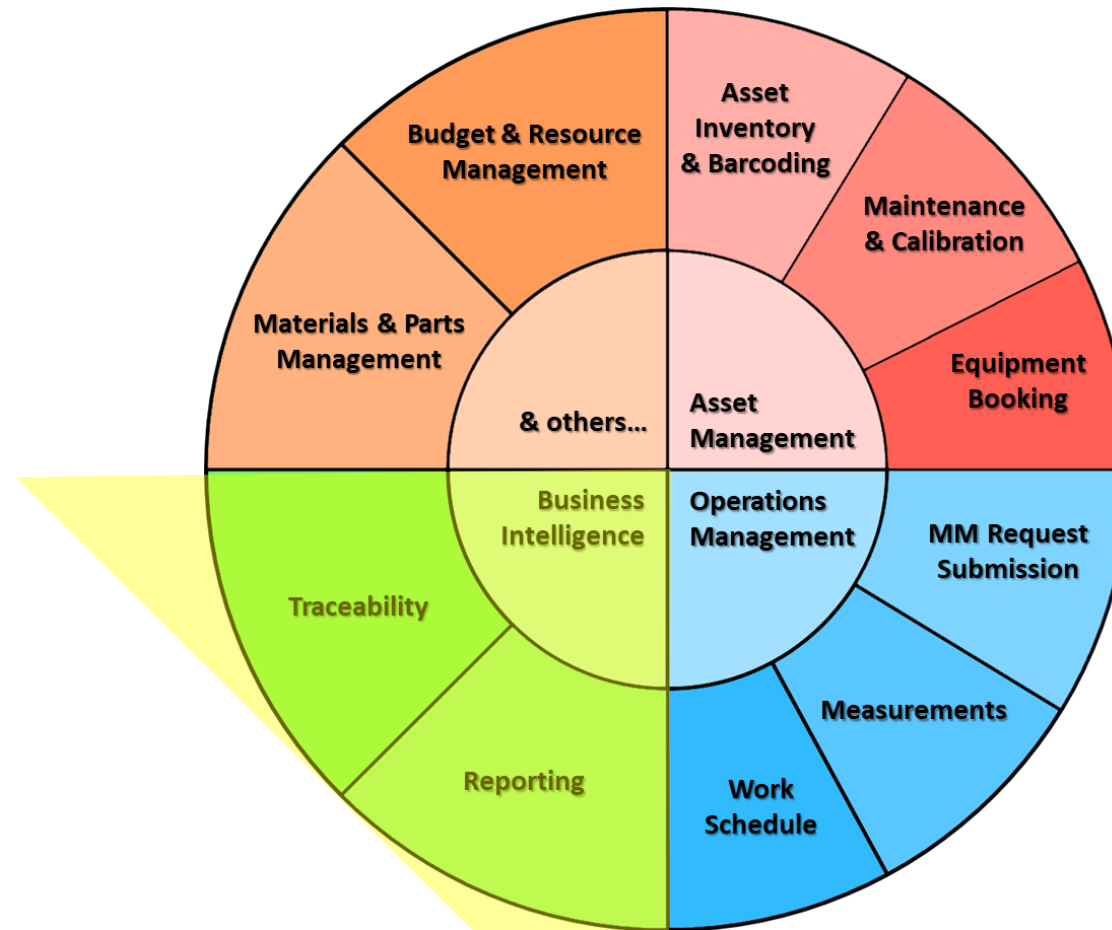


# Measurements: Rotating Coil System

- ✓ Next milestone: upcoming measurement campaign for HL-LHC
- ✓ More complex system:
  - Measurements in cryogenics conditions
  - Need for reduced feedback loop
  - Complex data structure
  - High volume of data
- ✓ Preparation already done
- ✓ Re-use of features of existing scripts & development of advanced features



# Traceability & Reporting



# How many times have we measured a magnet?

**infor EAM**

Work Equipment PRODUCTION - Group: MM-ADM - User: TESTTOUR

Work Order 28136145 MM Request Form for Normal-conducting/Permanent Magnets

MM WOs - Date Created Edit Date Created = Run

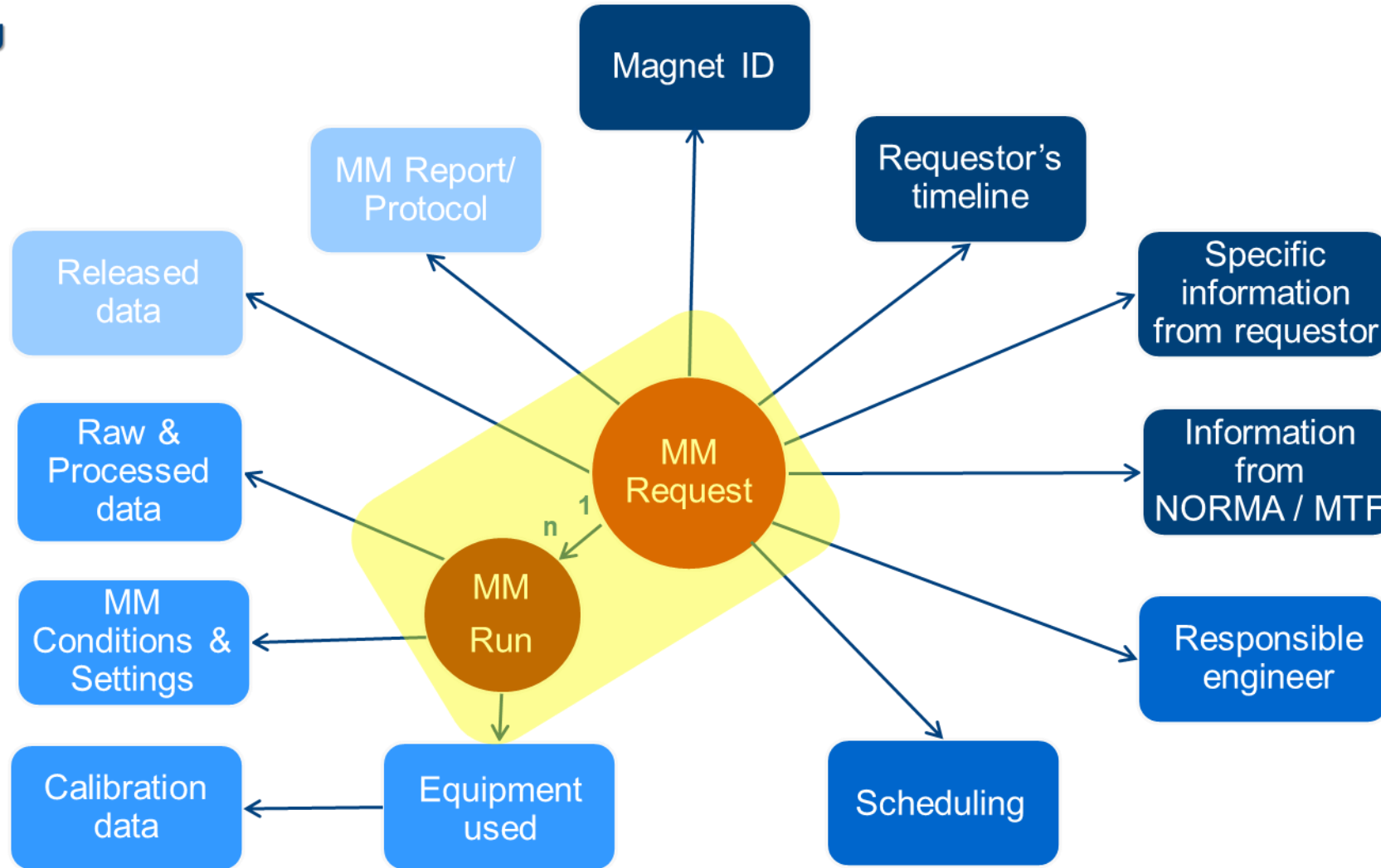
Date Created	Work Order	Description	Status	Equipment	Equipment Description	Req. Start Date	Req. End Date	Assigned To	Created By
19-MAY-2020	28136145	MM Request Form for Normal-conducting/Permanent Magnets	RA - Accepte	PXMQNDCTWP	PXMQNDCTWP - Quadrupole magnet, ISR, type QDS, 0.82m	22-JUN-2020	26-JUN-2020	43046	RUSSO
19-DEC-2018	25908029	MM Request Form for Normal-conducting/Permanent Magnets	C - Completed	PXMQNDCTWP	PXMQNDCTWP - Quadrupole magnet, ISR, type QDS, 0.82m	20-JAN-2019	31-JAN-2019	43046	RUSSO

Records: 2 of 2 Show Filter Row:

# How many Meas. Runs have we performed to fulfil a Request?

Post-processing  
Phase

Request  
Phase



Execution  
Phase

Preparation  
Phase

# How many Meas. Runs have we performed to fulfil a Request?

The screenshot shows the Infor EAM interface for a Work Order. The breadcrumb trail is "Work Order 27533987 MM Request Form for Normal-conducting/Permanent Magnets". The "Children" tab is selected and highlighted with a red box. Below the tabs, there is a filter dropdown set to "(temp)All Child WOs" and a search field. A table displays two child work orders:

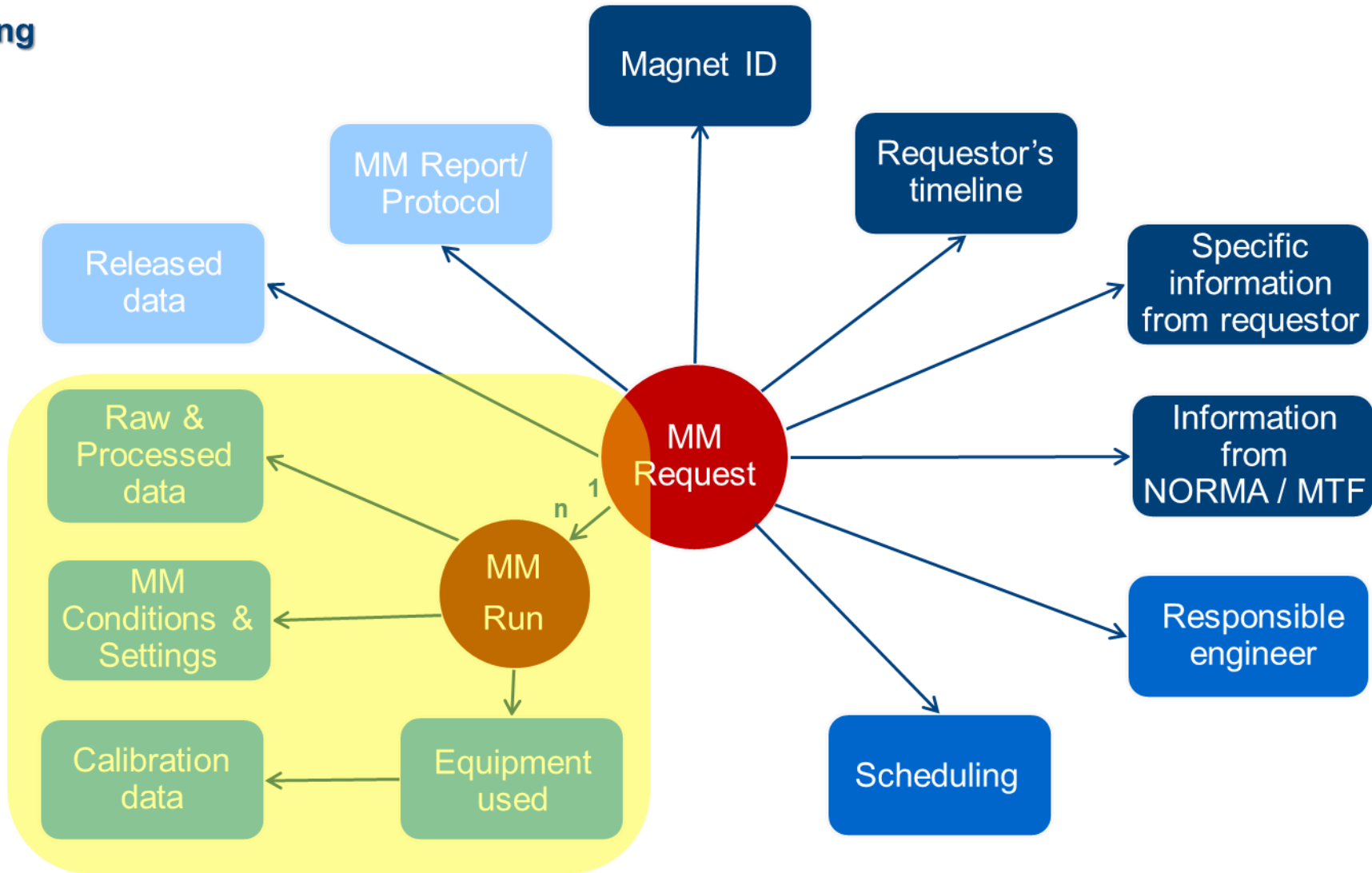
Child WO	Description	Status	Equipment
27412203	Helmholtz MM Run for FASER PM Block PXMDMCAM01-00004004	TX - Annule / Rejete	PXMDMCAM01-00004004
27497933	Helmholtz MM Run for FASER PM Block PXMDMCAM01-00004004	T - Termine	PXMDMCAM01-00004004

At the bottom left, it shows "Records: 2 of 2" with a refresh icon. At the bottom right, there is a "Show Filter Row" checkbox and some utility icons.

# Which are the details of a specific Meas. Run?

Post-processing  
Phase

Request  
Phase



Execution  
Phase

Preparation  
Phase

# Which are the details of a specific Meas. Run?

The screenshot displays the infor EAM interface for a specific work order. The main header shows 'infor EAM' and navigation options for 'Work' and 'Equipment'. The work order details include:

- Work Order: 28266781 - Helmholtz Coil Run Work Order generated by FFMM
- Equipment: PXMDMCAM01-00004139 - FASER dipole permanent block → Magnet
- Status: I - Termine
- Class: MME10
- Parent Work Order: 27412324 → Request

The 'Custom Fields' section is highlighted with a red box and contains the following measurement settings:

- Opérateur (ID CERN): 36069
- Measurement Settings:
  - Motor Velocity [Hz]: 1.000000
  - FDIs gain: 1.000000
  - Encoder Pulses per Turn: 1024
- Calibration Values:
  - Angular Encoder Offset [rad]: 6.262900
- Measurement Conditions:
  - Temperature [K]: 298.350175

Red text annotations on the right side of the image point to the 'Magnet' and 'Request' labels, and a red arrow points from the 'Custom Fields' section to the text 'Measurement Settings', 'Measurement Conditions', and 'Measurement Results'.

# Which are the details of a specific Meas. Run?

The screenshot displays the Infor EAM interface for a work order. At the top, the 'infor EAM' logo is visible. Below it, navigation tabs for 'Work' and 'Equipment' are shown. The main header identifies the work order as '28266781 Helmholtz Coil Run Work Order generated by FFMM'. A toolbar with various icons is located below the header.

Two tabs are active: 'MM Equipment Used' and 'EDMS Documents'. A red arrow points from the 'EDMS Documents' tab to a table of equipment used:

WO	Equipment Used
28266781	CRMMARM_AD-00000001
28266781	CRMMCEN_AB-00000002
28266781	CRMMCNO_AK-00000001
28266781	CRMMDPC_AA-00000002
28266781	CRMMETH_AB-00000001
28266781	CRMMFBE_XX-00000008

Below the table, the work order details are shown. The 'Equipment' field is set to 'PXMDMCAM01-00004139' with the label 'FASER dipole permanent block' and a red arrow pointing to the word 'Magnet'. The 'Status' dropdown is set to 'I - Termine'. The 'Created By' field is 'MMEASURE' with a red arrow pointing to 'FFMM's service account'. The 'Date Created' is '10-JUL-2020'. The 'Parent Work Order' is '27412324' with a red arrow pointing to 'Request'. The 'Class' is 'MME10'. The 'Scheduling' section shows 'Assigned To: 36069' and 'Date Completed: 10-JUL-2020 10:06'.

The 'Custom Fields' section is highlighted with a red box and contains the following data:

- Opérateur (ID CERN): 36069
- Motor Velocity [Hz]: 1.000000
- FDIs gain: 1.000000
- Encoder Pulses per Turn: 1024
- Angular Encoder Offset [rad]: 6.262900
- Temperature [K]: 298.350175

The 'EDMS Documents' section shows a list of document files for the work order, including 'Measurement Results' and 'Document files (2395890 v.1)'. A red arrow points from the 'EDMS Documents' tab to this section.



# Which is the current status of the Requests?



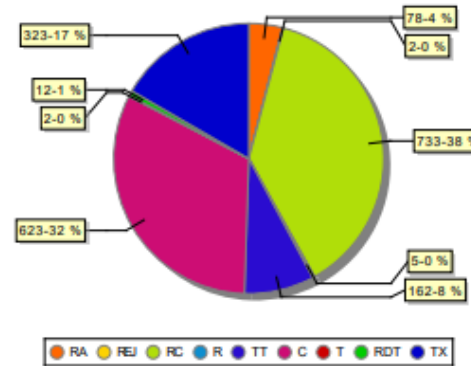
European Organization for Nuclear Research  
Organisation européenne pour la recherche nucléaire

## CMMS Service - MM section: Work orders per status Extracted on: 27/08/2020 03:41:22

**Prompt**  
Project:  
Scheduled Start Date from : <no value> This filter will be removed  
Scheduled Start Date to: <no value> This filter will be removed  
Status:  
Assigned to:

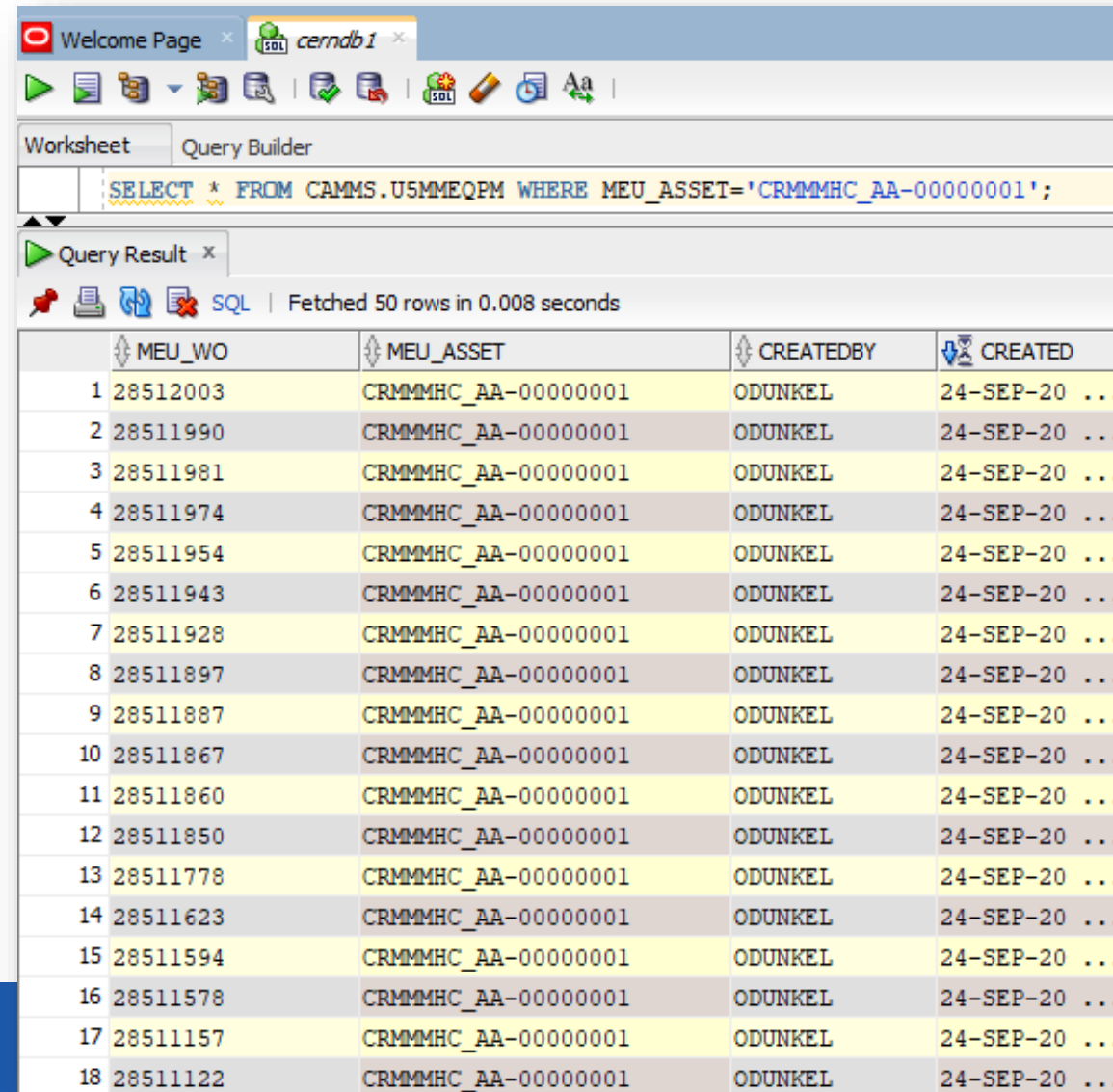
R - Lance: WO created, remains with client  
RDT - Demande de travaux lance: WO sent to the section's coordinator  
RA - Accepte: WO accepted by the section, engineer assigned to it  
RC - En cours: Magnetic Measurement is ongoing  
TT - Termine, attente validation CERN: MM finished, waiting for a report  
C - Completed: MM finished and WO closed

Number of work orders per status



WO Code	Status	Equipment name	Project	Completed date	Creator	Assigned To
<a href="#">25211409</a>	RA	CRMHRMC001-CR000004			NBOURCEY	PETRONE CARLO 79775 168208
<a href="#">28251587</a>	RDT	CRMMMAR_AJ-00000014			MMEASURE	BELTRON MERCADILLO RICARDO 78642 165160
<a href="#">28253705</a>	RDT	CRMMMCO_AD-00000030			MMEASURE	BELTRON MERCADILLO RICARDO 78642 165160
<a href="#">28152998</a>	RDT	CRMMMPB_AF-00000001			MMEASURE	BELTRON MERCADILLO RICARDO 78642 165160
<a href="#">28164074</a>	RDT	CRMMMPB_AH-00000020			MMEASURE	BELTRON MERCADILLO RICARDO 78642 165160
<a href="#">28167118</a>	RDT	CRMMMPB_AH-00000033			MMEASURE	BELTRON MERCADILLO RICARDO 78642 165160
<a href="#">28233994</a>	RDT	CRMMMPB_AK-00000001			MMEASURE	BELTRON MERCADILLO RICARDO 78642 165160

# In which Meas. Runs have we used a specific piece of equipment?



The screenshot shows a database query tool interface. The query executed is: `SELECT * FROM CAMMS.U5MMEQPM WHERE MEU_ASSET='CRMMHC_AA-00000001';` The result shows 18 rows of data, all with the same MEU\_ASSET value. The columns are MEU\_WO, MEU\_ASSET, CREATEDBY, and CREATED. The CREATED column shows dates from 24-SEP-20.

	MEU_WO	MEU_ASSET	CREATEDBY	CREATED
1	28512003	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
2	28511990	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
3	28511981	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
4	28511974	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
5	28511954	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
6	28511943	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
7	28511928	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
8	28511897	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
9	28511887	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
10	28511867	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
11	28511860	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
12	28511850	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
13	28511778	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
14	28511623	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
15	28511594	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
16	28511578	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
17	28511157	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...
18	28511122	CRMMHC_AA-00000001	ODUNKEL	24-SEP-20 ...

# Which are the calibration results of a specific Array?

**infor EAM**

Work Equipment PRODUCTION - Group: MM-ADM - User: TESTTOUR

Asset CRMMMPB\_AM-00000001 PCB Coil - CERN - L22W7.T60.N10.S250

(temp)MM Coil Calibration Data Edit Parent Asset [R] [Q] Run

Parent Asset	Asset	Description	Alias	Status	Efficient Coil Area (mounted calib.) [m <sup>2</sup> ]	Calibration Date (mounted)
CRMMMAR_AM-00000001	CRMMMPB_AM-00000001	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117418120916619	28-JUL-2020 12:09
CRMMMAR_AM-00000001	CRMMMPB_AM-00000002	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117381126868854	28-JUL-2020 12:09
CRMMMAR_AM-00000001	CRMMMPB_AM-00000003	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117329529594706	28-JUL-2020 12:09
CRMMMAR_AM-00000001	CRMMMPB_AM-00000004	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117346492585819	28-JUL-2020 12:09
CRMMMAR_AM-00000001	CRMMMPB_AM-00000005	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117413951116846	28-JUL-2020 12:09
CRMMMAR_AM-00000002	CRMMMPB_AM-00000006	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117313481046658	28-JUL-2020 13:48
CRMMMAR_AM-00000002	CRMMMPB_AM-00000007	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117286410704893	28-JUL-2020 13:48
CRMMMAR_AM-00000002	CRMMMPB_AM-00000008	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117283326284504	28-JUL-2020 13:48
CRMMMAR_AM-00000002	CRMMMPB_AM-00000009	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117246576365757	28-JUL-2020 13:48
CRMMMAR_AM-00000002	CRMMMPB_AM-00000010	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117367730419845	28-JUL-2020 13:48
CRMMMAR AM-00000003	CRMMMPB AM-00000011	PCB Coil - CERN - L22W7.T60.N10.S250	L22W7....	Installe et Maintenu	0.0117266555374391	28-JUL-2020 14:49

Records: 50 of 50 [123] Show Filter Row:  [Menu] [Menu] [Print] [Export]

## Benefits (1/2)



- ✓ Consistency & no duplications of data (*centralized database*)
- ✓ Fewer human errors (*manual entry of data minimized*)
- ✓ Streamline of procedures
- ✓ Systematic documentation without extra admin. overhead  
(*equipment used, raw data, final results, meta-data*)
- ✓ Time & workload savings
- ✓ More focus on the workflow

## Benefits (2/2)

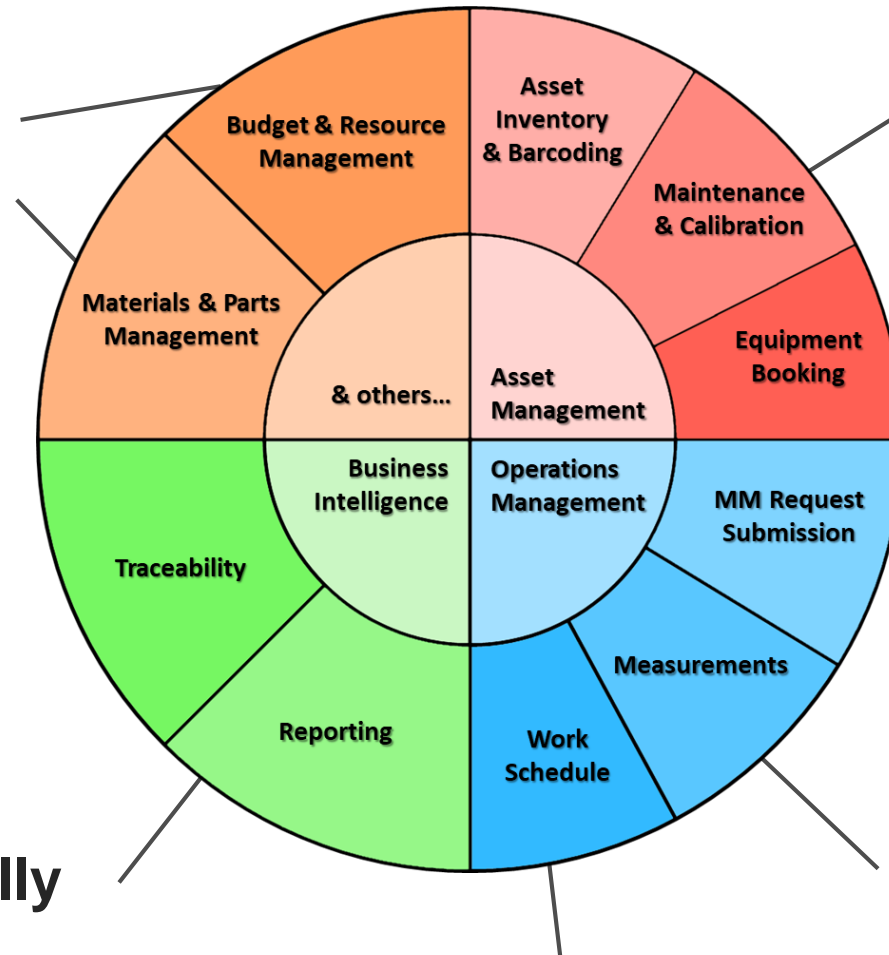


- ✓ Full history of maintenance, calibration & measurements available
- ✓ Full traceability of results (*reconstruction possible if needed*) & faults of equipment
- ✓ Latest information available instantaneously and in a few clicks
- ✓ User-friendly interfaces (*EAM Light, Infor EAM, FFMM, Pentaho Reports*)
- ✓ Knowledge transfer (*a single “view of all the data”*)



# Future Road-Map

Monitor budget & resources (*costs, materials, parts, man-power, etc.*)



Create alerts & task-plans  
Handle warranties

Use Infor's equip. booking functionality

**Generate automatically the MM Protocols**

**Expand to other MM Systems**

Use Infor's Gantt chart functionality

# Conclusions

- ✓ Management & Information System that:
  - integrates asset management, database structures, and FFMM to support our every-day activities.
  - increases the traceability and the quality of the results, while limiting the administrative overheads to a minimum.
- ✓ Effort is shifted to development & customization.
  - Re-use of functions & structures helps in this direction.
- ✓ Benefits already available, more to come as system expands!

**Thank you very much  
for your attention!**

