EE535
Asset Maintenance & Reliability Engineering
Module 3

Computerized Maintenance Management System (CMMS)
电脑化维护管理系统

a) *Functions and Key Components of CMMS* CMMS 的功能和关键组件
b) *Core Operations of CMMS* CMMS 的核心操作
c) *CMMS Software Packages in the Market* 市场上的 CMMS 软件
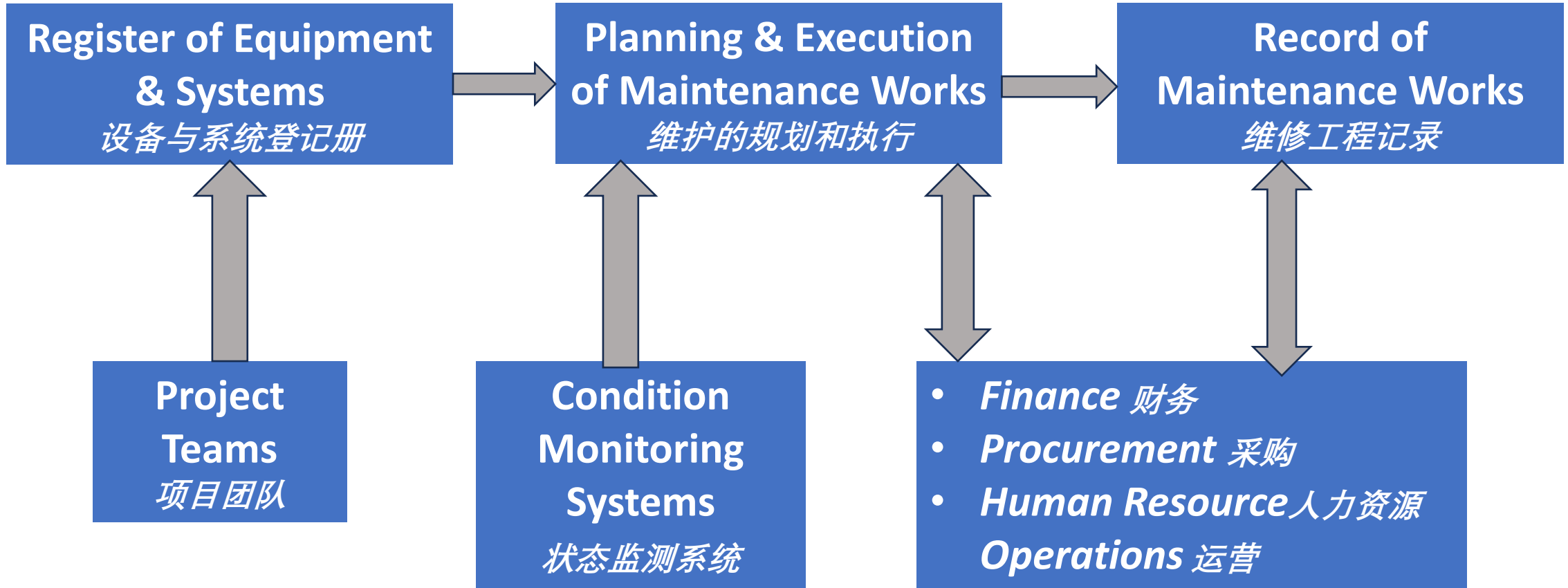
Semester 1 – 2025/ 2026
Dr K K Lee

Functions and Key Components of CMMS
CMMS 的功能和关键组件

Why Do We Need CMMS - *Exceptionally large amount of data to be handled!*

- *Complexity of asset maintenance process – asset information and its updating, planning and implementation of maintenance works, inventory and procurement of spare parts and materials, etc.* 设备维护流程的复杂性——设备信息及其更新、维护工作的规划和实施、备件及材料的库存和采购等。 大量的文档及其更新。 与财务、人力资源和运营部门的接口。 随着物联网 (IoT) 和通信与信息技术 (CIT) 的进步，电子维护的兴起催生了数字化的需求。

- *Substantial documentation and its updating.* 大量的文档及其更新。

- *Interfaces with finance, human resources, and operations.* 与财务、人力资源和运营部门的接口。

- *The need for digitalization arising from the emergence of e-Maintenance through advance in Internet of Things (IoT), and Communication & Information Technology (CIT).* 随着物联网 (IoT) 和通信与信息技术 (CIT) 的进步，电子化维护系统的兴起催生了数字化的需求。

(937) How Maintenance Planning & Scheduling Works - YouTube

Why Do We Need CMMS – Data Flow *数据流*

Register of Equipment & Systems
设备与系统登记册

Planning & Execution of Maintenance Works
维护的规划和执行

Record of Maintenance Works
维修工程记录

Project Teams
项目团队

Condition Monitoring Systems
状态监测系统

- *Finance 财务*
- *Procurement 采购*
- *Human Resource 人力资源*

Operations 运营

Primary objective of CMMS 主要目标

To automate the planning and management of asset maintenance activities, including the interfaces with 实现设备维护活动规划和管理的自动化，包括与以下系统的接口：

- *Distributed, remote and fully automated condition monitoring systems* 分布式、远程、全自动状态监测系统。

- *Train and passenger service operation management system* 列车及客运运营管理系统

- *Procurement – purchase of spare parts, matrials, tools and instruments.* 采购备件、材料、工具和仪器。人

- *Human resources – staff resources, qualifications and competencies.* 员工资源、资质和能力。

- *Finance – costing of maintenance jobs.* 维护工作成本核算。

Functions of CMMS

- *Issue and close work orders arising from corrective, preventive, or condition-based maintenance works.* 签发并完结纠正性、预防性或基于状态的维护工作产生的工单。
- **Maintains and updates the Asset Register which keeps the records of all the assets being maintained.** 维护并更新设备登记册，该登记册记录所有正在维护的设备。
- *Control inventory of materials, parts, tools, and equipment required for the maintenance operations.* 控制维护操作所需的材料、零件、工具和设备的库存。
- *Request for procurement of maintenance inventory for topping up to the predefined levels of stock.* 申请采购维护库存，以补充到预定的库存水平。
- *Manage outsourced maintenance works.* 管理外包维护工作。
- *Maintains and updates asset maintenance requirements and history.* 维护并更新设备维护需求和历史记录。
- *Scheduling of maintenance activities and resources.* 安排维护工作和资源。

[(937) WHAT IS A CMMS ? Computerized Maintenance Management System - YouTube](#)

Functions of CMMS

- ***Cost control of the maintenance operations.*** 维护作业的成本控制。

- *Generates reports and statistics of the maintenance operations.* 维护作业的报告和统计数据。

- *Conducts analysis of the maintenance operations to support continuous improvement and planning of maintenance for new asset/equipment*维对维护作业进行分析，以支持新设备的持续改进和维护规划。

- *Maintains and updates technical information required for the maintenance operations and provides convenient access to the maintenance personnel when such information is required* 维护和更新维护作业所需的技术信息，并在需要时方便维护人员查询。

- *Maintains and updates maintenance management procedures and work instructions.* 更新维护管理程序和工作指导。

- ***Interfaces with other IT systems including train and passenger service operations management, human resources, procurement, and finance.*** 与其他IT系统接口，包括列车和客运服务运营管理、人力资源、采购和财务系统。

Core Components of CMMS

- *Equipment Management, also commonly known as Asset Register – keep and update record of the as-built information of assets, labelling of assets at various asset hierarchy levels, bills of asset quantities.* 设备管理，通常也称为资产登记册——保存并更新设备的信息、各资产层级的资产标签以及资产数量清单。

- *Work Management – automate the management of asset maintenance works, mainly work orders.* 工作管理——自动化资产维护工作管理，主要是工单。

- *Maintenance Planning – scheduling of maintenance works.* 维护计划——维护工作安排。

- *Analysis and Reporting – conduct performance analysis and generate regular reports on the performance and progress of asset maintenance works.* 分析与报告——进行绩效分析并定期生成资产维护工作绩效和进度报告。

Core Components of CMMS

MAINTENANCE PLANNING

- *Standard jobs, bills of labour & material, planning requirements*
- *Time, measurement and pattern based preventive maintenance*
- *Job depdencies, superseding and opportunities*
- *Dynamic planning parameters*
- *Optimal maintenance functions*

WORK MANAGEMENT

- *Work Request and Work Order workflow process*
- *Faults, incidents and delays management*
- *Condition-based work management*
- *Outsourcing and contractor management*
- *Train delays and incidents recording from equipment perspective*

ANALYSIS AND REPORTING

- *Key performance indicators and targets*
- *Productivity performance analysis*
- *Cost analysis*
- *RAM analysis*
- *Management reporting*

EQUIPMENT MANAGEMENT (ASSET REGISTER)

- *Definition, registration and tracking of assets.*
- *Special features of rolling stock, station and linear assets*
- *Levels of equipment hierarchies*
- *Linkage with stores system for parts catalogue, materials specification, bill of materials, etc.*
- *Maintenance contracts and warranty*

Asset Structures of CMMS

- *Rolling stock – EMU trains and engineering vehicles.* 机车车辆——动车组列车和工程车辆。

- *Fixed linear assets distributed along the railway alignment, e.g., tracks, signalling system, overhead wiring, tunnels, and viaducts, etc.* 沿铁路线分布的固定线性资产，例如轨道、信号系统、架空线路、隧道和高架桥等。

- *Fixed assets located at stations, depots, and ancillary buildings along the alignment.* 位于铁路线沿线车站、车辆段和辅助建筑的固定资产。

This complexity of railway assets would necessitate a mixture of different data structures in the asset register of the CMMS. This is more demanding than CMMS for other assets. 铁路设备的复杂性使得 CMMS 的资产登记册中必须混合使用不同的数据结构。这比其他资产的 CMMS 要求更高。

As an example, all together 7 levels are usually provided for EMU trains as the lower-level assets are subject to a lot of rotation of use for different cars and trains. 例如，动车组列车通常总共提供 7 个级别，因为较低级别的资产会在不同的车厢和列车之间频繁轮换使用。

Asset Hierarchy - EMU Train

- ***Train level***列车级
- ***Car level***车辆级
  Subsystem level
  子系统级
- ***Component level***
  部件级
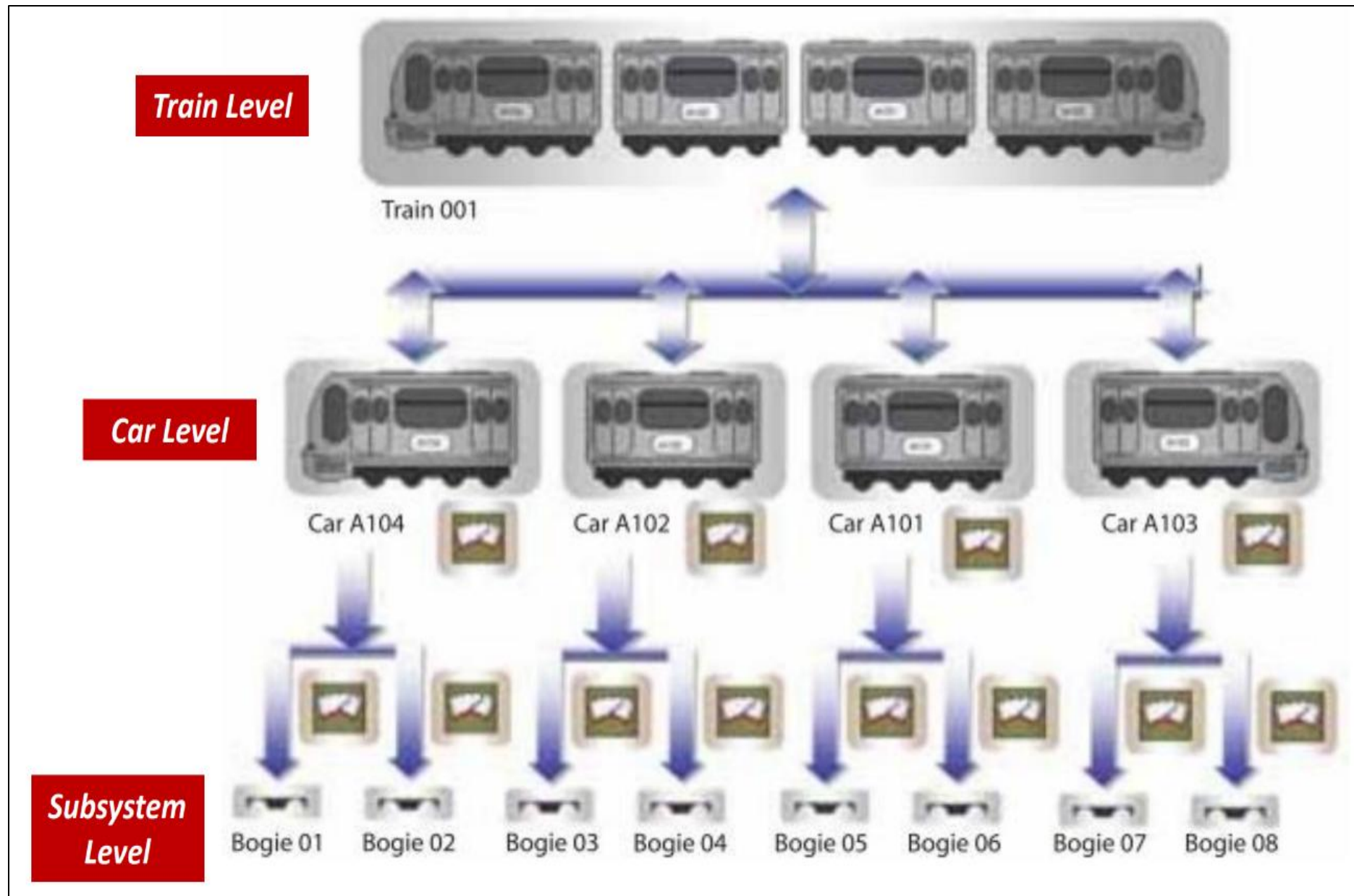
Example of Asset Hierarchy – EMU Train
Bogie Component Level

Wheel

Axle

Brake Disc

Bogie Frame
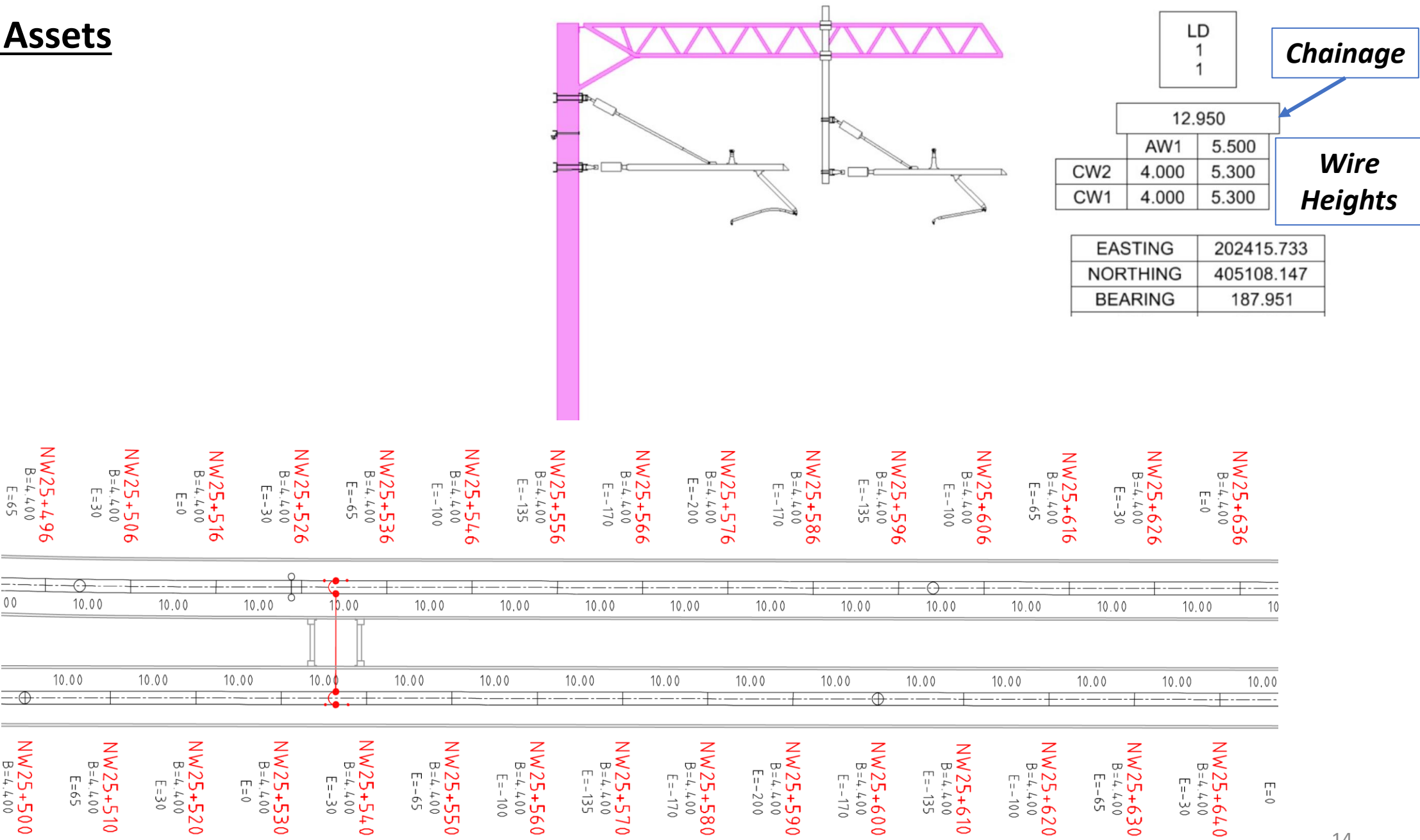
Air Bag

Damper

Spring

Axle Bearing
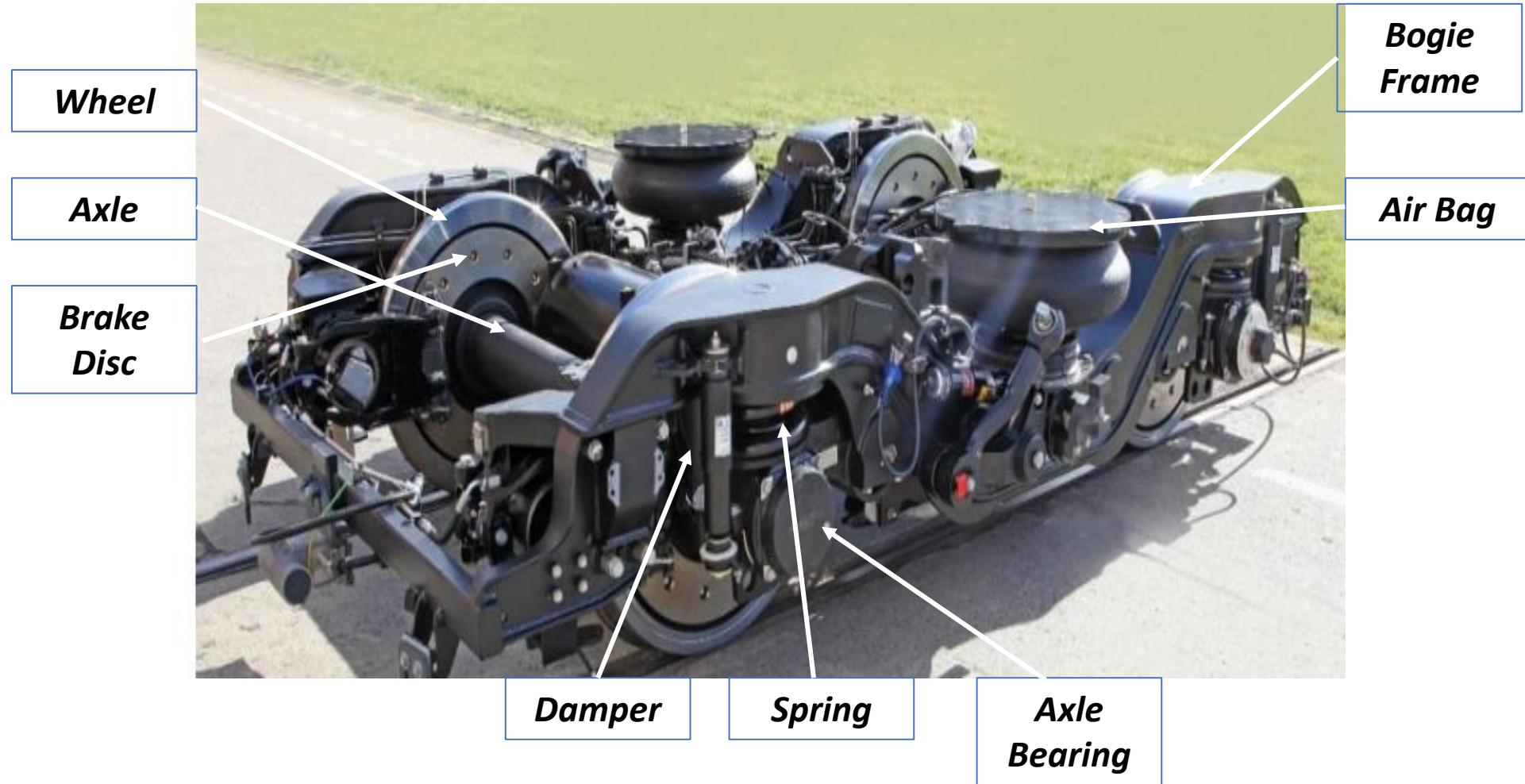
Linear Assets

Identified by the distance of the equipment location measured along the track from a reference point – this is called chainage. 通过沿轨道测量设备位置与参考点之间的距离来识别——这称为里程.

e.g., a chainage of 23.156 means the equipment is 23.156 km away from the reference point, measured along the track. 例如，23.156 的里程表示设备沿轨道测量距离参考点 23.156 公里。

Linear Assets

Chainage

Wire Heights

	12.950	
	AW1	5.500
CW2	4.000	5.300
CW1	4.000	5.300

EASTING	202415.733
NORTHING	405108.147
BEARING	187.951

Top labels (left to right):
- NW25+496 B=4.400 E=65
- NW25+506 B=4.400 E=30
- NW25+516 B=4.400 E=0
- NW25+526 B=4.400 E=-30
- NW25+536 B=4.400 E=-65
- NW25+546 B=4.400 E=-100
- NW25+556 B=4.400 E=-135
- NW25+566 B=4.400 E=-170
- NW25+576 B=4.400 E=-200
- NW25+586 B=4.400 E=-170
- NW25+596 B=4.400 E=-135
- NW25+606 B=4.400 E=-100
- NW25+616 B=4.400 E=-65
- NW25+626 B=4.400 E=-30
- NW25+636 B=4.400 E=0

Bottom labels (left to right):
- NW25+500 B=4.400 E=65
- NW25+510 B=4.400 E=30
- NW25+520 B=4.400 E=0
- NW25+530 B=4.400 E=-30
- NW25+540 B=4.400 E=-65
- NW25+550 B=4.400 E=-100
- NW25+560 B=4.400 E=-135
- NW25+570 B=4.400 E=-170
- NW25+580 B=4.400 E=-200
- NW25+590 B=4.400 E=-170
- NW25+600 B=4.400 E=-135
- NW25+610 B=4.400 E=-100
- NW25+620 B=4.400 E=-65
- NW25+630 B=4.400 E=-30
- NW25+640 B=4.400 E=0
- E=-30

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CMMS Realization

Prevalent practice in the asset maintenance industry is that there are three options for realizing a CMMS: 实现 CMMS 有三种方案：

- *As one of the Enterprise Portal modules, e.g., the Enterprise Portal package SAP has a module for asset maintenance which is closely integrated with the other modules in the Enterprise Portal.* 作为企业管理系统模块之一，例如，SAP 企业门户软件包中有一个资产维护模块，该模块与企业管理系统中的其他模块紧密集成。

- *An off the shelf dedicated asset maintenance software package available from the market, e.g., Ellipse, Maximo, etc.* 市场上现成的专用资产维护软件包，例如 Ellipse、Maximo 等。

- *A dedicated CMMS built by the railway operator, e.g., RailAssure by Hong Kong MTR* 由铁路运营商构建的专用 CMMS，例如香港地铁的 RailAssure。

Core Operations of CMMS
CMMS 的核心操作

RailAssure

- *RailAssure is a rail specific Asset Management solution.*
  RailAssure 是一款专用于铁路的设备管理解决方案.

- *It adopts MTR railway asset management process and best practices. RailAssure improves asset management process and provides useful information for strategic decision making.*
  它采用港铁 (MTR) 的铁路设备管理流程和最佳实践。RailAssure 改进了设备管理流程，并为战略决策提供了实用信息。

Core Modules

Equipment Management (EM)
- Equipment Class
- Equipment Registrations
- Equipment Structure

Maintenance Planning (MP)
- PM Master Plan
  - A 101
  - A-Check
  - B-Check
  - B 101
- Maintenance Policy
- BOL BOM

Work Management (WM)
- Fault Reporting
- WO Management (CM, PM, NM)
  - Out of Order
- WO Execution

Optional Modules
- Maintenance Based Budgeting Module
- Engineering Analysis and Management Reporting Module
- Maintenance Planning Integrator
- Mobile Integrator
- Mobile Work Order Integrator
- External Systems

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- *It is designed for railway-specific equipment such as rolling stock, station, and linear assets such as tracks and tunnels.*
它专为铁路专用设备（例如机车车辆、车站）以及线性资产（例如轨道和隧道）而设计。

- *It also provides maintenance planners with rich, dynamic, and rail-specific features to optimize maintenance resources, increase asset usability rate, increase productivity, and reduce production cost.*
它还为维护规划人员提供丰富、动态且专用于铁路的功能，以优化维护资源，提高资产利用率，提高生产效率并降低生产成本。
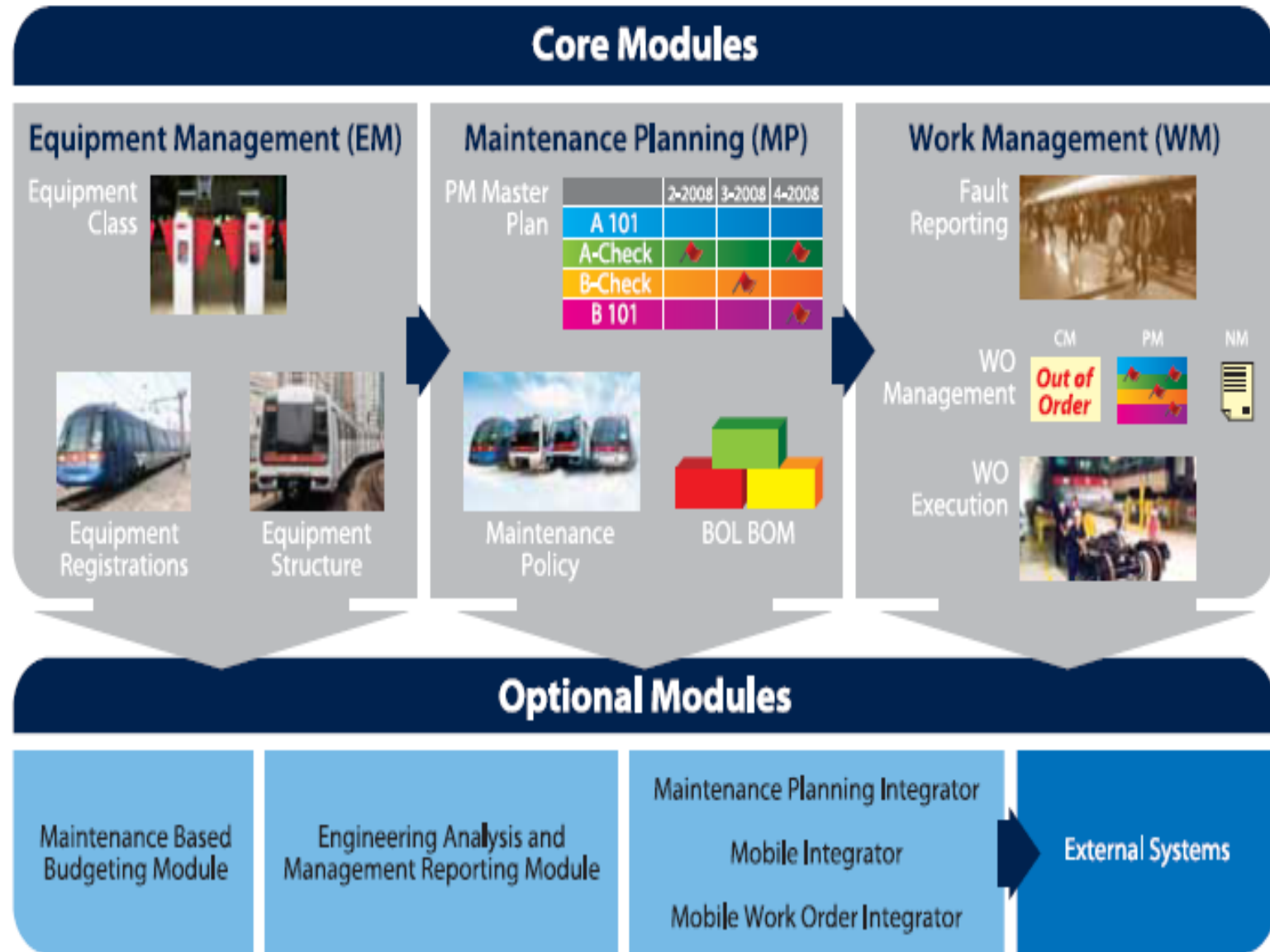
RailAssure

Asset Register

- *RailAssure is designed for railway-specific equipment including trains, stations, and linear assets such as tracks and tunnels. Equipment can be individually registered and attached to its parent in a hierarchical structure. Linear assets can be described in segments, eg, a rail track can be divided into curve tracks or plain tracks.*
RailAssure 专为铁路专用设备而设计，包括列车、车站以及轨道和隧道等线性资产。设备可以单独注册，并以分层结构的方式关联到其父级设备。线性资产可以分段描述，例如，一条轨道可以分为曲线轨道和平面轨道。

- *Operating data, including car-km run, gate transaction, equipment measurement, preventive and corrective maintenance, and costs can be attached to an individual piece of equipment and can also be rolled up to its parent.*
运行数据（包括车辆公里数、门站交易、设备测量、预防性和纠正性维护以及成本）可以关联到单个设备，也可以汇总到其父级设备。

Asset Register

- *RailAssure registers all the equipment's **repairable items** as Equipment in the Equipment Registration Module which keep track of the fitment/de-fitment/Work Order throughout the asset lifecycle*
RailAssure 将设备所有可修复项目在设备注册模块中注册为"设备"，该模块可跟踪资产整个生命周期内的安装/拆卸/工单

- *RailAssure allows **three standard Tags definable by users, and an unlimited number of user-defined fields** for keeping track of equipment information.*
RailAssure 允许用户定义三个标准标签，以及无限数量的用户自定义字段，用于跟踪设备信息。

- *The basic set up for equipment registration includes equipment class; equipment hierarchy/ classification; equipment structure, equipment bill of materials, and warranty and contract.*
设备注册的基本设置包括设备类别、设备层级/分类、设备结构、设备物料清单以及保修和合同。

Typical Screens – Asset Condition Records

Work Order Process

- ❑ *Step 1 - Task Identification - Identifies the task the maintenance staff needs to complete, either manually or by CMMS* 任务识别 - 识别维护人员需要完成的任务，手动或通过 CMMS 完成。

- ❑ *Step 2 - Work Request Submission – submit the work request to the CMMS, or CMMS initiates the work automatically.* 工作请求提交 - 向 CMMS 提交工作请求，或由 CMMS 自动启动工作。 步

- ❑ *Step 3 - Work Request Evaluation – CMMS to decide on the best way of fulfilling the work request.* 工作请求评估 - CMMS 决定完成工作请求的最佳方式。

- ❑ *Step 4 - Work Order Creation by CMMS - includes all the necessary details of the job.* 通过 CMMS 创建工作单 - 包含所有必要的工作细节。

- ❑ *Step 5 - Work Order Distribution and Completion - assigns the jobs to a qualified maintenance technician who will complete the tasks on the proposed timeline.* 工作单分配和完成 - 将工作分配给合格的维护技术人员，由其按照建议的时间表完成任务。

- ❑ *Phase 6. Work Order Documentation and Closure - Maintenance technicians are responsible for documenting and closing a work order using the CMMS once all tasks are completed.* 工作单记录和结束 - 维护技术人员负责在所有任务完成后使用 CMMS 记录和结束工作单

- *Work Order Number: A unique identifier for tracking.*

- *Date Issued: When the work order was created.*

- *Maintenance Type: Specifies the type of work (e.g., preventive, corrective, inspection).*

- *Asset Information: Details the specific asset, such as "Track Section 15A" or a specific locomotive.*

- *Description of Work: A detailed explanation of the task to be performed, such as "Inspect for rail misalignment and ballast degradation".*

- *Labor Requirements: The number and type of technicians or crews needed, including specialized skills.*

- *Materials & Parts: A list of necessary materials, tools, or replacement parts.*

- *Safety Precautions: Specific instructions to ensure the safety of personnel during the work.*

- *Estimated Completion Time: The expected duration of the task.*

- *Assigned To: The name or designation of the technician or team responsible for the work.*

- *Completion Details: Record what was done, by whom, and when, along with any findings or additional notes.*

Work Order – Preventive Maintenance Jobs

Typical Screens – Engineering Possessions of Tracks

Maintenance Jobs

*RailAssure provides a full function for the maintainer to set up jobs based on:*RailAssure 为维护人员提供全面的功能，可根据以下信息设置工作：

- *Scheduled maintenance programs* 维护计划

- *Unscheduled maintenance works request* 计划外维护工作申请

- *Condition monitoring results of asets* 状态监测结果 。

For each maintenance job, RailAssure will estimate the material and labour cost requirements by using standard bill of material and bill of labour down to each store item and labour categories/rates. These estimations will then be used as inputs for the maintenance costing activities. 使用标准物料清单和人工清单，估算物料和人工成本需求，直至每个库存项目和人工类别/费率。这些估算结果将作为维护成本核算活动的输入。

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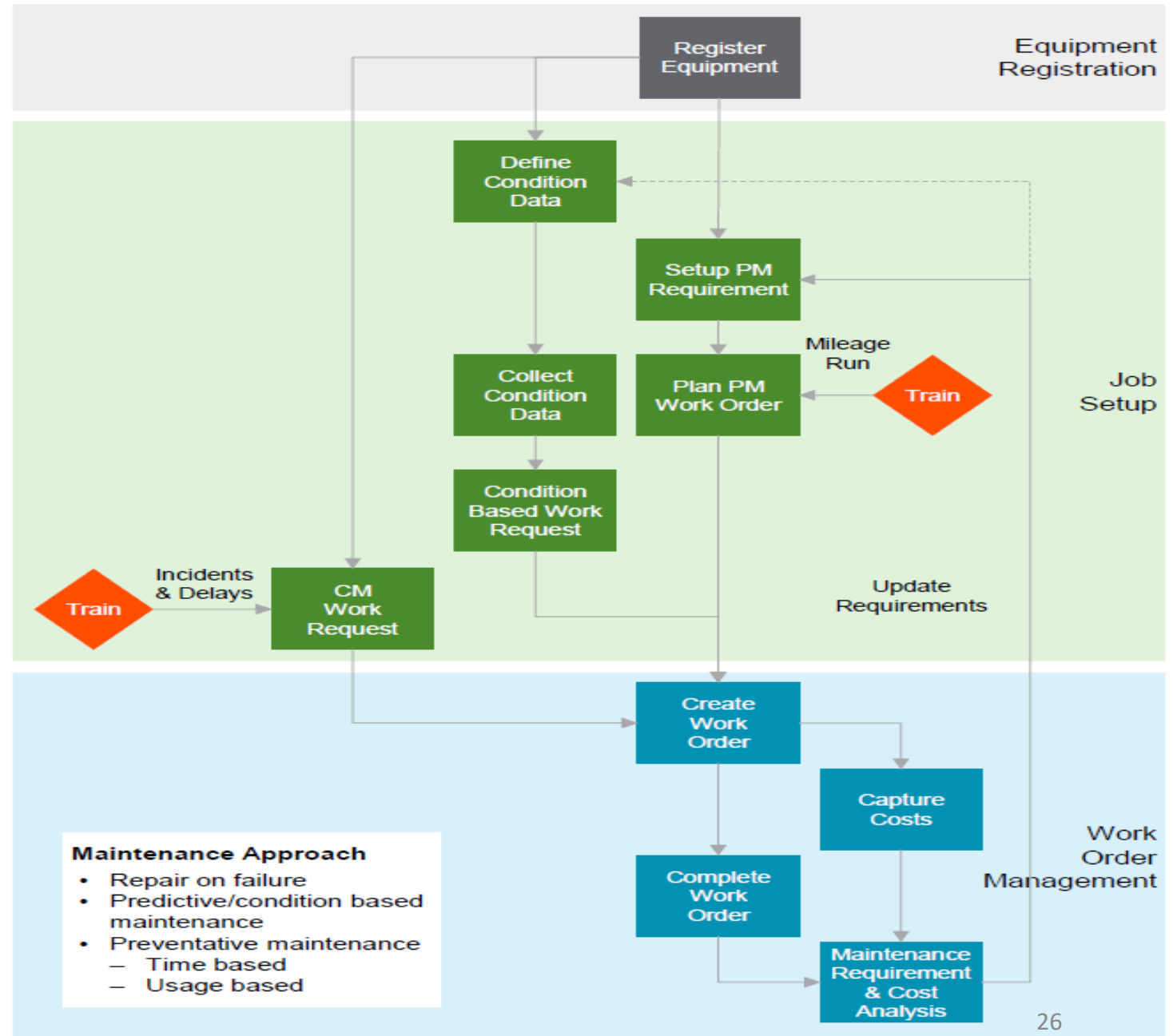
Maintenance Works Management

RailAssure is built on proven asset management practices. It guarantees that the right data is captured and processed in the right way at the right time.

Users will benefit from additional functionality including:

- *Railway-specific templates and powerful functions to optimize data capturing efficiency and data quality*
- *Unlike typical enterprise resource portals with broad and generic data fields*
- *RailAssure users are required to enter specific data fields according to defined business rules and equipment characteristics.*
- *Capture of operating statistics i.e., car-km run, incidents record including attribution system, delay incurred, and capture of fault, cause, and history.*
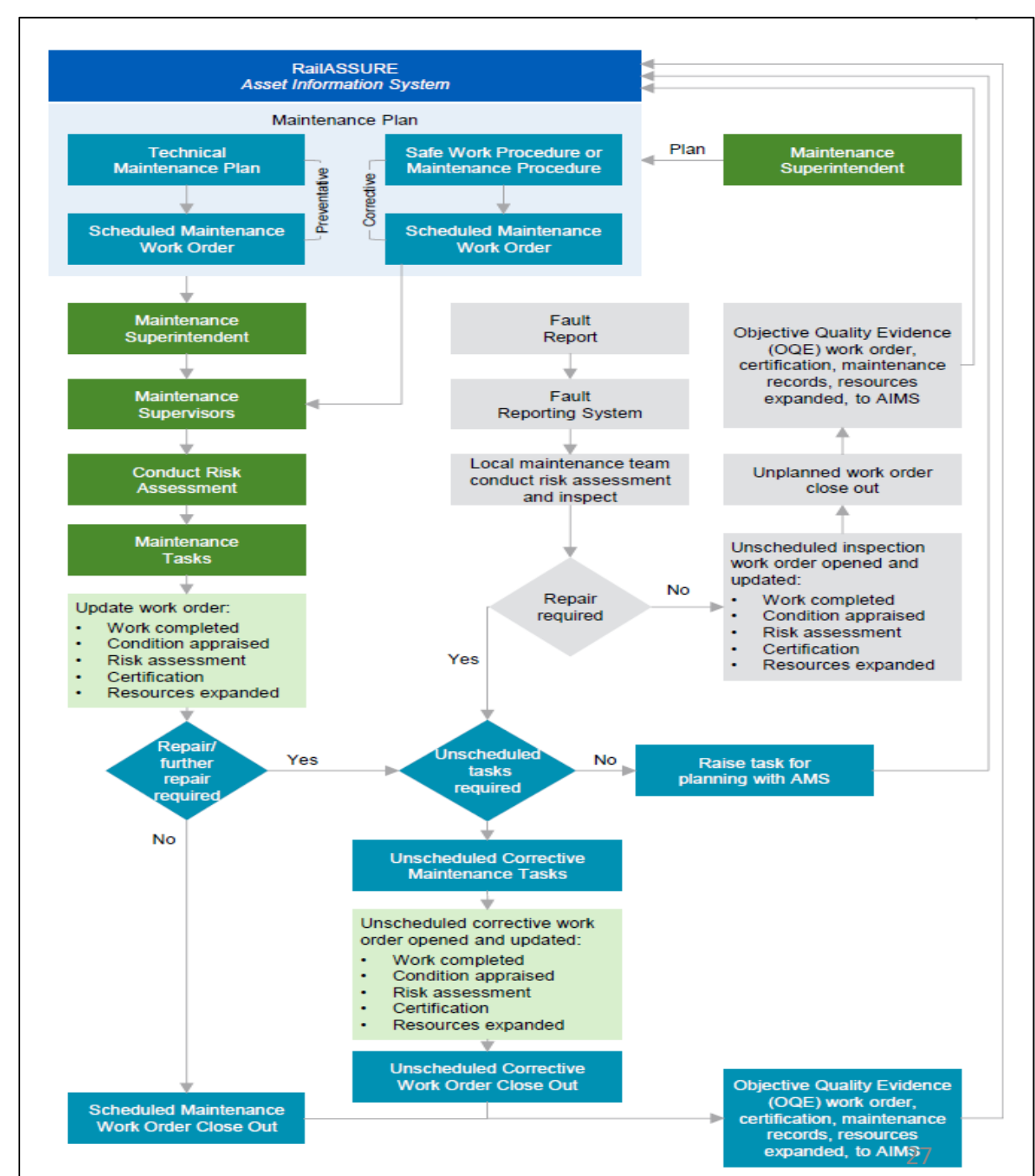
Maintenance Scheduling

- *Maintenance planning is the most critical function for achieving and sustaining high service, safety, and reliability standards. RailAssure is a powerful tool for scheduled maintenance planning. It provides planners with rich, dynamic, and rail-specific features to optimize maintenance resources. The system has a comprehensive scheduling capability i.e., time basis, statistical data basis, or both, with powerful scheduling pattern, maintenance opportunities and job associated/linking functions.*
维护计划是实现并维持高服务、安全和可靠性标准的最关键功能。RailAssure 是一款强大的定期维护计划工具。它为规划人员提供丰富、动态且针对铁路的特定功能，以优化维护资源。该系统具有全面的调度功能，例如基于时间、基于统计数据或两者兼而有之，并具有强大的调度模式、维护机会以及作业关联/链接功能。

- *For short term resource planning, the planner can consider planned preventive jobs, corrective jobs and other engineering works in a single workbench as well as considering manpower, material requirements, job dependencies and opportunities.*
对于短期资源规划，规划人员可以在单个工作台中考虑计划中的预防性作业、纠正性作业和其他工程工作，同时考虑人力、物料需求、作业依赖性和机会。

Maintenance Scheduling

- *For longer term planning, planners can tabulate the maintenance jobs and resources required for five years ahead, linking to the maintenance-oriented budget module to optimize maintenance resources.*
对于长期规划，规划人员可以列出未来五年所需的维护工作和资源，并与面向维护的预算模块关联，以优化维护资源。

- *Scheduled maintenance can be based on time or usage such as km run for trains. The scheduled maintenance cycle and pattern can be set up in RailAssure for scheduling and issue of Work Orders to the relevant maintenance section.*
允许用户跟踪单个设备和资产的移动/安装/拆卸情况。例如，对于列车，可以从列车自动运行系统接入运行里程。可以设置整列列车或单个车厢的读数。

- *RailAssure allows users to keep track of the movement/fitment/de-fitment of individual pieces of equipment and assets. For example, for trains, the km run can be interfaced from the automatic train operations system. The readings can be set for usage for the complete train or by individual car.*
RailAssure 允许用户跟踪单个设备的移动/安装/拆卸情况。例如，对于列车，可以从列车自动运行系统接入运行里程。可以设置整列列车或单个车厢的读数。

Condition Based Maintenance

❑ *RailAssure Condition Based Maintenance (CBM) provides an online function to maintain records of the measurement item. Users can create, update, delete, search, and find the measurement item.* RailAssure 基于状态的维护 (CBM) 提供在线功能，用于维护测量项目的记录。用户可以创建、更新、删除、搜索和查找测量项目。

❑ *A Measurement Plan will be set up for the relevant Equipment/Assets and Measurement Item to be recorded. The functionality allows users to link the Measurement Plan to equipment, equipment class, standard job, and location. Alert levels can also be set up and updated.* 系统将为待记录的相关设备/资产和测量项目制定测量计划。该功能允许用户将测量计划与设备、设备类别、标准作业和位置关联。用户还可以设置和更新警报级别。

❑ *When an alert level has been reached, uploaded condition data can be viewed, an order created, and measurements downloaded for analysis. Examples of CBM application include wheel flat, wheel dimensions since wheel turning, civil structure defects etc.* 达到警报级别后，可以查看已上传的状态数据、创建订单并下载测量数据进行分析。CBM 应用的示例包括车轮扁平、车轮转动后的车轮尺寸、土木结构缺陷等

What is an SAP CMMS system? | On Device Solutions - YouTube

(937) Maximo Enterprise Asset Management - YouTube

IBM Maximo Asset Management | Core Product Overview 2024 | Tom Mahon Ex-IBM Pt. 2 (youtube.com)

(2881) An Introduction to IBM Maximo as Maintenance Management System - MACS Webinar - YouTube

IBM Maximo General Demonstration

CMMS Software Packages in the Market
市场上的 CMMS 软件

CMMS Market

❑ *There is good competition in the market for the supply of off the shelf Enterprise Asset Management System and software packages.* 市场上现成的企业资产管理系统 (EAM) 和软件包的供应竞争非常激烈。

❑ *It is important to note that substantial customization and process reengineering works always come along with the launching of an EAM system. Therefore, the business of these suppliers is always a combination of the supply of software packages as a vendor and supporting the clients as a consultant on the launching of the EAM system.* 值得注意的是，EAM 系统的上线通常伴随着大量的定制化和流程重组工作。因此，这些供应商的业务始终是作为供应商提供软件包，并作为顾问为客户提供 EAM 系统上线支持。

❑ *Available in the market are also qualified consultant organizations providing supporting service to clients on the launching of EAM system.* 市场上也有一些合格的咨询机构为客户提供 EAM 系统上线支持服务

❑ *Flexibility of the software packages built in by the vendors allows the clients to launch the system in the form of CMMS, EAM or IAM, depending on the existing IT infrastructure and strategy of the clients.* 供应商内置的软件包灵活性使得客户可以根据现有的 IT 基础设施和战略，选择以 CMMS、EAM 或 IAM 的形式上线系统。

❑ *Some of the vendors are also capable of supporting more advanced maintenance analytics through the EAM/IAM systems which they provide.* 一些供应商还能够通过其提供的 EAM/IAM 系统支持更高级的维护分析。

IBM Maximo- Core Functional Modules

IBM maximo®

Asset Management

Service Management

Work Management

Maximo Asset Management

Procurement Management

Contract Management

Materials Management

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Asset Management

*The Assets management module tracks and manages asset and location data throughout the asset life cycle:*设备管理模块可在整个资产生命周期内跟踪和管理资产和位置数据：

o *Track asset detail - including location, work, cost and other attributes and their histories - over time to help maximize productivity and extend asset life*跟踪设备详细信息（包括位置、工作、成本和其他属性及其历史记录），以最大程度地提高生产力并延长设备寿命。

o *Establish location and asset hierarchies to roll up costs across systems, subsystems, departments, and locations, enabling a better understanding of the true cost of assets.* 建立位置和设备层次结构，以汇总跨系统、子系统、部门和位置的成本，从而更好地了解资产的真实成本。

o *Monitor asset and location conditions to enable proactive - rather than reactive - maintenance that helps reduce unplanned downtime.* 监控设备和位置状况，以实现主动维护（而非被动维护），从而有助于减少计划外停机。支持传统设备和线性设备。

o *Support both conventional and linear assets.*支持传统设备和线性设备。

Work Management

*Manage both planned and unplanned maintenance activities, from initial work request and work order generation through completion and recording of actuals. Work planners can match job tasks to available resources, estimate and obtain approval of costs, establish priorities, and initiate maintenance activities across the enterprise. Work management supports your business goals by providing the following functions:*管理计划内和计划外的维护活动，从初始工作请求和工单生成，到实际完成情况和记录。工作规划人员可以将工作任务与可用资源进行匹配，估算成本并获得批准，确定优先级，并在整个企业范围内启动维护活动。工作管理通过提供以下功能来支持您的业务目标：

o *Tracking tools enable more detailed analysis of resources, inventory, and equipment use and costs, helping decrease labor and materials costs.*
跟踪工具可以更详细地分析资源、库存和设备的使用情况和成本，有助于降低劳动力和材料成本。

Work Management

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o ***Multiple assets, locations, and configuration items are allowed per work order or ticket. Work management also supports work order tracking, task sequencing, attaching documents at the task level, and generating work orders from asset information.*** 每个工单或工单允许多个设备、位置和配置项。工作管理还支持工单跟踪、任务排序、在任务级别附加文档以及根据资产信息生成工单减少计划外停机和被动维护。

o ***A graphical assignment manager helps optimize maintenance schedules and labor use by assigning the right person with the right skills to the right job.*** 图形化的任务分配管理器通过将合适的人员和技能分配到合适的工作，帮助优化维护计划和劳动力使用.

o ***Preventive maintenance (PM) functionality enables you to put PM schedules in place with the right job steps and resource requirements, facilitating planning as well as work, to help reduce unplanned downtime and reactive maintenance.*** 预防性维护 (PM) 功能使您能够根据正确的工作步骤和资源需求制定预防性维护计划，从而简化计划和工作，并帮助减少计划外停机和被动维护。

Work Management

o *Newly developed work management tools enable job plan hierarchies, automated workflow processes, enhanced status control, and support for linear assets.* 新开发的工作管理工具支持作业计划层级结构、自动化工作流程、增强的状态控制以及对线性设备的支持份合同中获得最大价值。

o *Contract correlation links SLAs to vendor contracts, helping you identify unreliable vendors as well as low-quality products. It also enables user to reference service-level agreement (SLA) performance metrics when renegotiating vendor terms.* 合同关联功能将服务等级协议 (SLA) 与供应商合同关联起来，帮助您识别不可靠的供应商以及低质量产品。

o *A terms and conditions library enables you to more consistently apply standardized policies across the organization*条款和条件库使您能够在整个组织内更一致地应用标准化政策。自动通知和警报功能可帮助您满足供应商条款、避免处罚并从每份合同中获得最大价值。

o *Automatic notifications and alerts help you meet vendor terms, avoid penalties, and get the most value out of every contract.*自动通知和警报功能可帮助您满足供应商条款、避免处罚并从每份合同中获得最大价值。

Field Service Management with Mobile Devices

- *Through the extensive use of smart phones and iPads, mobile applications have become a vital part of CMMS for the management and coordination of field maintenance works for railway assets.* 随着智能手机和iPad的广泛应用，移动应用程序已成为铁路设备维护管理系统（CMMS）的重要组成部分，

- *Mobile devices help to automate asset maintenance processes in the field, including preventive maintenance, corrective maintenance, and data capture activities* 移动设备有助于实现现场资产维护流程的自动化，包括预防性维护、纠正性维护和数据采集活动.

- *The mobile solutions enable data access and data entry anywhere, avoiding errors arising from outdated information, and speeding up the maintenance process.* 移动解决方案支持随时随地查询和输入数据，避免因信息过时而导致的错误，并加快维护流程。

- *IBM Maximo Mobile*

- *Hitachi Ellipse Mobile*

Field Services Management

- ## *Asset inspections*

  Using custom forms with dynamic fields to guide a mobile user through the assessment process, technicians see only the fields that are relevant to the equipment being serviced. This allows the technicians to control the inspection whilst eliminating paper-based data capture and the errors. 使用带有动态字段的自定义表单引导移动用户完成评估流程，技术人员只会看到与正在维修的设备相关的字段。这使得技术人员能够掌控检查过程，同时避免纸质数据采集和错误。

- ## *Inspection compliance*

  By requiring all mobile users to follow the same electronic workflow (script), managers are assured that inspections are being conducted correctly every time, regardless of who does the work. This improves compliance rates and allows managers to focus on operations rather than on rework and data audits. 通过要求所有移动用户遵循相同的电子工作流程（脚本），管理人员可以确保无论由谁执行检查，每次检查都能正确进行。这不仅提高了合规率，还使管理人员能够专注于操作，而不是返工和数据审核。

- ## *Maintenance and repair*

  The application supports a variety of scenarios, such as creating work requests from the field to address issues identified during routine maintenance and capturing GPS data for an asset in the field to facilitate locating the asset. The ability to manage inspections, maintenance and repair through a single application eliminates the need for multiple applications, which drives operational efficiency and cost savings. 该应用程序支持多种场景，例如在现场创建工作请求以解决日常维护过程中发现的问题，以及捕获现场资产的 GPS 数据以方便定位资产。通过单个应用程序即可管理检查、维护和维修，无需使用多个应用程序，从而提高运营效率并节省成本。

Field Services Management

- *Dispatch*

- *View live asset locations and dispatching routing* 查看实时资产位置和调度路线
- *Filter or sort based on technician attributes* 根据技术人员属性进行筛选或排序
- *Have the system automatically display the most appropriate technicians for a job based on their status, skills, and* 系统会根据技术人员的状态、技能和位置自动显示最适合该工作的技术人员 通过移动设备分配工作
- *Assign work through the mobile device* 通过移动设备分配工作

- *Outage management*

    The FSM enables maintainers to respond quickly to system outages. Integrated to Network Manager ADMS, the field service management system can receive work orders directly from the outage management system when faults are detected. Based on the severity of the fault, work orders are resourced and workers quickly dispatched to restore the network. Seamless integration between the systems ensures that real-time information is available to key stakeholders about the expected restoration time and effort required to return the network to normal operations. FSM 使维护人员能够快速响应系统故障。现场服务管理系统 (FSM) 与 Network Manager ADMS 集成，可在检测到故障时直接从故障管理系统接收工单。根据故障严重程度，系统会根据工单资源分配情况，并快速派遣工作人员恢复网络。系统之间的无缝集成确保关键利益相关者能够实时获取有关网络恢复正常运行所需预计恢复时间和工作量的信息
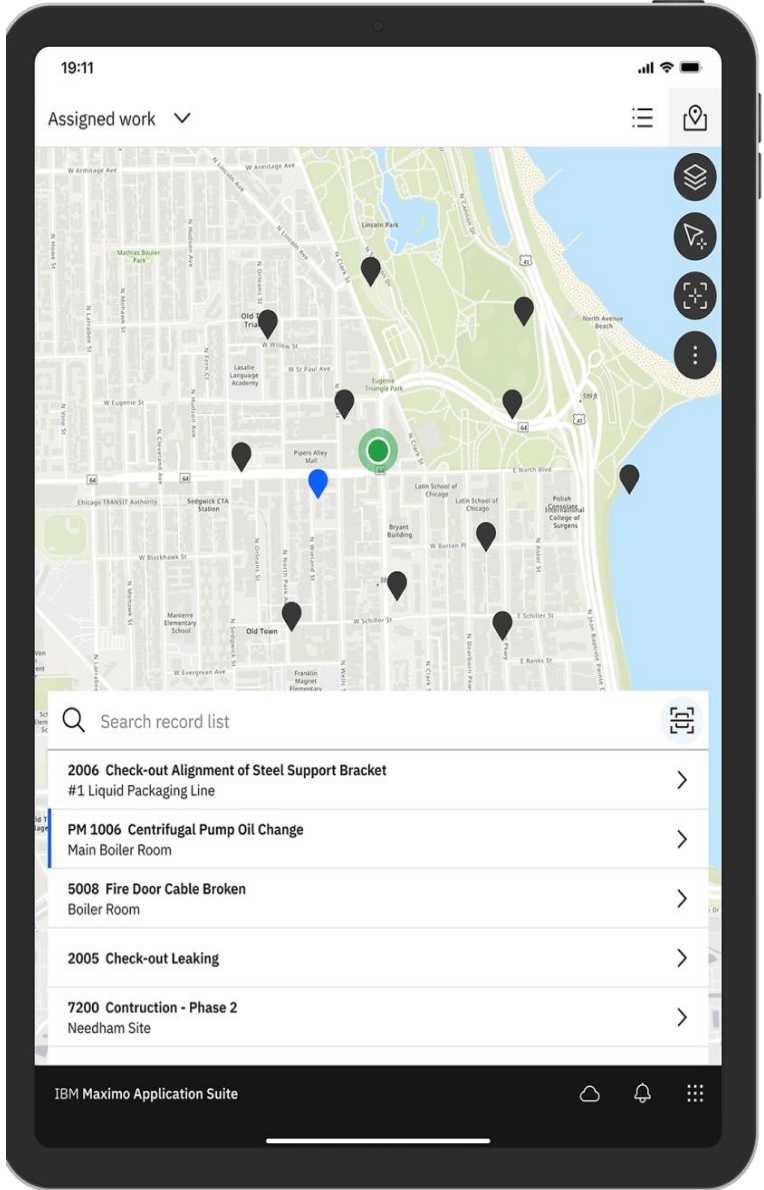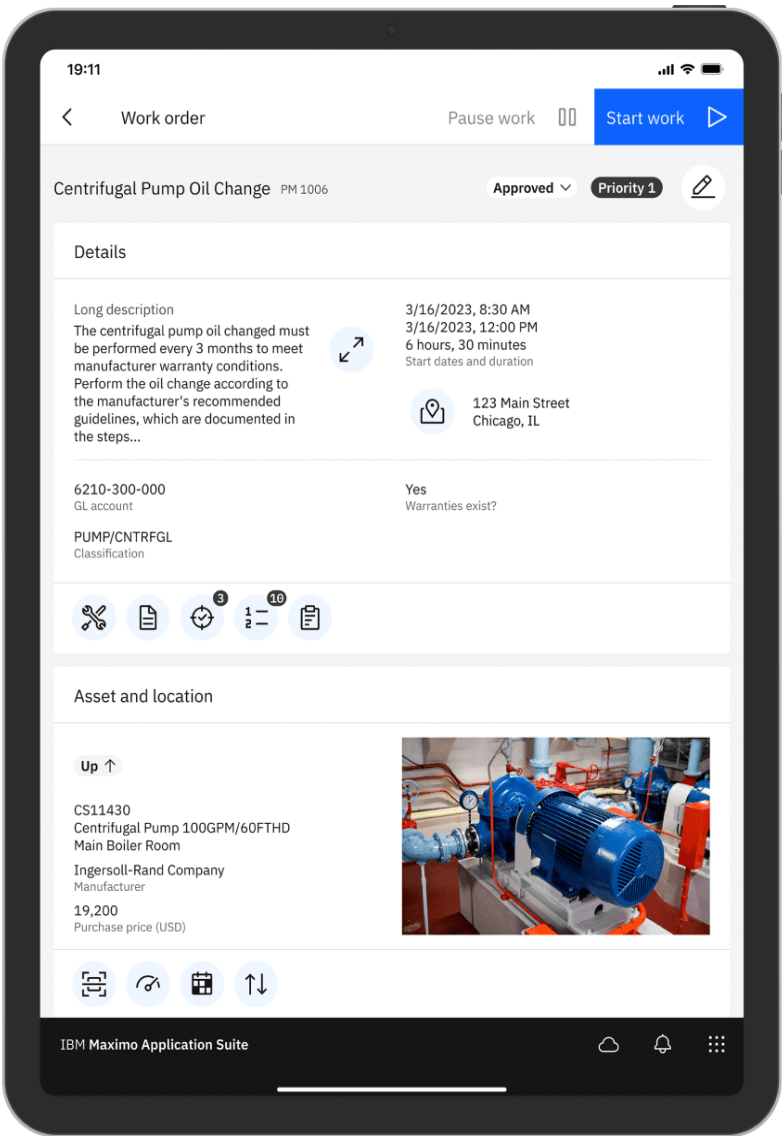
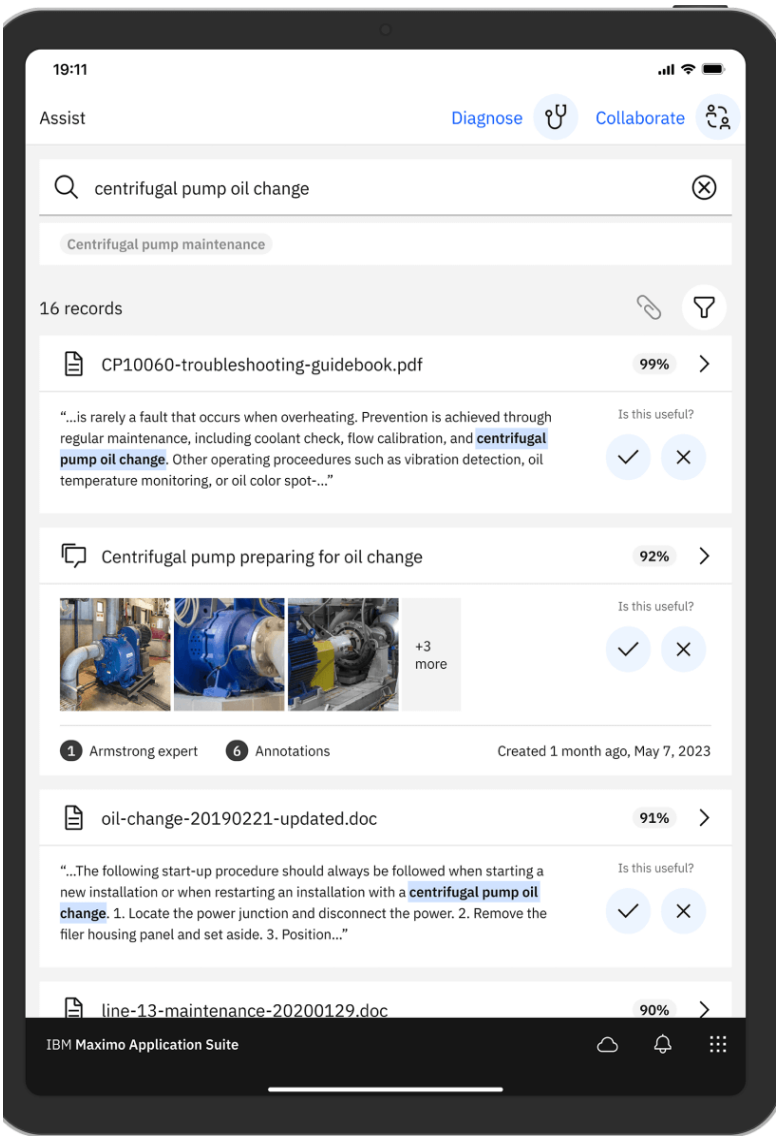# IBM Maximo Mobile Work Order Process
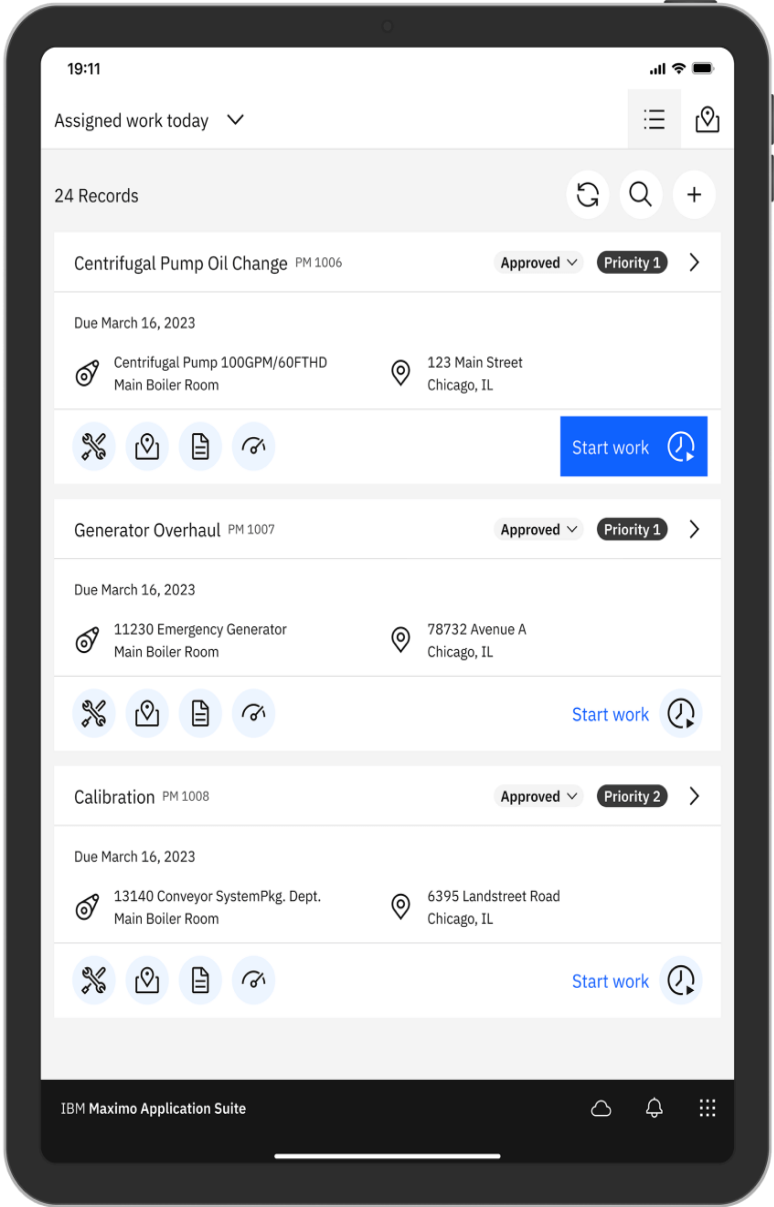
IBM Maximo Mobile Work Order Process

Complete the Work Order

Get Expert Advice if needed

IBM Maximo Mobile – Sign Off Work Order